QUALITY INDICATORS IN CRITICALLY ILL PATIENTS

UPDATE 2011

SOCIEDAD ESPAÑOLA DE MEDICINA INTENSIVA, CRÍTICA Y UNIDADES CORONARIAS

SEMICYUC
LOS PROFESIONALES DEL ENFERMO CRÍTICO

This version of the Quality Indicators in Critically Ill Patients has been elaborated by updating the Indicators published by the SEMICYUC in 2005, avalilable http://www.semicyuc.org/temas/calidad/indicadores-de-calidad.

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PROLOGUE

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Since well before the publication of the first version of the Indicators in 2005, critical care professionals have continually strived to evaluate our results to improve the quality of care. Sometimes our efforts have taken the form of local or individual initiatives, other times they have taken the form of larger projects undertaken or coordinated by our scientific society. Through its multidisciplinary Steering Committees and Work Groups, the Spanish Society of Critical Care Medicine and Coronary Units (SEMICYUC) has led the way in the development of policies to ensure the quality and safety of care for critical patients, concentrating on specific activities in research and training in close collaboration with the Ministry of Health, Social Policy, and Equality. Along these lines, the first version of the SEMICYUC's *Quality Indicators in Critically Ill Patients* was elaborated in 2005 by our scientific societies' work groups, coordinated by the Work Group for Planning, Organization, and Management in close collaboration with and with the methodological support of the Instituto Universitario Avedis Donabedian, a renowned center with extensive experience in improving quality and safety. This excellent collaborative project resulted in the development of 120 quality indicators that have become a reference for many professionals. These indicators have been implemented in many critical care departments in our country and are being incorporated into the information systems that are progressively being employed in our environment.

The 2005 version of the SEMICYUC's *Quality Indicators in Critically Ill Patients* is document has been referenced by different scientific societies and included in various web pages like those of the European Society of Intensive Care Medicine and the government of Chile's "Observatory of Good Practices in Health". On the other hand, the Indian Society of Critical Care Medicine, the German Society for Anaesthesiology and Intensive Care Medicine, and the German Interdisciplinary Association of Intensive Care and Emergency Medicine have used the methods developed by our society to develop their own quality indicators for critical care patients.

The current *Quality Indicators in Critically Ill Patients* is the result of the review undertaken during 2009-2010 to update the first version, using the same methodology as in the first version. During these two years, each work group evaluated the contents of all the sections of each of the indicators related to their area of interest, incorporating the latest scientific evidence and bringing the standards recommended up to date. Likewise, the bibliographical citations have been updated to enable the most relevant references for each indicator to be incorporated. Experts decided whether each proposed indicator continued to be valid, whether it needed to be modified, or whether it should be eliminated. Moreover, the evaluation made it possible to identify new indicators that deserved to be included in the updated version, and the definitive indicators were selected on the basis of their reliability, validity, specificity, sensitivity, and relevance.

Recently, the American Health Services Research Analyst agency has expressed their interest in reaching an agreement with the SEMICYUC to allow the National Quality Measures Clearinghouse (NQMC) to implement this updated version of the *Quality Indicators in Critically Ill Patients* in clinical practice.

This important project would not have been possible without the collaboration of the intensivists that make up the SEMICYUC's work groups and of the nurses from the Spanish Society of Intensive Care and Coronary Unit Nurses (SEEIUC). We thank all these professionals for their selfless contributions and the Fundación Avedis Donabedian for the support this institution provided in this project.

I would also like to thank the coordinators of this project, Dr. Jesús Blanco, Dr. Lluís Cabré, Dr. Pedro Galdos, and Dr. Federico Gordo, for their ceaseless efforts.

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Once again, Dr. Mari Cruz Martin has been the undisputable champion of this project. Her enthusiasm, interest, and leadership have ensured the success of this project. Thanks to her efforts, the SEMICYUC can offer critical patients the care that they need, guaranteeing the highest quality and safety possible. Thank you, Dr. Martin.

C. León.
President of the SEMICYUC

Madrid, May 2011

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PREFACE

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The aim of intensive care medicine is to provide critical patients with the healthcare that they need, ensuring the quality and safety of care. Intensive care medicine is one of the principal components of modern healthcare systems. There is an increasing demand for this resource, which involves high costs.

The quality of care has gradually come to be the central focus of healthcare, and in recent years patient safety has come to represent one of the key aspects of quality. In the case of intensive care medicine, this interest in quality is even more evident, not only because of its social and economic impact, but also because some of the dimensions involved in the quality of care of critical patients take on greater importance: critical patients are more vulnerable, access to critical care is more limited so efforts to distribute resources equitably are more important, scant scientific evidence is available, and the efficiency is limited.

The quality of care can be defined as the degree to which the services provided to an individual and to a population increase the probability of obtaining a desirable outcome that is coherent with the current knowledge of the profession. Or, to put it more simply, the evaluation of quality reflects the discordance between the results that should be achieved and those that are achieved. Quality healthcare guarantees safe, appropriate, effective, efficient, accessible, and fair patient-centered care.1 Although the final aim of medicine is to cover patients' medical needs, the expectations of the family or of the patient's significant others, of the professionals, of the institutions, and of the society in general should also be taken into consideration.

Since 1978, intensive medicine has been a recognized medical specialty in Spain, and this has helped improve the care of critical patients. During the intervening years, important changes in the management of these patients have taken place, not the least of which include the incorporation of scientific and technological advances, especially for monitoring and for the support of organ dysfunction. While these developments have undoubtedly improved the effectiveness of intensive care, they have also increased the risks involved. To paraphrase Chantler, medicine has gone from being simple, not very effective, and relatively safe, to being complex, effective, and potentially dangerous.2 Intensive medicine is the epitome of this transformation. The challenge in the coming years is to integrate the other quality dimensions with effectiveness in intensive medicine, and in cases where safety enters in conflict with another dimension, ensuring safety should take priority to fulfill the Hippocratic aphorism "first, do no harm".

Until recently, measuring quality was not considered a priority in healthcare systems. Reliable information that would enable a process to be evaluated is often unavailable, and when it is available, managers, and especially healthcare professionals, may not have access to it. This makes it difficult to monitor quality and safety effectively, to answer the question "How often do patients receive the appropriate care?", or to check whether certain initiatives to improve the quality of care have been effective. Monitoring systems make it possible to use quality indicators to measure and evaluate aspects relevant to care on a planned, regular basis; in this scheme, quality indicators are the basic unit in the

[1] Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st Century. Washington, DC: National Academy Press; 2001.

[2] Chantler C. The role and education of doctors in the delivery of health care. Lancet. 1999;3;353:1178-81

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control system. Quality indicators are instruments of measurement that identify the presence of a phenomenon or event and its intensity; thus, quality indicators need to be reliable, objective, acceptable, relevant, and grounded in evidence. The objective of monitoring is to identify problems or situations that can be potentially improved or deviations from standard practice; indicators act as alarms, warning us about possible anomalies.

In 2005, with the methodological support of the Fundación Avedis Donabedian, the SEMICYUC elaborated 120 quality indicators for critical patients, 20 of which were considered fundamental and applicable in all critical care departments.[3] These indicators have been disseminated to many ICUs in Spain and have been incorporated in one way or another into practice. In 2008, the SEMICYUC's Work Group on Management carried out a study to monitor adherence to five fundamental indicators in 80 ICUs over a three-month period. This study found that, although adherence with the indicators was high in a high percentage of ICUs, there were still opportunities for improvement in some ICUs. [4]

The 2005 version of the Quality Indicators in Critically Ill Patients was translated into English and published in the European Society of Intensive Care Medicine's web page. This publication has also served as a reference for other international scientific societies.[5, 6] The SEMICYUC is currently collaborating in the "Safety Task Force" project, which aims to define indicators in consensus that, together with other tools, will make it possible to evaluate quality and safety in European ICUs.

As was stated in the first edition, the quality indicators need to be reviewed and revised periodically as the healthcare practice changes and scientific evidence accumulates. In the present, 2011 version, we have aimed to update the indicators, using methods similar to those used in the first edition, in which many professionals collaborated through the SEMICYUC's work groups. The thorough review of the scientific evidence and the contributions of experts in the different areas of care have resulted in the development of 120 quality indicators. In light of new scientific evidence, many of the original quality indicators have been updated, a few have been eliminated, and new ones have been incorporated in the current version.

As a final consideration, computerized systems to make it easier to monitor the indicators and to incorporate them into information systems in ICUs represent a line of work to be developed in the near future.

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[4] Martín MC, Merino P, Cabré L, Ruiz et al. "Monitoring Quality Indicators in Critical Patients" Project Group. Monitoring quality indicators in critical patients. Abstract. Intensive Care Med 2007; 33: S117

[5] Braun JP, Bause H, Bloos F, Geldner G, Kastrup M, Kuhlen R, et al; NeQuI (Quality Network in Intensive Care Medicine). Ger Med Sci 2010;8:Doc23, doi: 10.3205/000112.

[6] Ray B, Samaddar DP, Todi SK, Ramakrishnan N, John G, Ramasubban S. Quality indicators for ICU: ISCCM guidelines for ICUs in India. Indian J Crit Care Med 2009;13:173–206.

We hope that these indicators will be a useful tool for all the professionals in all critical care departments where the quality of care of is considered essential.

María Cruz Martín
Scientific Coordination Update Quality Indicators in critically ill patients 2011

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INTRODUCTION

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CONCEPTS AND EVOLUTION OF QUALITY IMPROVEMENT

The improvement of the quality of healthcare has been a major concern for healthcare professionals for many years, if not from the inception of the medical professional itself. We have long strived for excellence, albeit not always through specific and recognized methodologies.

The development of instruments that enable quality to be measured has been essential in the transformation of this concern into a way of working. Once it became possible to measure (evaluate), the focus shifted from quality control to quality assurance. Later, from the 1990s, we have progressed toward total quality systems.

Nevertheless, this evolution has not always followed a precise chronological order; rather different phases have overlapped and coincided. As in many other areas, when we discuss quality of care we must bear in mind that classification is useful in that it helps us to situate ourselves at a theoretical level and to understand the order of events, although they do not always precisely describe a fact or real situation.

As the concept of health itself has evolved, the focus has shifted from the most basic approaches grounded in the individual relationship between the physician and the patient to more general approaches that include not only the totality of services provided by healthcare professionals but that have also incorporated care of the entire community and by extension the concepts of efficiency and equity in the distribution of healthcare resources and the ethics of decision making.

The first documented events in the history of the assessment of the quality of care date to the second half of the 19th century, when **Florence Nightingale** studied the mortality rates of military hospitals during the Crimean war.

Another forerunner in this field was **Ernest Codman**, cofounder of the American College of Surgeons, who developed a method that allowed the outcomes of surgical intervention to be measured and classified in 1912 in the United States.

Another well-known reference is the definition of the "**Minimum Standard**" by the American College of Surgeons in 1918, which specified the minimum standards that hospitals needed to fulfill and laid the foundation for the system of accreditation in the United States.

Another noteworthy event was the creation of the **Joint Commission on the Accreditation of Hospitals (JCAH)** in 1951. Comprised of a consortium of American professional colleges, the JCAH first undertook to accredit those hospitals that voluntarily applied for accreditation and met pre-established standards of quality. Throughout its evolution, the JCAH has promoted the development of different methodologies in the area of quality and have extended their scope to include other types of healthcare centers; for this reason, the organization changed its name and is currently called the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).

One important development in methodology in the 1950s was the formulation of the **medical audit**, a new method for evaluating quality, by Paul Lembcke of Johns Hopkins University School of Medicine. Lembcke, deeply concerned about the variability in outcomes observed in his daily practice, established what would lead to **explicit criteria** to enable

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comparison among centers and professionals and a systematic approach to data collection that included verification and study design.

Later, the establishment of MEDICARE and MEDICAID, federal programs to provide healthcare to the elderly and economically disadvantaged, in 1965 and 1966 and the stipulation that only hospitals with JCAHO accreditation would be recognized by these programs, represented another step forward.

The work done by J. Williamson in the 1970s also deserves mention. Williamson introduced a new methodology based on the concept of "achievable benefit not achieved" (ABNA), which measures the difference between the standards of diagnosis and treatment considered desirable and that actually achieved, measured both through review of clinical histories as well as reviewing patients' conditions and through questionnaires in which patients themselves report their condition. Williamson carried out part of his work in primary care (hypertension, etc.), establishing the "desirable results" of care and placing special emphasis on the improvement of the quality obtained after it was evaluated. This marked the beginning of the stage of **quality assurance**, after the earlier stage that was more focused on evaluation than on improvement.

However, R. Brook is without a doubt one of the authors that has had the greatest impact on the change in perspective toward quality assurance. Brook established long-term follow-up of patients and showed the low correlation between the healthcare process and outcomes. Brook's studies led to the development of methods to establish the appropriateness of procedures, one of the most interesting contributions, as they brought about the hypothesis that enabled variability to be explained (payment systems, training of professionals, etc.) and the way to approach this variability from the viewpoint of studies on quality.

This brief historical review would not be complete without mentioning **Professor Avedis Donabedian**, who has undertaken numerous studies and helped to rethink the concepts of quality in healthcare -- from the classification of methods of quality assessment in structure, process and outcome in 1966 to reflection about the impact of the industrial model of quality on the healthcare model in 1992. His contributions, both theoretical and practical, have been invaluable for those professionals working to improve the quality of care.

Like Donabedian, Heather Palmer has been instrumental in defining the **dimensions of quality** that have had a decisive influence on the conceptualization of this discipline.

PRACTICAL EXPERIENCES

The practical application of theoretical formulations on quality in healthcare has taken place in many countries around the world. Apart from the United States, noteworthy experiences have taken place in Canada, Australia, the Netherlands, the United Kingdom, Portugal, Italy, France, Mexico, Argentina…and also here in Spain.

The Spanish experience begins in 1982 with the implementation of the first Quality Program in the Hospital de la Santa Creu i Sant Pau in Barcelona, although some important initiatives had preceded this on less systematic, smaller scale.

From this first experience, the subject of quality was progressively introduced in other hospitals, as well as at other levels of healthcare, such as primary care, social-healthcare, and mental health.

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In Spain, two noteworthy projects are the creation of the Spanish Society for Quality in 1984 and, at the level of primary care, the development of the Programa Ibérico together with Portugal that enabled the implementation of improvement programs in over 300 centers by combining strategies for training, incentives, and follow-up.

Also noteworthy is the contribution of the Avedis Donabedian Foundation, whose basic mission since its creation in 1990 has been to collaborate with professionals and healthcare centers, public administrations, professional associations, and other public and private institutions in the healthcare sector with the aim of improving the quality of care.

The consolidation of the methodology of bioethics also represents an important advance that will influence the field of quality by redefining the criteria for good practice in many circumstances.

On the other hand, the public administrations, both of the Spanish central government with the "General Healthcare Law" of 1986 and the governments of Spain's Autonomous Communities with various laws and ordinances in their regions, have also promoted and favored the implementation of quality assessment and improvement programs throughout the different levels of healthcare.

EXPERIENCE WITH INDICATORS

During the 1980s, the JCAHO required all centers applying for accreditation to have integrated quality plans for the entire center. This requirement initially met with strong opposition, leading to the establishment of a standard that implemented the Indicator Measurement System (IMSystem) for monitoring quality of care and its methodological development.

These systems for monitoring quality are conceived as an overall evaluation of an entire department and not only of the areas in which problems might be detected. In order to apply them, the type of care performed by a particular department or center must be defined by a process of dimensioning, the main work areas need to be established, and indicators that enable them to be measured must be created. These indicators are assessed periodically and provide an overview of the quality of care in a department as well as enable action to be taken when necessary. They were applied basically to the evaluation of different specialties and less intensely at the level of entire centers.

The JCAHO started to develop a system of outcomes indicators integrated into the accreditation system, and these allowed different service providers to be compared. To this end, an ambitious project was undertaken to develop indicators and this continued through the mid-1990s.

The JCAHO's strategy along these lines had limited success due to the appearance of other systems of indicators on a nationwide level in the United States. The JCAHO currently employs their own system of indicators called ORYX, which is revised and updated periodically, with a total of 52 indicators in 2004. Other countries, especially Australia, have, through their own scientific societies, also advanced greatly in the development of outcomes indicators that allow different centers to be compared.

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In 1990, the University Hospital Consortium, comprising over 50 university hospitals located throughout the United States, developed a compendium of clinical indicators that encompassed most medical specialties, elaborated by a committee of experts and used by all members of the Consortium.

In 1991, "Monitoring with Indicators" was published by J.G. Caroll, and this influential work has since been updated several times.

In 1995 the Australian Council of Healthcare Standards introduced clinical indicators for intensive care units elaborated by the Australian and New Zealand Intensive Care Society into its assessment program.

Other experiences closer to home that have resulted from initiatives by scientific societies in Spain are:

a) 1993: Catalan Society of Family and Community Medicine with the publication of "Criteria for Quality in Primary Healthcare", which contains a list of quality indicators for different work areas of primary care.

b) 1999: The Spanish Society of Gynecologists and Obstetricians with Quality of Care Indicators for Gynecology and Obstetrics, covering all areas of these specialties.

c) 2001: Catalan Society of Emergency Medicine with the project "Emergency Departments: Indicators for Measuring the Quality of Care", financed by the Agency for the Evaluation of Medical Technology and Research and embraced by the Spanish Society of Emergency Medicine.

d) 2003: Spanish Society for Pediatric Emergencies, with the adaptation of C to the pediatric area.

e) 2003: Spanish Society for Palliative Care Medicine, with Quality Indicators for Palliative Care.

f) 2006: Development of indicators related to the process and outcome and evaluation of oncologic care

g) 2010: GEDISA's quality of care indicators for HIV/AIDS patients

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METHODOLOGY FOR THE EVALUATION AND IMPROVEMENT OF QUALITY: "MONITORING SYSTEMS"

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There are two basic approaches to the evaluation and improvement of the quality of care.

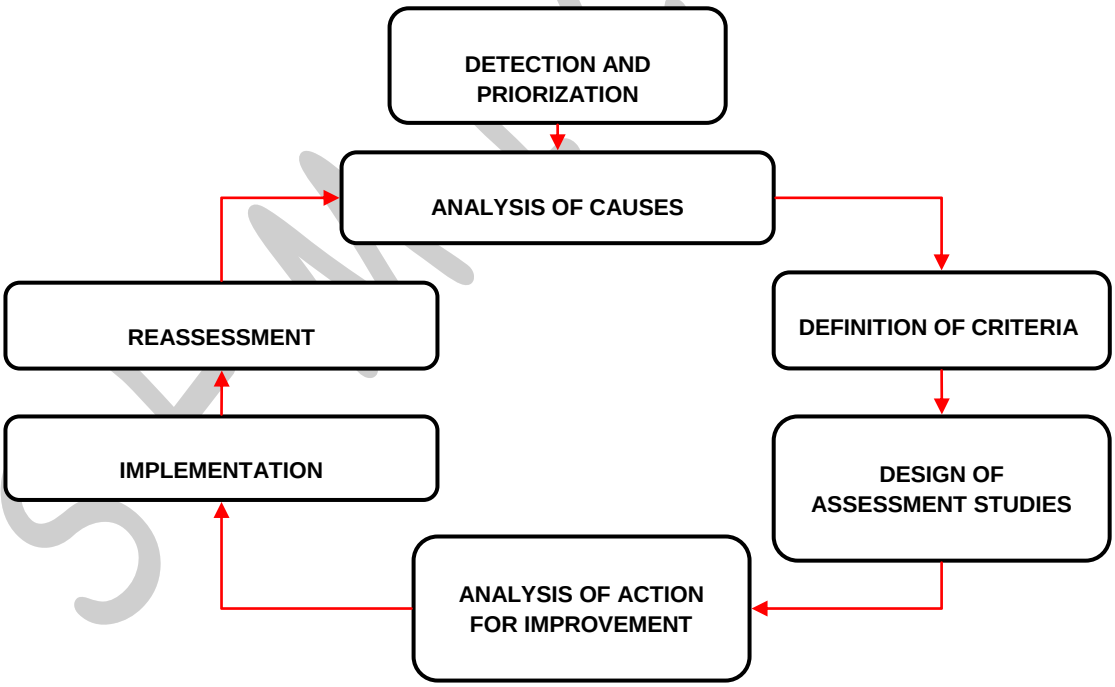
a) The so-called **"room for improvement"** model that begins with the identification of problems, followed by their analysis and proposals for improvement, conceptually based on W. Edwards Deming's cycle of evaluation and improvement, better known as PDCA (Plan, Do , Check, Act), adapted by Header Palmer (Figure 1).

b) **"Monitoring systems"**, used to detect problems and periodically evaluate performance, the fundamental element of which is the "INDICATOR".

When we work with the "room for improvement" model we try to answer the question: What could we or should we improve? On the other hand, the underlying question of the "monitoring systems" approach is: of everything that we do, what is most important and how can we assure that we are doing it well enough?

In any case, these approaches are complementary and it is common to work with both of them in parallel. Monitoring systems can be viewed as a way to seek opportunities for improvement: whenever the results of monitoring do not meet the expected standard, we detect an opportunity for improvement and enter the PDCA cycle.

Figure 1



MONITORING SYSTEMS

A monitoring system periodically measures and evaluates relevant aspects of care by means of quality indicators, which are the basic unit of a monitoring system.

Indicators are, therefore, instruments of measurement that indicate the presence of a phenomenon or event and its intensity.

A monitoring system requires that the type of care performed first be defined by the process of dimensioning, which consists of establishing the principal care areas and then elaborating the indicators that will enable the outcome of the healthcare process to be measured.

Monitoring allows us to make sure that "the basics are alright". This system is based on repeated quantitative measurements. Variations seen in successive results for an indicator cannot be interpreted directly: these variations might be random, in which case we refer to them as endogenous or systemic causes, or they might be caused by aspects related to people, professionals, organization, environment, etc., in which case we refer to them as exogenous or extrasystemic causes. The latter are what show us those aspects on which we need to work to improve the quality of care delivered.

In any case, the final objective in monitoring is to identify problems, situations that can potentially be improved, or deviations from the standard, and indicators serve to call our attention to this problem or sound an alarm to warn us of this possibility.

We could say that an indicator is a criterion for quality, albeit a very specific one, and therefore all of the conditions and characteristics recommended for the construction of criteria (acceptable, comprehensible, relevant, measurable, etc.) apply to indicators. Likewise, we speak of indicators as applying to structure, process, and outcome in function of the area of evaluation.

Given that an indicator is an instrument of measurement that is used systematically and that its result will be used in managing quality, it is essential to ensure that it reflects reality and is useful.

To this end, all indicators must comprise the following three characteristics or properties:

1. **Validity:** An indicator is valid when it fulfills the aim of identifying situations in which quality of care can be improved. We also speak of face validity as the extent to which an indicator is intelligible. Can its meaning and importance be understood without long, drawn-out explanations?

2. **Sensitivity:** When it detects ALL cases in which a real situation or problem with quality of care occurs.

3. **Specificity:** When it ONLY detects those cases in which there are problems related to quality of care.

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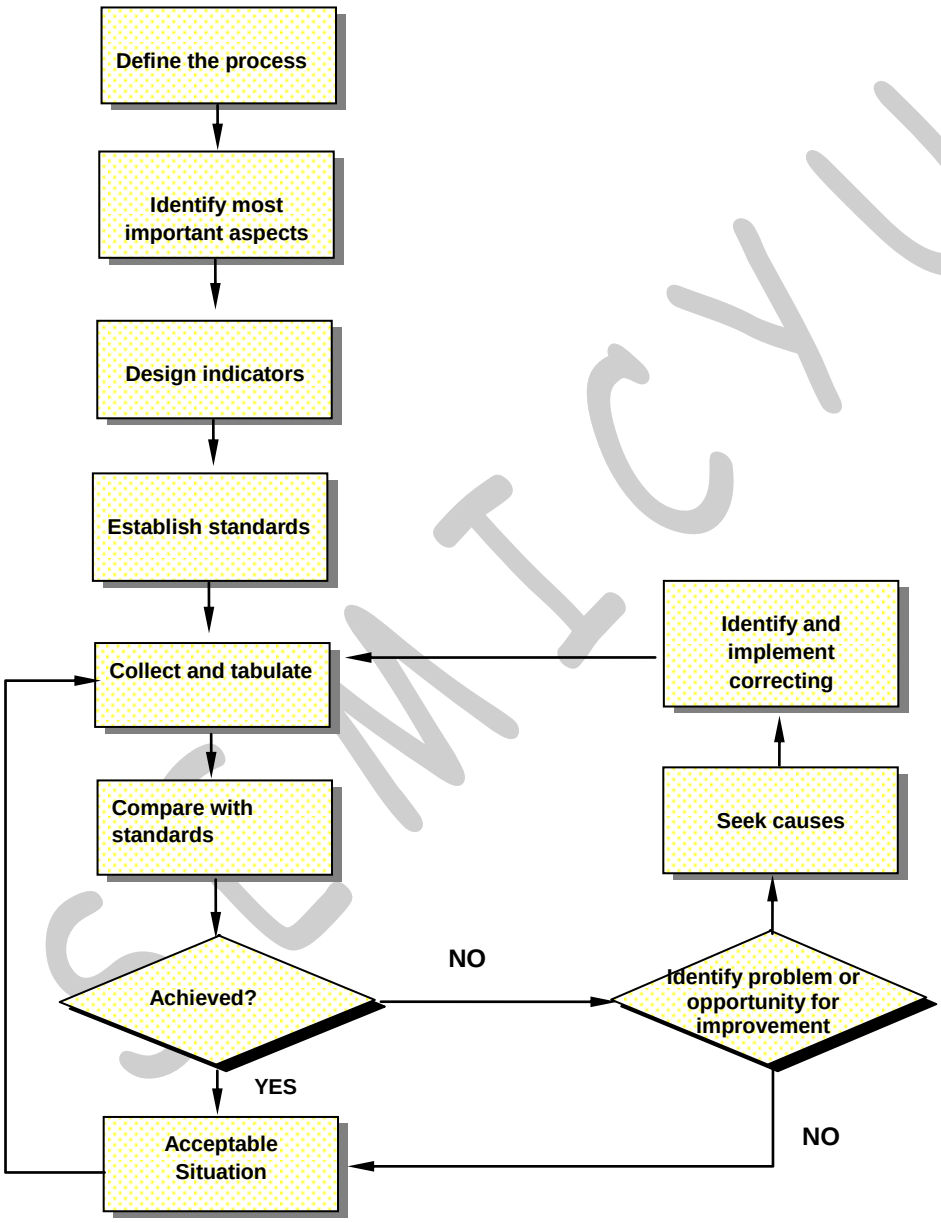
These aspects must be taken into consideration when constructing indicators. Only those with the highest level of validity, sensitivity, and specificity should be chosen.

The steps involved in designing a monitoring system are shown in figure 2.

Figure 2:



Source: Modified from "Quality Criteria in Primary Healthcare, 1993"

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DEFINE THE PROCESS. This consists of specifying the area of care to be monitored. Activities, professionals, structures, circuits, etc. involved in the process should be specified. This will guarantee that no important aspect that can be improved will be ignored. When dealing with a department it corresponds to the dimensioning phase that aims to provide a complete map of the department itself. If the starting point is the improvement cycle, the process is already defined in the improvement cycle itself.

IDENTIFY THE MOST IMPORTANT ASPECTS. This is a matter of prioritizing the most important aspects related to the previously defined process or processes. Different criteria can be used for prioritization, e.g.:

- Number of users or patients affected
- Risk for the patient involved in the process
- Activity identified as problematic

DESIGN THE INDICATORS AND ESTABLISH STANDARDS. The quality indicator is a quantitative measure used as a guide to control and evaluate the quality of the most important aspects of care. Its design should include a description of the different aspects that ensure its validity and reliability. Table 1 provides a brief description of these aspects, and a more complete definition is found in Section 4.3.

Tabla 1

SECTION	DEFINITION
Dimension	Important aspect of care assessed by the indicator
Justification	Usefulness of the indicator as a measurement of quality, related to its validity, i.e. does what we aim to measure make sense?
Formula	Mathematical expression
Explanation of terms	Definition of the terms in the formula that might be ambiguous
Population	Identification of the unit of study
Type	Structure, process, or outcome
Source of data	Origin and sequence of data obtainment
Standard	Desired level of fulfillment of the indicator
Commentaries	Includes reflections concerning validity and bibliographic references

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BEGIN SYSTEMATIC MEASUREMENT with collection and tabulation of results. The periodicity of measurement, which can vary in function of the type of event, its incidence, or the degree of interest for the organization and the accessibility of the information, should be decided on prior to beginning. Measurement normally takes place monthly or annually, and this will provide an estimation of the degree of fulfillment of the indicator.

COMPARE WITH PREVIOUSLY ESTABLISHED STANDARDS. Results should be compared with the reference standard as well as with prior measurements for this indicator. In the first case, substandard situations (i.e. when performance is below the minimum required) will be identified, and in the second case we can evaluate the evolution of the behavior of the indicator over time.

INTERPRETATION OF RESULTS. When the result of a comparison reveals a substandard situation or a worsening of results, this should be considered a call for attention or an alarm. As stated above, we must consider whether the cause is random (systemic or endogenous cause) or whether we face a problem or situation that can be improved (extrasystemic or exogenous cause), in which case it will be necessary to take action.

Sometimes the action to be taken is clear and obvious, but at other times it will be necessary to begin the steps of the cycle of evaluation again if the causes of the problem are unknown. This is the point where the monitoring system is complemented by the evaluation cycle to obtain the results expected for a quality evaluation and improvement program.

Once the causes have been identified and the actions proposed for improving quality have been implemented, systematic measurement of the indicator continues and we observe whether the desired improvements have been accomplished. In this case, we say that we have the indicator “under control” again.

SEMICYUC

QUALITY INDICATORS IN THE CRITICALLY ILL PATIENT

SEMICYUC

OBJECTIVES

The main objective of this project is to provide healthcare professionals and managers with instruments to analyze the appropriateness of care for critical patients. To this end, we have used the first edition of the document *Quality Indicators in Critically Ill Patients*, which was elaborated in 2005 by the Spanish Society of Intensive Medicine and Coronary Units (SEMICYUC) in collaboration with the Fundación Avedis Donabedian.

Specific objectives:

1. To identify aspects of clinical practice that are important for the care of critically ill patients in different healthcare contexts.
2. Based on the best available scientific evidence, to develop indicators related to structure, process, and outcome, encompassing the different dimensions that make up the concept of quality of care.
3. To select the indicators that should be considered fundamental and applied in most critical care departments, regardless of the level of complexity of their hospitals or of the specific conditions that they treat.

METHODOLOGY OF ELABORATION (2005 VERSION)

Given that the current version of the Quality Indicators in Critically Ill Patients is based on the 2005 version, we consider it necessary to describe the methods used in elaborating the first edition.

Creation of the work group. The quality indicators presented here have been elaborated by a large group of professionals belonging to the SEMICYUC; all of the Society's work groups have been represented, and the Avedis Donabedian Foundation has overseen and coordinated this project. The SEMICYUC invited these professionals to participate in the project because of their accredited knowledge and experience in specific areas of critical care. Initially, a single representative from each of the Society's work groups was recruited, but eventually many other members contributed their expertise on specific issues or were involved as consultants. Once the work group was formed and the objectives of the project defined, a training workshop was held to reach a consensus on the system of working and to ensure unity of concepts.

This project was put together in 12 successive meetings that took place over a 19- month period in which the participant's prior work performed individually was integrated and a consensus reached.

Method of working. The project was carried out according to the above-described (Section 3) methodology. Each of the Society's work groups chose those aspects that they considered to be of fundamental importance.

Each group elaborated different indicators that dealt with the distinct aspects of the process and dimension of quality. After consultation among groups in the different work sessions, a consensus was reached regarding which indicators best fulfilled the conditions of validity, sensitivity, and specificity.

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When the first draft was finished, it was submitted for review to a group of 16 critical care professionals who had not taken part in the previous process of design and who were therefore not influenced by the evaluations and opinions of the members of the work group. The different proposals were considered and discussed by the work group, who then decided whether or not to incorporate them into the definitive text. This final version was approved in April 2005 and includes a total of 120 indicators.

Of the 120 definitive indicators, the work group reached a consensus as to the twenty most important or fundamental for the specialty. The SEMICYUC considers these indicators to be essential and recommends their application in all critical care departments. These fundamental indicators are indicated in **bold type** in Section 4.4 and are shaded in the tables in Sections 5 and 6.

It is evident that this version cannot be considered definitive; like protocols, indicators must be revised and updated periodically as clinical practice and scientific evidence evolve and shed new light on relevant issues.

METHODOLOGY OF UPDATING THE INDICATORS (2011)

Once the Board of the SEMICYUC decided it was necessary to update the document *Quality Indicators in Critically Ill Patients*, they designated a group of five experts to coordinate the project. Likewise, as in the elaboration of the first edition, they considered it both interesting and necessary to involve all the SEMICYUC's work groups and those of the SEEIUC. The project was carried out over a period of 24 months, from March 2009 to March 2011.

The strategy followed to achieve the aims of the projects rests on three fundamental pillars:

1. Revision of the *Quality Indicators in Critically Ill Patients* published by the SEMICYUC in 2005.

   The Coordinating Group asked the SEMICYUC's and SEEIUC's work groups to review and revise the indicators published in 2005 on the basis of currently available scientific evidence. The work groups were encouraged to involve all their active members in the project. In the first phase, we asked that each indicator be classified as:

   a. Requiring minor changes: these were indicators that could be maintained without substantial changes apart from updating the bibliographical references
   b. Requiring major changes: these were indicators in which one or more sections needed substantial changes apart from updating the bibliographical references
   c. No longer relevant: these were indicators that should be considered for elimination
   d. New indicators should be proposed, taking into consideration the criteria of validity, sensitivity, and specificity

   Furthermore, we asked the work groups to explain the reasons behind their decisions and to give bibliographic references to support their decisions.

2. Searching for scientific evidence

Independently, the Coordinating Group thoroughly reviewed the literature for each of the indicators included in the first edition. We systematically reviewed different electronic databases, including PubMed /MEDLINE, EMBASE, and the Cochrane Library for articles published between January 2005 and March 2011. For each indicator, we used a keyword together with other terms to narrow the search. We analyzed the abstracts of all the articles found in the search and also analyzed the articles themselves when we thought they might be relevant to the objectives of the project.

The Coordinating Group's bibliographical reviews were compared to the reviews done by the different work groups.

3. Consensus among experts

After the work groups' proposals and after several electronically coordinated rounds of work between the representatives of the work groups and the Coordinating Group, the first version of the new document was elaborated.

The new document was independently evaluated by each member of the Coordinating Group, and then four meetings were held to consider and discuss what should be included in the new document. Decisions were reached in consensus and when there were significant discrepancies with the initial proposals, the material was returned to the work groups for further consideration. The final version, comprising 120 indicators, was approved in March 2011.

The Coordinating Group used the Delphi method to reach a consensus about 20 indicators that are fundamental for all critical care departments regardless of the complexity of the hospital and type of diseases treated. For the previous edition, we considered including among the fundamental indicators some indicators that are specific for determinate conditions because of their great importance and high incidence, even though they are not treated in all critical care departments. Finally, some of the indicators have been considered "fundamental" because compliance with them is still far from the established standards and because the scientific evidence and expert consensus consider that compliance needs to be improved in the short term. On the other hand, some indicators have not been included among the fundamental indicators because compliance is very high and complying with them has become routine.

Again, this new version cannot be considered definitive; it will certainly need to be revised and adjusted in the future as clinical practice changes and new scientific evidence becomes available.

PRACTICAL APPLICATION OF THE PROPOSED MONITORING SYSTEM

Indicators are instruments for the improvement of quality and as such monitoring them should never be considered an end in and of itself. In other words, the measuring stage is necessary and sometimes essential to determine the level of the quality of care, but it is merely a means to an end: It enables us to take action to improve the weak points in the system and to select the most effective course of action, but measuring is never the final objective.

Having a set of indicators like the one presented here streamlines complicated processes involved in continual improvement, such as determining which aspects of care are fundamental and designing the instruments to measure them, and, above all, providing a point of reference (standard) with which to compare our practice.

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The indicators are presented here in the same order as the Society's work groups, making it easy for them to be identified and for each department or professional to choose the ones that seem most appropriate for their professional practice.

This is a large set of indicators, and it does not seem realistic or practical for any department to monitor all of them. Nevertheless, the authors considered it useful to elaborate and present a sufficient number of indicators to cover the most important aspects of all of the activities carried out within the specialty, leaving the choice of which ones to monitor systematically to each critical care department. We recommend monitoring a limited number of indicators at first and bearing in mind that a monitoring system is a commitment to both measurement and periodic evaluation of the results obtained.

As a general guideline, the following criteria might be useful in helping each department choose which indicators to employ:

- Variability in the healthcare practice within the department
- Known weak points
- Basic aspects of care
- Possibility of risks
- Existence of valid and reliable sources of information
- Possibility to generate results automatically.

It is not advisable to incorporate too many indicators at first, as this would make it difficult to follow them. Moreover, it is important to remember that it may at times be necessary to quantify the data manually, depending on the information technology implemented, and that this will require time and professional resources that may be unavailable in the early stages.

Another advantage of the progressive incorporation of indicators as the informatics system improves is that the team gains valuable experience in their use.

This approach also allows more and more professionals to become involved with the quality improvement program.

One possible option is to begin monitoring those indicators considered "fundamental" by the work groups. In a manner of speaking, these indicators represent not only those points that should be done properly, but also those for which it is essential to know the quality of care.

From the organizational point of view, it is convenient to assign the responsibility for monitoring the indicator or indicators for a particular process to a specific professional, usually a staff physician. The overall responsibility obviously falls always on the chief of the department, and he or she will distribute the responsibilities for monitoring the different indicators chosen among the staff.

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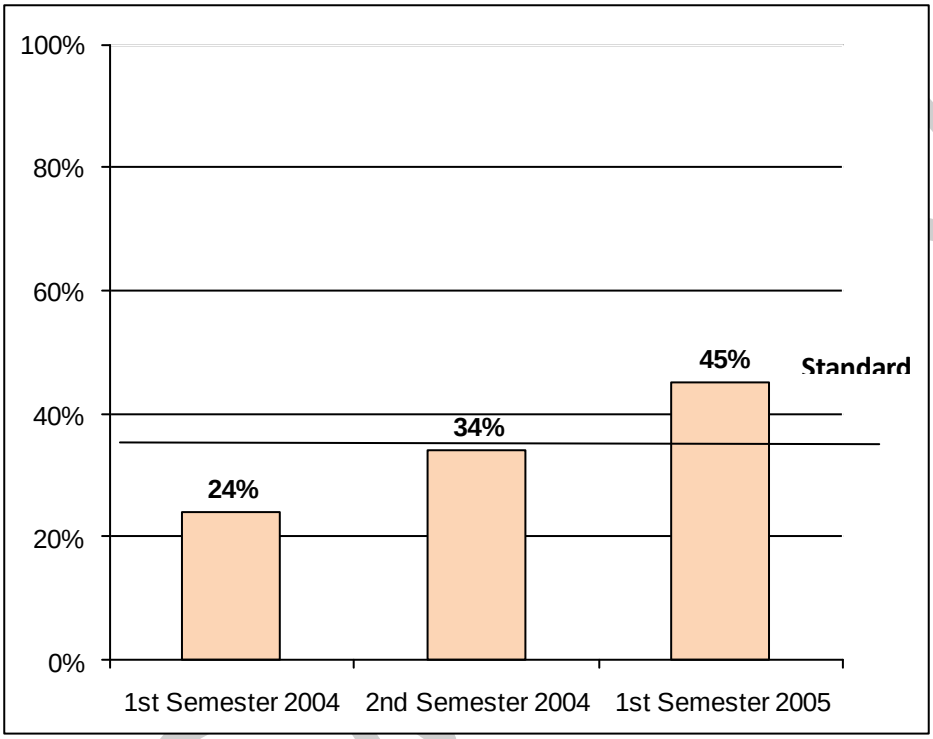
This is usually done when the department elaborates its planning calendar, and the monitoring of indicators is incorporated as another objective for quality.

The person responsible for each indicator will verify the reliability of the source of data and will follow up the results at the established periodicity and report them to the rest of the department.

It is helpful to present the results in the form of a graph that allows the evolution of the indicator over time and its relation to the standard of reference to be easily observed.

The following example shows the presentation of the results of the evolution of an indicator whose standard is 40%.



When the evolution of the indicator is negative or the results are substandard, the person responsible for the indicator should propose the most appropriate course of action: this might entail direct measures to improve quality or it might be necessary to carry out a study to determine the causes of the poor results.

Actions should be well defined and planned, and a calendar for the individuals in charge of performing the proposed tasks should be elaborated.

ACTIONS PROPOSED	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

Monitoring the results of the indicator before and after the actions taken for improvement will show to what extent these measures have been effective.

It bears reminding that the adoption of a monitoring system using indicators implies the commitment of the entire department to act when the practice evaluated shows substandard results; the causes must be investigated and action taken to improve the quality of care. Otherwise, measurement becomes a meaningless routine that is useless for the clinical management of the department.

USE OF THE PROPOSED INDICATORS

This section aims to provide a more detailed definition of the components of the indicators and how to use them to measure healthcare practice.

Dimension: Characteristic or attribute of healthcare quality examined by means of this indicator.

Justification: Usefulness of the indicator as a measurement of quality. This is related to validity, i.e. does what we are measuring make sense? Will it help to identify areas that need to be improved?

Formula: Mathematical expression that reflects the results of the measurement; although often expressed as a percentage, it can also be expressed as a mean or an absolute number.

Explanation of terms: Definition of those aspects of the indicator expressed in the formula that might be ambiguous or open to various interpretations, e.g. If an indicator mentions administering prophylaxis for gastrointestinal hemorrhaging (indicator Nº. 59), the drugs to be used to achieve it are specified.

Population: Description of the unit of study that will be the object of measurement. It can refer to patients, examinations, visits, diagnoses, etc. Occasionally, it will be necessary to introduce exclusion criteria for the population thus defined. For instance, if we want to know how many patients with acute coronary syndrome and elevated ST segments (STEMI) have undergone early reperfusion (indicator Nº. 6), it will obviously be necessary to exclude patients with STEMI with indications to withhold life support.

On the other hand, when quantifying the indicator, it is not always necessary or practical to carry out the measurement over the entire population defined during the entire period of the study (annual, biannual, etc.); in these cases a **sample** is reviewed.

This may be the case for indicators that describe the level of compliance with informed consent policies, early treatment of cardiovascular dysfunction, assessment of nutritional condition, etc. In these cases it is not necessary to verify informed consent for each and every transfusion or technique performed; rather this can be done on a sample. In order to choose a sample, it is necessary to take into account the number of units necessary (size) and to ensure that the selection is random for the result to be considered representative of the entire population. If the sample is collected appropriately, the value of the indicator will apply to the entire population. For some indicators, specific recommendations are provided for quantification using a sample, whether by selecting cases randomly or selecting

sampling days. In the latter case, all of the cases produced on the sampling day will be included and care should be taken to include all days of the week.

Type: This refers to the classification of the indicator according to the focus of the evaluation, with three possibilities:

- Structure: used for indicators that measure aspects related to technological, organizational, or human resources necessary for care, as well as to the existence of protocols
- Process: used for indicators that evaluate the way in which care is delivered with the resources available, protocols, and scientific evidence
- Outcome: used for indicators that measure the consequences of the healthcare process, expressed in terms of complications, mortality, opportunities missed, failed circuits, quality of life, etc.

Source of data: Defines the origin of data and the sequence of data obtainment necessary to enable quantification of the indicator. This is an important aspect, as the level of information management and processing will be different at each center and this might determine whether or not it is possible to measure the indicator.

In this project, the concrete specifications for this section have been omitted, normally with a reference to the patient's clinical records, as information management and processing will be different at each center.

Standard: This reflects the desired level to be met for an indicator. It is not always easy to establish a standard, given the variability in the scientific evidence and reference sources consulted.

In this project, the team of authors has made an effort to synthesize variable information from diverse sources and has reached a consensus regarding the standard for each indicator with the idea that, rather than reflect the results of common practice, the standard should represent the level of good practice that should be demanded in light of the scientific evidence while being, at the same time, achievable with the available resources.

In some cases the standard has been set at 100% or 0% when it is a matter of ensuring that the fundamentals are realized.

Commentaries: This section is reserved for reflections on the validity of the indicator or pointing out possible factors that might cause confusion that should be taken into account when interpreting the results. It also incorporates the most important bibliographic references consulted for the elaboration of the indicator and setting the standard.

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LIST OF INDICATORS

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Those considered fundamental are marked in this format

CARDIAC CARE AND CPR

1 Early administration of acetylsalicylic acid in acute coronary syndrome

2 Administration of beta-blockers in acute coronary syndrome

3 Risk stratification in acute coronary syndrome

4 Urgent invasive strategy in unstable non-ST-segment elevation acute coronary syndrome

5 Reperfusion techniques in ST-elevation acute coronary syndrome

6 Door-needle time in ST-elevation acute coronary syndrome (STE-ACS)

7 Door-balloon time in primary percutaneous transluminal coronary angioplasty

8 Hospital mortality in acute coronary syndrome

9 Therapeutic hypothermia after cardiac arrest

10 Use of the Utstein template

11 Registry of quality indicators in heart surgery

12 Incidence of early complications in the implantation of permanent pacemakers

ACUTE RESPIRATORY FAILURE

13 Incidence of barotrauma

14 Ventilator circuit change at 7 days

15 Registering complications occurring in patients with acute respiratory distress syndrome while in prone position

16 Spontaneous breathing trials

17 Selective digestive tract decontamination in patients at risk

18 Semirecumbent position in patients undergoing invasive mechanical ventilation

19 Changing heat-and-moisture exchangers

20 Prevention of thromboembolism

21 Unplanned extubation

22 Reintubation

23 Early implementation of noninvasive mechanical ventilation on exacerbation of chronic obstructive pulmonary disease

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24 Lung-protective ventilation in acute lung injury / acute respiratory distress syndrome

NEUROINTENSIVE CARE AND TRAUMATOLOGY

25 Examination of potentially severe trauma patients by intensivists

26 Tracheal intubation in patients with severe traumatic brain injury and Glasgow Coma Score < 9 during the first 24 hours

27 Surgical intervention in traumatic brain injury with subdural hematoma and/or epidural hematoma

28 Incidence of acute respiratory distress syndrome in severe trauma

29 Monitoring intracranial pressure in patients with severe traumatic brain injury with pathological CT findings

30 Mortality in severe traumatic brain injury

31 Early osteosynthesis in fractures of the femoral diaphysis

32 Early surgical fixation of open fractures

33 Early cerebral angiography in subarachnoid hemorrhage

34 Administration of nimodipine in subarachnoid hemorrhage

35 Critical illness polyneuropathy

36 Immediate CT examination in ischemic stroke

37 Intravenous fibrinolysis in acute ischemic stroke

38 Use of somatosensory evoked potentials in post-anoxic encephalopathy

INFECTIOUS DISEASES

39 Bacteremia related to central venous catheter

40 Urinary tract infection related to urethral catheter

41 Ventilator-associated pneumonia

42 Early resuscitation in severe sepsis / septic shock

43 Inappropriate empirical antibiotic treatment for infections treated in the ICU

44 Methicillin-resistant *Staphylococcus aureus* infections

45 Indications for isolation

46 Early antibiotic treatment in severe sepsis

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METABOLISM AND NUTRITION

47 Complications of total parenteral nutrition: hyperglycemia and liver dysfunction

48 Maintaining appropriate blood glucose levels

49 Severe hypoglycemia

50 Identification of patients with nutritional risk

51 Assessment of nutritional status

52 Calorie and protein requirements in critical patients

53 Early enteral nutrition

54 Monitoring enteral nutrition

55 Appropriate use of parenteral nutrition

56 Prophylaxis against gastrointestinal bleeding in patients undergoing invasive mechanical ventilation

NEPHROLOGIC CARE

57 Monitoring continuous renal replacement therapy

58 Dopamine use in acute renal failure

59 Incidence of acute renal failure in non-coronary critical patients

60 Incidence of renal failure in patients with acute coronary syndrome

61 Prevention of contrast-induced nephropathy in cardiac catheterization

62 Stratification of acute renal failure in critical patients del fallo renal agudo (FRA) en enfermos críticos

SEDATION AND ANALGESIA

63 Monitoring sedation

64 Appropriate sedation

65 Daily interruption of sedation

66 Pain management in unsedated patients

67 Pain management in ventilated patients

68 Inappropriate use of muscle relaxants

69 Monitoring neuromuscular blockage

70 Identification of delirium

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BLOOD COMPONENTS

71 Informed consent for the transfusion of blood components

72 Inappropriate transfusion of fresh-frozen plasma

73 Inappropriate transfusion of platelet-rich plasma

74 Inappropriate transfusion of packed red blood cells

TOXICOLOGY

75 Correct indications and methods of digestive decontamination in acute intoxication

76 Minimum stock of antidotes in the critical care department and/or hospital pharmacy

77 Early appropriate renal replacement therapy in acute intoxication

78 Appropriate indication of forced diuresis

79 Mortality due to acute (medical) drug poisoning or to other poisons

TRANSPLANTS

80 Organ donors

81 Assessment for liver transplantation in acute liver failure

82 Monitoring potential organ donors

83 Diagnosis of brain death

NURSING CARE

84 Removal of enteral feeding tube due to obstruction

85 Appropriate bronchial aspiration

86 Information from nursing staff to patients' families

87 Intrahospital transport

88 Cuff pressure

89 Management of monitoring alarms

90 Accidental falls

91 Nursing registries in the ICU

92 Medication errors in the ICU

93 Compliance with hand-washing protocols

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94 Accidental removal of vascular catheters

95 Crash cart review

BIOETHICS

96 Appropriate end-of-life care

97 Information to families of ICU patients

98 Incorporation of advance directives in the decision-making process

99 Informed written consent

100 Limiting life support

101 Use of restraints

PLANNING, ORGANIZATION, AND MANAGEMENT

102 Daily rounds for multidisciplinary teams

103 Regulated exchange of information

104 Suspension of scheduled surgery

105 Inappropriate or precipitated discharge from the ICU

106 Delayed discharge from critical care

107 Delayed admission to the ICU

108 Survey about perceived quality at discharge from the ICU

109 ICU discharge report

110 Standardized mortality rate

111 Autopsy rate

112 ICU staff orientation plan

113 Presence of an intensivist in the ICU 24 h per day

114 System for the notification of adverse events

115 Unscheduled readmission to the ICU

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INTERNET

116 Access to fundamental medical sources in electronic format

CONTINUING MEDICAL EDUCATION, TEACHING, AND RESEARCH

117 Existence of basic protocols

118 Participation in research projects

119 Scientific publications from the critical care department

120 Continuing medical education

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FUNDAMENTAL INDICATORS

FUNDAMENTAL INDICATORS	Indicator no.	Corresponding group or specialty
1. Therapeutic hypothermia after cardiac arrest	9	Cardiac care
2. Semirecumbent position in patients undergoing invasive mechanical ventilation	18	Respiratory care
3. Prevention of thromboembolism	20	Respiratory care
4. Early implementation of noninvasive mechanical ventilation on exacerbation of chronic obstructive pulmonary disease	23	Respiratory care
5. Lung-protective ventilation in acute lung injury / acute respiratory distress syndrome	24	Respiratory care
6. Bacteremia related to central venous catheter	39	Infectious diseases
7. Ventilator-associated pneumonia	41	Infectious diseases
8. Early antibiotic treatment in severe sepsis	46	Infectious diseases
9. Early enteral nutrition	53	Metabolism and nutrition
10. Prophylaxis against gastrointestinal bleeding in patients undergoing invasive mechanical ventilation	59	Metabolism and nutrition
11. Appropriate sedation	64	Sedation and analgesia
12. Pain management in unsedated patients	66	Sedation and analgesia
13. Inappropriate transfusion of packed red blood cells	74	Blood components
14. Organ donors	80	Transplants
15. Compliance with hand-washing protocols	93	Nursing
16. Information to families of ICU patients	97	Bioethics
17. Limiting life support	100	Bioethics
18. Survey about perceived quality at discharge from the ICU	108	Planning, organization, and management
19. Presence of an intensivist in the ICU 24 h per day	113	Planning, organization, and management
20. System for the notification of adverse events	114	Planning, organization, and management

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UNFOLDING OF INDICATORS

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CARDIAC CARE AND RCP

INDICATOR NUMBER 1

Name of the indicator	**EARLY ADMINISTRATION OF ACETYLSALICYLIC ACID (ASA) IN ACUTE CORONARY SYNDROME (ACS)**
Dimension	Effectiveness and safety
Justification	Administering ASA reduces mortality and reinfarction in patients with ACS, making its use mandatory except when contraindicated.
Formula	Nº. of patients with ACS administered ASA in the first 24 hrs ---------- x100 Nº. of patients with ACS discharged from ICU
Explanation of terms	24 hours: time interval from onset of pain to administration of ASA Administration can take place in the hospital or prior to arriving at the hospital
Population	All patients with ACS discharged from ICU during the period reviewed Exclusion criterion: Patients with contraindications for ASA Patients admitted to the Intensive Care Unit (ICU) after the first 24 hours
Type	Process
Source of data	Clinical records. Information system. Electronic prescription.
Standard	100%
Comments	References: • ACC/AHA 2007 guidelines for the management of patients with unstable angina/non ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non ST-Elevation Myocardial Infarction): developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and the Society of Thoracic Surgeons: endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation and the Society for Academic Emergency Medicine. Circulation. 2007 Aug 14;116(7):e148-304 • 2009 Focused Updates: ACC/AHA Guidelines for the Management of Patients with ST-Elevation Myocardial Infarction (updating the 2004 Guideline and 2007 Focused Update) and ACC/AHA/SCAI Guidelines on Percutaneous Coronary Intervention (updating the 2005 Guideline and 2007 Focused Update): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2009 Dec 1;120(22):2271-306 • Frans Van de Werf, Jeroen Bax, Amadeo Betrium, Carina Blomstrom-Lundqvist, Filippo Crea. Volkmar Falk, Gerasimos Filippatos, Keith Fox, Kurt Huber, Adnan Kastrati, Annika Rosengren, P. Gabriel Steg, Marco Tubaro, Freek Verheugt, Franz Weidinger, Michael Weis Guidelines of the European Society of Cardiology (ESC). Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation. Eur Heart J. 2008;29:2909-2945 • Felices-Abad F, Latour-Pérez J, Fuset-Cabanes MP, Ruano-Marco M, Cuñat-de la Hoz J, del Nogal-Sáez F; Grupo Ariam.[Quality indicators in the acute coronary syndrome for the analysis of the pre- and in-hospital care process]. Med Intensiva. 2010 Aug-Sep;34(6):397-417.

INDICATOR NUMBER 2

Name of the indicator	**ADMINISTRATION OF BETA-BLOCKERS IN ACUTE CORONARY SYNDROME (ACS)**
Dimension	Effectiveness and safety
Justification	Administering beta-blockers is associated with a reduction in the relative risk of progression of non-ST-segment elevation acute coronary syndrome (NSTE-ACS) to acute myocardial infarction, although no significant effect on mortality has been demonstrated. The benefit of indefinite treatment with beta-blockers after NSTE-ACS is well established. The cost of beta-blockers is acceptable.
Formula	Nº. of patients with ACS administered beta-blockers during the ICU stay ---------- x 100 Nº. of patients with ACS discharged from the ICU
Explanation of terms	ACS: Includes both STE-ACS and NSTE-ACS
Population	All patients with ACS discharged from critical care in the period reviewed Exclusion criterion: patients with contraindications for beta-blockers: a) allergy to the drug; b) history of bronchial asthma; c) congestive heart failure (Killip II -IV); d) "myocardial stunning" (ejection fraction < 45%, measured by echocardiography, with signs of heart failure; e) arterial hypotension (systolic BP < 90 mmHg); f) bradycardia (heart rate < de 55 bpm); f) abnormal atrioventricular conduction.
Type	Process
Source of data	Clinical records. Information system. Electronic prescription.
Standard	90%
Comments	References: • ACC/AHA 2007 guidelines for the management of patients with unstable angina/non ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non ST-Elevation Myocardial Infarction): developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and the Society of Thoracic Surgeons: endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation and the Society for Academic Emergency Medicine. Circulation. 2007 Aug 14;116(7):e148-304 • 2009 Focused Updates: ACC/AHA Guidelines for the Management of Patients with ST-Elevation Myocardial Infarction (updating the 2004 Guideline and 2007 Focused Update) and ACC/AHA/SCAI Guidelines on Percutaneous Coronary Intervention (updating the 2005 Guideline and 2007 Focused Update): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2009 Dec 1;120(22):2271-306 • Frans Van de Werf, Jeroen Bax, Amadeo Betrium, Carina Blomstrom-Lundqvist, Filippo Crea. Volkmar Falk, Gerasimos Filippatos, Keith Fox, Kurt Huber, Adnan Kastrati, Annika Rosengren, P. Gabriel Steg, Marco Tubaro, Freek Verheugt, Franz Weidinger, Michael Weis Guidelines of the European Society of Cardiology (ESC). Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation. Eur Heart J. 2008;29:2909-2945. • Felices-Abad F, Latour-Pérez J, Fuset-Cabanes MP, Ruano-Marco M, Cuñat-de la Hoz J, del Nogal-Sáez F; Grupo Ariam.[Quality indicators in the acute coronary syndrome for the analysis of the pre- and in-hospital care process]. Med Intensiva. 2010 Aug-Sep;34(6):397-417.

INDICATOR NUMBER 3

Name of the indicator	**RISK STRATIFICATION IN ACUTE CORONARY SYNDROME (ACS)**
Dimension	Effectiveness and safety
Justification	Risk stratification in patients with ACS: a) facilitates decision making and enables the correct analysis of mortality; b) is useful in the analysis and interpretation of results, making it possible to detect the underuse of certain treatments in high risk groups; c) facilitates clinical research.
Formula	Nº. of patients with ACS classified according to risk ---------- x 100 Nº. of patients with ACS discharged from ICU
Explanation of terms	Classified according to risk: assignment to a risk group in function of a validated scale. The expanded TIMI risk score is recommended.
Population	All patients with ACS discharged from intensive care unit (ICU) during the period reviewed.
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Van de Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, Filippatos G, Fox K, Huber K, Kastrati A, Rosengren A, Steg PG, Tubaro M, Verheugt F, Weidinger F, Weis M; ESC Committee for Practice Guidelines (CPG). Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation: the Task Force on the Management of ST-Segment Elevation Acute Myocardial Infarction of the European Society of Cardiology. Eur Heart J. 2008 Dec;29(23):2909-45 • Civeira Murillo E, Del Nogal Saez F, Alvarez Ruiz AP, Ferrero Zorita J, Alcantara AG, Aguado GH, López Messa JB, Montón Rodríguez JA; Intensive cardiac care and CPR work group. [The recommendations regarding non-ST segment elevation acute coronary syndrome have been reviewed. SEMICYUC. Spanish Society for Intensive Medicine, Critical Care and Coronary Units]. Med Intensiva. 2010 Jan-Feb;34(1):22-45 • Felices-Abad F, Latour-Pérez J, Fuset-Cabanes MP, Ruano-Marco M, Cuñat-de la Hoz J, del Nogal-Sáez F; Grupo Ariam.[Quality indicators in the acute coronary syndrome for the analysis of the pre- and in-hospital care process]. Med Intensiva. 2010 Aug-Sep;34(6):397-417.

INDICATOR NUMBER 4

Name of the indicator	**URGENT INVASIVE STRATEGY IN UNSTABLE NON-ST-SEGMENT ELEVATION ACUTE CORONARY SYNDROME (NSTE-ACS)**
Dimension	Effectiveness and safety
Justification	Cardiac catheterization should be performed as soon as possible (urgent invasive strategy) in patients with severe unstable NSTE-ACS at admission and later when this complication occurs.
Formula	Nº. of patients with NSTE-ACS treated with urgent invasive strategy ---------- x 100 Nº. of patients with NSTE-ACS
Explanation of terms	Unstable NSTE-ACS: severe ACS that is not stabilized with standard drug therapy with one or more of the following symptoms: • Untreatable or recurrent angina • Hemodynamic instability • Severe rhythm disorders (major arrhythmias) • Heart failure Urgent invasive strategy: invasive procedures indicated and performed between 4 and 24 hours after criteria are fulfilled.
Population	All patients with NSTE-ACS admitted to the ICU during the period reviewed. Exclusion criterion: orders to withhold life support
Type	Process
Source of data	Clinical records / Admissions department / ARIAM registry
Standard	95%
Comments	References : • ACC/AHA 2007 guidelines for the management of patients with unstable angina/non ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non ST-Elevation Myocardial Infarction): developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and the Society of Thoracic Surgeons: endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation and the Society for Academic Emergency Medicine. Circulation. 2007 Aug 14;116(7):e148-304 • Van de Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, Filippatos G, Fox K, Huber K, Kastrati A, Rosengren A, Steg PG, Tubaro M, Verheugt F, Weidinger F, Weis M; ESC Committee for Practice Guidelines (CPG). Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation: the Task Force on the Management of ST-Segment Elevation Acute Myocardial Infarction of the European Society of Cardiology. Eur Heart J. 2008 Dec;29(23):2909-45 • Civeira Murillo E, Del Nogal Saez F, Alvarez Ruiz AP, Ferrero Zorita J, Alcantara AG, Aguado GH, López Messa JB, Montón Rodríguez JA; Intensive cardiac care and CPR work group. [The recommendations regarding non-ST segment elevation acute coronary syndrome have been reviewed. SEMICYUC. Spanish Society for Intensive Medicine, Critical Care and Coronary Units] Med Intensiva. 2010 Jan-Feb;34(1):22-45 • Felices-Abad F, Latour-Pérez J, Fuset-Cabanes MP, Ruano-Marco M, Cuñat-de la Hoz J, del Nogal-Sáez F; Grupo Ariam.[Quality indicators in the acute coronary syndrome for the analysis of the pre- and in-hospital care process]. Med Intensiva. 2010 Aug-Sep;34(6):397-417.

INDICATOR NUMBER 5

Name of the indicator	**REPERFUSION TECHNIQUES IN ST-ELEVATION ACUTE CORONARY SYNDROME (STE-ACS)**
Dimension	Effectiveness, safety, and appropriateness
Justification	Reperfusion with thrombolytic treatment or primary PTCA reduces the size of the infarct, improves ventricular function, and reduces morbidity and mortality in patients with STE-ACS.
Formula	Nº. of patients with STE-ACS who receive reperfusion treatment ---------- x 100 Nº. of patients with indications for STE-ACS discharged from the critical care department
Explanation of terms	Indications for reperfusion: all patients with a history of angina < 12 h and persistent ST-segment elevation or new (suspected) complete left bundle branch block Reperfusion treatment: treatment thrombolytic or primary PTCA
Population	All patients diagnosed with STE-ACS discharged from the critical care department during the study period • Exclusion criteria: patients with orders to limit life support
Type	Process
Source of data	Clinical records
Standard	> 90%
Comments	References: • Rosell Ortiz F, Mellado Vergel FJ, Ruiz Bailén M, García Alcántara A, Reina Toral A, Arias Garrido J, Alvarez Bueno M; Grupo Cardiológico de EPES; Grupo ARIAM de Andalucía. [Acute coronary syndrome (ACS) with elevated ST segment: consensus strategy for early reperfusion. The Public Enterprise for Health Emergencies and the ARIAM Project Andalusia] Med Intensiva. 2007 Dec;31(9):502-9. • Van de Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, Filippatos G, Fox K, Huber K, Kastrati A, Rosengren A, Steg PG, Tubaro M, Verheugt F, Weidinger F, Weis M; ESC Committee for Practice Guidelines (CPG). Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation: the Task Force on the Management of ST-Segment Elevation Acute Myocardial Infarction of the European Society of Cardiology. Eur Heart J. 2008 Dec;29(23):2909-45 • 2009 Focused Updates: ACC/AHA Guidelines for the Management of Patients with ST-Elevation Myocardial Infarction (updating the 2004 Guideline and 2007 Focused Update) and ACC/AHA/SCAI Guidelines on Percutaneous Coronary Intervention (updating the 2005 Guideline and 2007 Focused Update): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2009 Dec 1;120(22):2271-306

INDICATOR NUMBER 6

Name of the indicator	**DOOR-NEEDLE TIME IN ST-ELEVATION ACUTE CORONARY SYNDROME (STE-ACS)**
Dimension	Effectiveness, safety, and appropriateness
Justification	Early administration of fibrinolytic agents in STE-ACS, when indicated, reduces the size of the infarct, improves residual ventricular function, and reduces morbidity and mortality.
Formula	Nº. of patients with STE-ACS and indications for fibrinolytic treatment and door-needle time ≤ 30 minutes ---------- x 100 Nº. of patients with STE-ACS and indications for fibrinolytic treatment
Explanation of terms	• Door-needle time: time from entry in the emergency department (door) to the start of fibrinolytic treatment (needle). • Fibrinolytic treatment prior to arrival at the emergency department is also considered correct door-needle time. • Indications for fibrinolytic treatment: absence of contraindications and when PCI cannot be performed within the recommended time period *
Population	All patients with STE-ACS who are candidates for fibrinolytic treatment discharged from the critical care department during the period reviewed Exclusion criteria: patients with orders to limit life support
Type	Process
Source of data	Clinical records or ARIAM (Analysis of Delay in Acute Myocardial Infarction) registry
Standard	100%
Comments	References: * The interval from first medical contact to balloon dilation should be < 2 h in all cases and < 90 min in patients that arrive at the hospital within 2 h who have a large infarct and low risk of bleeding. • Rosell Ortiz F, Mellado Vergel FJ, Ruiz Bailén M, García Alcántara A, Reina Toral A, Arias Garrido J, Alvarez Bueno M; Grupo Cardiológico de EPES; Grupo ARIAM de Andalucía.[Acute coronary syndrome (ACS) with elevated ST segment: consensus strategy for early reperfusion. The Public Enterprise for Health Emergencies and the ARIAM Project Andalusia].Med Intensiva. 2007 Dec;31(9):502-9 • Van de Werf F, Bax J, Betriu A, Blomstrom-Lundqvist C, Crea F, Falk V, Filippatos G, Fox K, Huber K, Kastrati A, Rosengren A, Steg PG, Tubaro M, Verheugt F, Weidinger F, Weis M; ESC Committee for Practice Guidelines (CPG). Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation: the Task Force on the Management of ST-Segment Elevation Acute Myocardial Infarction of the European Society of Cardiology. Eur Heart J. 2008 Dec;29(23):2909-45 • 2009 Focused Updates: ACC/AHA Guidelines for the Management of Patients with ST-Elevation Myocardial Infarction (updating the 2004 Guideline and 2007 Focused Update) and ACC/AHA/SCAI Guidelines on Percutaneous Coronary Intervention (updating the 2005 Guideline and 2007 Focused Update): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2009 Dec 1;120(22):2271-306

INDICATOR NUMBER 7

Name of the indicator	**DOOR-BALLOON TIME IN PRIMARY PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA)**
Dimension	Effectiveness, safety, and appropriateness
Justification	Primary angioplasty (PTCA) is the treatment of choice for STE-ACS provided it is done early by an experienced team. The recommended time from first medical contact (FMC) to balloon dilation is < 2 h in all cases and < 90 min. in patients that reach the hospital soon after an extensive infarct.
Formula	Nº patients with FMC-balloon time <2 h or Nº patients with door-balloon time < 90 minutes* ---------- x 100 Nº patients with STE-ACS and primary PTCA
Explanation of terms	• FMC-balloon time: time from first medical contact and balloon inflation in PTCA. • Door-balloon time: time from the patient's arrival to balloon inflation in PTCA. * < 90 minutes: patients who arrive at the hospital soon (within 2 h) with a large infarct and low risk of bleeding
Population	All patients with STE-ACS and primary PTCA discharged from the critical care department
Type	Process
Source of data	Clinical records. ARIAM registry
Standard	100%
Comments	References: • Rosell Ortiz F, Mellado Vergel FJ, Ruiz Bailén M, García Alcántara A, Reina Toral A, Arias Garrido J, Alvarez Bueno M; Grupo Cardiológico de EPES; Grupo ARIAM de Andalucía.[Acute coronary syndrome (ACS) with elevated ST segment: consensus strategy for early reperfusion. The Public Enterprise for Health Emergencies and the ARIAM Project Andalusia].Med Intensiva. 2007 Dec;31(9):502-9 • Focused Updates: ACC/AHA Guidelines for the Management of Patients with ST-Elevation Myocardial Infarction (updating the 2004 Guideline and 2007 Focused Update) and ACC/AHA/SCAI Guidelines on Percutaneous Coronary Intervention (updating the 2005 Guideline and 2007 Focused Update): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2009 Dec 1;120(22):2271-306 • Felices-Abad F, Latour-Pérez J, Fuset-Cabanes MP, Ruano-Marco M, Cuñat-de la Hoz J, del Nogal-Sáez F; Grupo Ariam.[Quality indicators in the acute coronary syndrome for the analysis of the pre- and in-hospital care process]. Med Intensiva. 2010 Aug-Sep;34(6):397-417.

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INDICATOR NUMBER 8

Name of the indicator	**HOSPITAL MORTALITY IN ACUTE CORONARY SYNDROME (ACS)**
Dimension	Safety
Justification	Although mortality from ACS depends on many factors, it is associated with the levels of treatment that the patient receives, so we continue to consider this an indicator of the quality of care.
Formula	a) Nº. of patients discharged from the critical care department with a main diagnosis of STE-ACS who died ---------- x 100 Nº. of patients discharged from the ICU with a main diagnosis of STE-ACS b) Nº. of patients discharged from the critical care departmentwith a main diagnosis of NSTE-ACS who died ---------- x 100 Nº. of patients discharged from the ICU with a main diagnosis of NSTE-ACS
Explanation of terms	• Death should be considered in-hospital whether it occurs in the ICU or in any other department after discharge from ICU
Population	a) All patients with a main diagnosis of STE-ACS discharged from the critical care department (to another ward, to their homes, or due to death) during the period reviewed. b) All patients with a main diagnosis of NSTE-ACS discharged from the critical care department (to another ward, to their homes, or due to death) during the period reviewed. Exclusion criterion: • Patients transferred to another hospital (due to difficulties in follow-up) • Patients with STE-ACS or NSTE-ACS identified as a secondary diagnosis because the literature underlying the standard considers only patients with a main diagnosis of STE-ACS or NSTE-ACS
Type	Outcome
Source of data	Clinical records
Standard	< 10% (STE-ACS) and < 4% (NSTE-ACS) If the standard is surpassed, the results must be re-evaluated using the risk-adjusted rate
Comments	References: • Fox KA, Steg PG, Eagle KA, Goodman SG, Anderson FA Jr, Granger CB, Flather MD, Budaj A, Quill A, Gore JM; GRACE Investigators. Decline in rates of death and heart failure in acute coronary syndromes, 1999-2006. JAMA. 2007 May 2;297(17):1892-900. • Eagle KA, Nallamothu BK, Mehta RH, Granger CB, Steg PG, Van de Werf F, López-Sendón J, Goodman SG, Quill A, Fox KA; Global Registry of Acute Coronary Events (GRACE) Investigators. Trends in acute reperfusion therapy for ST-segment elevation myocardial infarction from 1999 to 2006: we are getting better but we have got a long way to go. Eur Heart J. 2008 Mar;29(5):609-17. • Figueras J, Heras M, Baigorri F, Elosua R, Ferreira I, Santaló M. [III Catalan registry of ST elevation acute myocardial infarction. Comparison with former Catalan registries I and II from Catalonia, Spain] Med Clin (Barc). 2009 Nov 14;133(18):694-701

INDICATOR NUMBER 9 (FUNDAMENTAL INDICATOR)

Name of the indicator	THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST (CA)
Dimension	Effectiveness and safety
Justification	Moderate hypothermia induced after CA in patients who remain in coma after recovering circulation has proven to improve the neurological prognosis and reduce mortality (Recommendation Grade A, Level I evidence). A lower level of evidence is recognized for its use after CA due to heart rhythms that do not respond to defibrillation.
Formula	Nº. of patients with CA meeting the inclusion criterion who undergo therapeutic hypothermia ---------- x 100 Nº. of patients with CA meeting the inclusion criterion
Explanation of terms	• Therapeutic hypothermia: Induction of moderate hypothermia (33 ± 1 ºC) within 4 h of CA • Inclusion criterion: Persistent coma after circulation is recovered. Both rhythms that can be defibrillated and those that cannot are included
Population	All patients with CA who meet the inclusion criterion discharged from the critical care department during the study period • Exclusion criteria: o cardiogenic shock o malignant arrhythmias o pregnancy o coagulation disorders o orders to withhold life support
Type	Process
Source of data	Clinical records
Standard	90%
Comments	References: • Arrich J, Holzer M, Herkner H, Müllner M. Hypothermia for neuroprotection in adults after cardiopulmonary resuscitation. Cochrane Database Syst Rev. 2009 Oct 7;(4):CD004128. • Martín-Hernández H, López-Messa JB, Pérez-Vela JL, Molina-Latorre R, Cárdenas-Cruz A, Lesmes-Serrano A, Alvarez-Fernández JA, Fonseca-San Miguel F, Tamayo-Lomas LM, Herrero-Ansola YP; members of the SEMICYUC's steering committee for the National CPR Plan. [Managing the post-cardiac arrest syndrome. Directing Committee of the National Cardiopulmonary Resuscitation Plan (PNRCP) of the Spanish Society for Intensive Medicine, Critical Care and Coronary Units (SEMICYUC)] Med Intensiva. 2010 Mar;34(2):107-26 • Nolan JP, Soar J, Zideman DA, Biarent D, Bossaert LL, Deakin C, Koster RW, Wyllie J, Böttiger B; on behalf of the ERC Guidelines Writing Group. European Resuscitation Council Guidelines for Resuscitation 2010: Section 1. Executive summary. Resuscitation. 2010 Oct;81(10):1219-76

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INDICATOR NUMBER 10

Name of the indicator	**USE OF THE UTSTEIN TEMPLATE**
Dimension	Appropriateness.
Justification	Data collection after cardiac arrest (CA) enables statistical analysis of in-hospital morbidity and mortality. The Utstein style is a uniform system of data recollection that provides precise information about the healthcare process for CA so it can be improved and compared between centers.
Formula	Nº. of CA alerts and Utstein template correctly completed ---------- x 100 Nº. of CA alerts
Explanation of terms	• Utstein template correctly completed: All template variables registered • CA alerts: Include: CA with or without Emergency Code (EC) activation CA with unjustified activation of EC This indicator is only applicable to critical care departments that participate in the hospital's CRA resuscitation team
Population	All CRA alerts attended at the hospital during the study period.
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References : • Langhelle A, Nolan J, Herlitz J, Castren M, Wenzel V, Soreide E, Engdahl J, Steen PA; 2003 Utstein Consensus Symposium. Recommended guidelines for reviewing, reporting, and conducting research on post-resuscitation care: the Utstein style. Resuscitation. 2005 Sep;66(3):271-83. • Peberdy MA, Cretikos M, Abella BS, Devita M, Goldhill D, Kloeck W, Kronick SL, Morrison LJ, Nadkarni VM, Nichol G, Nolan JP, Parr M, Tibballs J, van der Jagt EW, Young L. Recommended guidelines for monitoring, reporting, and conducting research on medical emergency team, outreach, and rapid response systems: an Utstein-style scientific statement. A Scientific Statement from the International Liaison Committee on Resuscitation; the American Heart Association Emergency Cardiovascular Care Committee; the Council on Cardiopulmonary, Perioperative, and Critical Care; and the Interdisciplinary Working Group on Quality of Care and Outcomes Research. Resuscitation. 2007 Dec;75(3):412-33 • Herrera M, López F, González H, Domínguez P, García C, Bocanegra C. [Results of the first year of experience of the cardiopulmonary resuscitation program "Juan Ramón Jiménez" Hospital (Huelva)] Med Intensiva. 2010 Apr;34(3):170-81.

INDICATOR NUMBER 11

Name of the indicator	**REGISTRY OF QUALITY INDICATORS IN HEART SURGERY**
Dimension	Safety and effectiveness
Justification	Units with heart surgery are recommended to have a specific registry about some related indicators related to process and outcome to enable the quality of care to be assessed. Likewise, the registry enables benchmarking with other units.
Formula	YES/NO
Explanation of terms	The registry should include most of the following indicators: • Nº. of re-examinations • Prolonged mechanical ventilation • Surgical wound infection • Perioperative CVA • Perioperative AMI • Postoperative renal failure • Risk-adjusted hospital mortality Participation in the SEMICYUC's RECCMI (Spanish heart surgery registry for intensive care) will fulfill the standard
Population	• Critical care department
Type	Structure
Source of data	Hospital registry. PLARSE (SEMICYUC's registry platform)
Standard	Yes (100%)
Comments	References: • Shahian DM, Edwards FH, Ferraris VA, Haan CK, Rich JB, Normand SL, DeLong ER, O'Brien SM, Shewan CM, Dokholyan RS, Peterson ED; Society of Thoracic Surgeons Quality Measurement Task Force. Quality measurement in adult cardiac surgery: part 1--Conceptual framework and measure selection. Ann Thorac Surg. 2007 Apr;83(4 Suppl):S3-12. • Shroyer AL, McDonald GO, Wagner BD, Johnson R, Schade LM, Bell MR, Grover FL. Improving quality of care in cardiac surgery: evaluating risk factors, processes of care, structures of care, and outcomes. Semin Cardiothorac Vasc Anesth. 2008 Sep;12(3):140-5 • Ferris TG, Torchiana DF. Public release of clinical outcomes data—online CABG report cards. N Engl J Med. 2010 Oct 21;363(17):1593-5

INDICATOR NUMBER 12

Name of the indicator	**INCIDENCE OF EARLY COMPLICATIONS IN THE IMPLANTATION OF PERMANENT PACEMAKERS (PP)**
Dimension	Safety
Justification	The appearance of complications in patients in whom PP are implanted is associated to increased mortality.
Formula	Nº. of patients with early complications after PP implantation ---------- x 100 Nº. of patients undergoing PP implantation
Explanation of terms	The following are considered <u>early complications</u>: • cavity perforation • electrode dislocation • pneumothorax • arterial puncture PP infection is not included because it is generally considered to be a late complication.
Population	All patients discharged from the critical care department after PP implantation in the period reviewed.
Type	Outcome
Source of data	Clinical records from the critical care department. MAMI (Intensive care pacemaker registry)
Standard	< 2 %
Comments	References: • F. Zubia Olaskoaga. F. García Urra. [Report of MAMI (data base on definitive pacemakers in intensive medicine) registry 1996-2003]. Med Intensiva. 2005;29(5):265-71 • Poole JE, Gleva MJ, Mela T, Chung MK, Uslan DZ, Borge R, Gottipaty V, Shinn T, Dan D, Feldman LA, Seide H, Winston SA, Gallagher JJ, Langberg JJ, Mitchell K, Holcomb R; REPLACE Registry Investigators.. Complication rates associated with pacemaker or implantable cardioverter-defibrillator generator replacements and upgrade procedures: results from the REPLACE registry. Circulation. 2010 Oct 19;122(16):1553-6

ACUTE RESPIRATORY FAILURE

INDICATOR NUMBER 13

Name of the indicator	**INCIDENCE OF BAROTRAUMA**
Dimension	Safety
Justification	The appearance of barotrauma in patients on mechanical ventilation (MV) is independently associated to increased risk of death.
Formula	Nº. of patients with invasive MV > 12 h and barotrauma ---------- x 100 Nº. of patients with invasive MV > 12h
Explanation of terms	• Barotrauma is defined as the appearance of at least one of the following findings in relation with MV: ✓ interstitial emphysema ✓ pneumothorax ✓ pneumomediastinum ✓ subcutaneous emphysema • Barotrauma specifically associated with the placement of a central line or with chest trauma is specifically excluded.
Population	Patients undergoing invasive MV for more than 12 h discharged from the critical care department during the period reviewed.
Type	Outcome
Source of data	Clinical records
Standard	< 3%
Comments	References: • Esteban A, Anzueto A, Frutos F, Alía I, Brochard L, Stewart TE, Benito S, Epstein SK, Apezteguía C, Nightingale P, Arroliga AC, Tobin MJ; Mechanical Ventilation International Study Group.Characteristics and outcomes in adult patients receiving mechanical ventilation: a 28-day international study.JAMA. 2002 Jan 16;287(3):345-55. • Anzueto A, Frutos-Vivar F, Esteban A, Alía I, Brochard L, Stewart T, Benito S, Tobin MJ, Elizalde J, Palizas F, David CM, Pimentel J, González M, Soto L, D'Empaire G, Pelosi P. Incidence, risk factors and outcome of barotrauma in mechanically ventilated patients. Intensive Care Med. 2004 Apr;30(4):612-9 • de Lassence A, Timsit JF, Tafflet M, Azoulay E, Jamali S, Vincent F, Cohen Y, Garrouste-Orgeas M, Alberti C, Dreyfuss D; OUTCOMEREA Study Group.Pneumothorax in the intensive care unit: incidence, risk factors, and outcome.Anesthesiology. 2006 Jan;104(1):5-13. • Meade MO, Cook DJ, Guyatt GH, Slutsky AS, Arabi YM, Cooper DJ, Davies AR, Hand LE, Zhou Q, Thabane L, Austin P, Lapinsky S, Baxter A, Russell J, Skrobik Y, Ronco JJ, Stewart TE; Lung Open Ventilation Study Investigators. Ventilation strategy using low tidal volumes, recruitment maneuvers, and high positive end-expiratory pressure for acute lung injury and acute respiratory distress syndrome: a randomized controlled trial. JAMA. 2008 Feb 13;299(6):637-45.

INDICATOR NUMBER 14

Name of the indicator	**VENTILATOR CIRCUIT CHANGE AT 7 DAYS**
Dimension	Safety and efficiency
Justification	Routine circuit change is associated with increased ventilator-associated pneumonia (VAP). Circuits should be changed only when a malfunction is detected. Circuits should not be changed more often than once every 7 days. Ensuring circuits are not changed too often lowers costs; this measure is easy to apply and monitor in all units.
Formula	Nº. of circuits used ---------- x 100 Total Nº. of days MV/ 7
Explanation of terms	• Days MV/ 7 : represents the total number of 7-day blocks of MV
Population	All patients undergoing MV during the period reviewed.
Type	Process
Source of data	Clinical records. Nursing registry. Registry of material used.
Standard	< 100%
Comments	Circuits are still routinely changed in 55% of cases. References: • Branson RD. The ventilator circuit and ventilator-associated pneumonia. Respir Care. 2005 Jun;50(6):774-85 • Kaynar AM, Mathew JJ, Hudlin MM, Gingras DJ, Ritz RH, Jackson MR, Kacmarek RM, Kollef MH. Attitudes of respiratory therapists and nurses about measures to prevent ventilator-associated pneumonia: a multicenter, cross-sectional survey study. Respir Care. 2007 Dec;52(12):1687-94. • Han J, Liu Y. Effect of ventilator circuit changes on ventilator-associated pneumonia: a systematic review and meta-analysis. Respir Care. 2010 Apr;55(4):467-74

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INDICATOR NUMBER 15

Name of the indicator	**REGISTERING COMPLICATIONS OCCURRING IN PATIENTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS) WHILE IN THE PRONE POSITION**
Dimension	Safety
Justification	Position change to prone in patients with ARDS significantly improves oxygenation, permitting safer parameters in mechanical ventilation, although no significant reduction in mortality has been demonstrated. Recent evidence suggests that mortality is decreased in patients with more severe hypoxemia. Although complications associated with this technique are very uncommon, it is advisable to register them when they occur.
Formula	$\frac{\text{Nº. of patients with ARDS and serious complications after prone positioning}}{\text{Nº. of patients with ARDS placed in the prone position}} \times 100$
Explanation of terms	• The register should include at least the following events: ✓ accidental extubation ✓ accidental withdrawal of intravascular catheters ✓ appearance of decubitus ulcers (related to being in the prone position) ✓ obstruction of the endotracheal tube
Population	All patients with ARDS in the prone position during the period reviewed.
Type	Process
Source of data	Clinical records. Nursing registry.
Estándar	100%
Comments	References: • Mancebo J, Fernández R, Blanch L, Rialp G, Gordo F, Ferrer M, Rodríguez F, Garro P, Ricart P, Vallverdú I, Gich I, Castaño J, Saura P, Domínguez G, Bonet A, Albert RK. A multicenter trial of prolonged prone ventilation in severe acute respiratory distress syndrome. Am J Respir Crit Care Med. 2006 Jun 1;173(11):1233-9. • Martínez O, Nin N, Esteban A.[Prone position for the treatment of acute respiratory distress syndrome: a review of current literature]. Arch Bronconeumol. 2009 Jun;45(6):291-6 • Should prone positioning be routinely used for lung protection during mechanical ventilation?. Fessler HE, Talmor DS. Respir Care. 2010 Jan;55(1):88-99. • Sud S, Friedrich JO, Taccone P, Polli F, Adhikari NK, Latini R, Pesenti A, Guérin C, Mancebo J, Curley MA, Fernandez R, Chan MC, Beuret P, Voggenreiter G, Sud M, Tognoni G, Gattinoni L. Prone ventilation reduces mortality in patients with acute respiratory failure and severe hypoxemia: systematic review and meta-analysis. Intensive Care Med. 2010 Apr;36(4):585-99

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INDICATOR NUMBER 16

Name of the indicator	**SPONTANEOUS BREATHING TRIALS**
Dimension	Safety and efficiency
Justification	The availability of a protocol for weaning from mechanical ventilation (MV) and conducting daily spontaneous breathing trials in patients undergoing MV significantly shortens the total time under MV and reduces the risks associated with MV.
Formula	Nº. of patients undergoing MV with daily spontaneous breathing trials ---------- x 100 Total Nº. of patients undergoing MV
Explanation of terms	• Spontaneous breathing trial: scheduled attempt to disconnect the ventilator to test tolerance to spontaneous breathing using any of the following techniques: 1. T-tube test 2. 7 cm H_2O pressure support ventilation (PSV) 3. Continuous positive airway pressure (CPAP) with 5 cm H_2O • Synchronized intermittent mandatory ventilation (SIMV) is specifically excluded.
Population	All patients intubated during the period reviewed who meet the following criteria: ✓ resolution of the underlying condition ✓ adequate oxygenation and pH ✓ temperature < 38º C ✓ hemodynamic stability without the need for high doses of vasoactive amines ✓ adequate functioning of the respiratory musculature ✓ absence of metabolic and electrolyte disturbances ✓ absence of delirium and anxiety
Type	Process
Source of data	Clinical records.
Estándar	> 75%
Comments	The authors consider it more practical to measure the indicator using "patients with MV" as the unit of analysis rather than "days of MV" because weaning trials are not usually registered in IT systems, and this approach facilitates the application of the exclusion criteria. We recommend evaluating whether the trial has been performed daily in patients meeting the inclusion criteria (conducting trials on > 80% of days is considered acceptable). References: • Esteban A, Frutos F, Tobin MJ, Alía I, Solsona JF, Valverdú I, Fernández R, de la Cal MA, Benito S, Tomás R, et al. A comparison of four methods of weaning patients from mechanical ventilation. Spanish Lung Failure Collaborative Group.N Engl J Med. 1995 Feb 9;332(6):345-50. • Girard TD, Kress JP, Fuchs BD, Thomason JW, Schweickert WD, Pun BT, Taichman DB, Dunn JG, Pohlman AS, Kinniry PA, Jackson JC, Canonico AE, Light RW, Shintani AK, Thompson JL, Gordon SM, Hall JB, Dittus RS, Bernard GR, Ely EW. Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial): a randomised controlled trial. Lancet. 2008 Jan 12;371(9607):126-34. • Robertson TE, Sona C, Schallom L, Buckles M, Cracchiolo L, Schuerer D, Coopersmith CM, Song F, Buchman TG. Improved extubation rates and earlier liberation from mechanical ventilation with implementation of a daily spontaneous-breathing trial protocol. J Am Coll Surg. 2008 Mar;206(3):489-95.

INDICATOR NUMBER 17

Name of the indicator	**SELECTIVE DIGESTIVE TRACT DECONTAMINATION (DTD) IN PATIENTS AT RISK**
Dimension	Safety and efficiency.
Justification	The use of DTD in patients requiring mechanical ventilation (MV) for more than 48 h reduces the incidence of ventilator-associated pneumonia (VAP) and mortality without increasing the risk of multiresistance.
Formula	Nº. of patients at risk with MV treated with DTD ---------- x 100 Total Nº. of patients at risk with MV
Explanation of terms	• DTD: a combination of topical treatment (antibiotic paste applied in the oral cavity and antibiotic solution administered through the nasogastric tube) during the period of MV, together with IV cefotaxime during the first four days. • Patients at risk: patients undergoing MV expected to require MV for more than 48 h
Population	All patients undergoing MV for more than 48 h during the period reviewed.
Type	Process
Source of data	Clinical records
Standard	80%
Comments	References: • De La Cal MA, Cerdá E, García-Hierro P, van Saene HK, Gómez-Santos D, Negro E, Lorente JA. Survival benefit in critically ill burned patients receiving selective decontamination of the digestive tract: a randomized, placebo-controlled, double-blind trial. Ann Surg. 2005 Mar;241(3):424-30. • De Smet AM, Kluytmans JA, Cooper BS, Mascini EM, Benus RF, van der Werf TS, et al. Decontamination of the digestive tract and oropharynx in ICU patients. N Engl J Med. 2009 Jan 1;360(1):20-31. • Liberati A, D'Amico R, Pifferi S, Torri V, Brazzi L, Parmelli E. Antibiotic prophylaxis to reduce respiratory tract infections and mortality in adults receiving intensive care. Cochrane Database Syst Rev. 2009 Oct 7;(4):CD000022. • Sánchez García M [Debates in intensive medicine: Pro: selective decontamination.] Med Intensiva. 2010 Jun-Jul;34(5):325-33.

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INDICATOR NUMBER 18 (FUNDAMENTAL INDICATOR)

Name of the indicator	SEMIRECUMBENT POSITION IN PATIENTS UNDERGOING INVASIVE MECHANICAL VENTILATION (MV)
Dimension	Safety and effectiveness
Justification	The semirecumbent position reduces the incidence of pneumonia associated to mechanical ventilation (MV).
Formula	Nº. of days invasive MV and position ≥ 30º ---------- x 100 Nº. of days invasive MV
Explanation of terms	Semirecumbent position: position maintaining an angle ≥ 30º
Population	All patients undergoing invasive MV during the period reviewed. • Exclusion criteria: ✓ patients ventilated in the prone position ✓ clinical contraindications
Type	Process
Source of data	ICU clinical records
Standard	97%
Comments	The authors recommend daily sampling to measure this indicator References: • Torres A, Serra-Batlles J, Ros E, Piera C, Puig de la Bellacasa J, Cobos A, Lomeña F, Rodríguez-Roisin R. Pulmonary aspiration of gastric contents in patients receiving mechanical ventilation: the effect of body position.Ann Intern Med. 1992 Apr 1;116(7):540-3. • Drakulovic MB, Torres A, Bauer TT, Nicolas JM, Nogué S, Ferrer M. Supine body position as a risk factor for nosocomial pneumonia in mechanically ventilated patients: a randomised trial. Lancet. 1999 Nov 27;354(9193):1851-8. • van Nieuwenhoven CA, Vandenbroucke-Grauls C, van Tiel FH, Joore HC, van Schijndel RJ, van der Tweel I, Ramsay G, Bonten MJ.Feasibility and effects of the semirecumbent position to prevent ventilator-associated pneumonia: a randomized study. Crit Care Med. 2006 Feb;34(2):396-402. • Alexiou VG, Ierodiakonou V, Dimopoulos G, Falagas ME. Impact of patient position on the incidence of ventilator-associated pneumonia: a meta-analysis of randomized controlled trials. J Crit Care. 2009 Dec;24(4):515-22

SEMICYUC

INDICATOR NUMBER 19

Name of the indicator	**CHANGING HEAT-AND-MOISTURE EXCHANGERS**
Dimension	Safety and effectiveness
Justification	In the absence of malfunction or fouling, changing heat-and-moisture exchangers is not indicated before 48 h. Unnecessary or early replacement can increase the incidence of ventilator-associated pneumonia (VAP).
Formula	Nº. of patients with heat-and-moisture exchanger and appropriate replacement ---------- x100 Nº. of patients with heat-and-moisture exchanger
Explanation of terms	• Appropriate replacement: Indications for substitution: ✓ > 48 h ✓ Malfunctioning ✓ Fouling
Population	All patients with heat-and-moisture exchangers during the period reviewed.
Type	Process
Source of data	Clinical records
Standard	100%
Comments	Exchangers should never be replaced until after at least 48 h; replacement should always be carried out following the manufacturer's specific recommendations. References: • Boisson C, Viviand X, Arnaud S, Thomachot L, Miliani Y, Martin C. Changing a hydrophobic heat and moisture exchanger after 48 hours rather than 24 hours: a clinical and microbiological evaluation. Intensive Care Med. 1999 Nov;25(11):1237-43. • Muscedere J, Dodek P, Keenan S, Fowler R, Cook D, Heyland D; VAP Guidelines Committee and the Canadian Critical Care Trials Group. Comprehensive evidence-based clinical practice guidelines for ventilator-associated pneumonia: prevention. J Crit Care. 2008 Mar;23(1):126-37. • Lorente L, Blot S, Rello J. New issues and controversies in the prevention of ventilator-associated pneumonia. Am J Respir Crit Care Med. 2010 Oct 1;182(7):870-6.

SEMICYUC

INDICATOR NUMBER 20 (FUNDAMENTAL INDICATOR)

Name of the indicator	PREVENTION OF THROMBOEMBOLISM
Dimension	Safety
Justification	The use of prophylactic measures against deep vein thromboembolism (DVTE) during the ICU stay is associated to a decrease in morbidity and mortality due to thromboembolism.
Formula	Nº. of patients receiving prophylaxis against DVTE ---------- x 100 Nº. of patients admitted
Explanation of terms	• Prophylaxis against DVTE: Use of any of the following throughout the ICU stay: ✓ Fractionated heparin ✓ Unfractionated heparin ✓ Fondaparinux ✓ Complete anticoagulation ✓ Devices (pneumatic or other) for compressing the lower limbs
Population	All patients discharged from the critical care department during the period reviewed. • Exclusion criteria ✓ absolute: patients admitted for procedures requiring hospitalization ≤ 1 day ✓ for the use of pharmacologic prophylaxis: contraindications for anticoagulation ✓ for the use of mechanical measures: lower limb lesions
Type	Process
Source of data	Clinical records
Standard	90% In the SEMICYUC's study (2007), compliance was 77.4%
Comments	The authors recommend measuring this indicator by periods. References: • Crowther MA, Cook DJ. Preventing venous thromboembolism in critically ill patients. Semin Thromb Hemost. 2008 Jul;34(5):469-74. • Chan CM, Shorr AF. Venous thromboembolic disease in the intensive care unit. Semin Respir Crit Care Med. 2010 Feb;31(1):39-46. • Cook DJ, Crowther MA.Thromboprophylaxis in the intensive care unit: focus on medical-surgical patients. Crit Care Med. 2010 Feb;38(2 Suppl):S76-82.

INDICATOR NUMBER 21

Name of the indicator	**UNPLANNED EXTUBATION**
Dimension	Safety
Justification	Unplanned extubation is associated with a high rate of reintubation and with increased risk of nosocomial pneumonia and death.
Formula	Nº. of unplanned extubations ---------- x 1000 Total Nº. of days of intubation
Explanation of terms	• Unplanned extubation includes: ✓ Accidental extubation: unforeseen or undesired extubation caused by malfunctioning of the tube itself (obstruction or breakage of the inflator cuff) or by inappropriate maneuver by professionals. ✓ Self-extubation: unforeseen or undesired extubation caused by the patient's own actions.
Population	All days of intubation in patients who require invasive mechanical ventilation through an endotracheal tube during the period reviewed.
Type	Outcome
Source of data	Clinical records
Standard	15 episodes x 1000 days MV The reported incidence ranges from 3% to 14% of MV patients
Comments	References: • Bouza C, Garcia E, Diaz M, Segovia E, Rodriguez I. Unplanned extubation in orally intubated medical patients in the intensive care unit: a prospective cohort study. Heart Lung. 2007 Jul-Aug;36(4):270-6 • Chang LY, Wang KW, Chao YF. Influence of physical restraint on unplanned extubation of adult intensive care patients: a case-control study. Am J Crit Care. 2008 Sep;17(5):408-15. • Curry K, Cobb S, Kutash M, Diggs C. Characteristics associated with unplanned extubations in a surgical intensive care unit. Am J Crit Care. 2008 Jan;17(1):45-51. • Tanios MA, Epstein SK, Livelo J, Teres D. Can we identify patients at high risk for unplanned extubation? A large-scale multidisciplinary survey. Respir Care. 2010 May;55(5):561-8.

SEMICYUC

INDICATOR NUMBER 22

Name of the indicator	**REINTUBATION**
Dimension	Safety and effectiveness
Justification	Reintubation significantly increases morbidity and mortality in critical patients (pneumonia, infection, anatomic lesions, etc.).
Formula	Nº. of reintubations ---------- x 100 Total Nº. of planned extubations
Explanation of terms	Reintubation: the need to reintubate within 48 h of extubation
Population	All planned extubations during the period reviewed. Exclusion criteria: • Extubations to withdraw life support • Reintubation due to surgical reintervention
Type	Outcome
Source of data	Clinical records from the critical care department
Standard	< 12%-13%
Comments	A low reintubation rate might indicate excessively long mechanical ventilation. References : • Frutos-Vivar F, Ferguson ND, Esteban A, Epstein SK, Arabi Y, Apezteguía C, González M, Hill NS, Nava S, D'Empaire G, Anzueto A. Risk factors for extubation failure in patients following a successful spontaneous breathing trial. Chest. 2006 Dec;130(6):1664-71 • Gowardman JR, Huntington D, Whiting J. The effect of extubation failure on outcome in a multidisciplinary Australian intensive care unit. Crit Care Resusc. 2006 Dec;8(4):328-33. • Kulkarni AP, Agarwal V. Extubation failure in intensive care unit: predictors and management. Indian J Crit Care Med. 2008 Jan;12(1):1-9. • Frutos-Vivar F, Esteban A, Apezteguia C, González M, Arabi Y, Restrepo MI, Gordo F, Santos C, Alhashemi JA, Pérez F, Peñuelas O, Anzueto A. Outcome of reintubated patients after scheduled extubation. J Crit Care. 2011 Mar 2. [Epub ahead of print]

INDICATOR NUMBER 23 (FUNDAMENTAL INDICATOR)

Name of the indicator	EARLY IMPLEMENTATION OF NONINVASIVE MECHANICAL VENTILATION ON EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)
Dimension	Effectiveness and efficiency.
Justification	The use of non-invasive mechanical ventilation (MV) on exacerbation of COPD reduces mortality, hospital stay, and the need for orotracheal intubation; moreover, it increases the success of treatment.
Formula	Nº. of patients diagnosed with exacerbation of COPD treated with early non-invasive MV ---------- x 100 Nº. of patients diagnosed with exacerbation of COPD discharged from the ICU
Explanation of terms	• Early noninvasive MV: initiated within 2 h of admission
Population	All patients diagnosed with exacerbation of COPD who are discharged from the ICU during the period reviewed Exclusion criteria: Contraindications for non-invasive MV • coma (GCS ≤8) • intolerance to the technique • facial lesions that contraindicate the use of the mask
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Gorini M, Ginanni R, Villella G, Tozzi D, Augustynen A, Corrado A. Non-invasive negative and positive pressure ventilation in the treatment of acute on chronic respiratory failure. Intensive Care Med. 2004 May;30(5):875-81 • Ram FS, Picot J, Lightowler J, Wedzicha JA. Non-invasive positive pressure ventilation for treatment of respiratory failure due to exacerbations of chronic obstructive pulmonary disease. Cochrane Database Syst Rev. 2004;(3):CD004104 • Ram FS, Wellington S, Rowe B, Wedzicha JA. Non-invasive positive pressure ventilation for treatment of respiratory failure due to severe acute exacerbations of asthma. Cochrane Database Syst Rev. 2005 Jul 20;(3):CD004360 • Fernández-Vivas M, González-Díaz G, Caturla-Such J, Delgado-Vílchez FJ, Serrano-Simón JM, Carrillo-Alcaraz A, Vayá-Moscardó J, Galcerá-Tomás J, Jaime-Sánchez FA, Solera-Suárez M. [Use of non-invasive ventilation in acute respiratory failure. Multicenter study in intensive care units]. Med Intensiva. 2009 May;33(4):153-60

SEMICYUC

INDICATOR NUMBER 24 (FUNDAMENTAL INDICATOR)

Name of the indicator	LUNG-PROTECTIVE VENTILATION IN ACUTE LUNG INJURY (ALI) / ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)
Dimension	Safety
Justification	Acute respiratory distress syndrome (ARDS) and acute lung injury (ALI) are complicated by ventilator-associated lung injury. Lung-protective strategies can help improve survival.
Formula	Nº. of patients with ALI/ARDS receiving lung-protective ventilation ---------- x 100 Nº. of patients with ALI/ARDS undergoing MV
Explanation of terms	• Acute lung injury: lung injury accompanied by Pa/FIO2<300 regardless of PEEP and meeting the Consensus Conference criteria (1) • Lung-protective ventilation: Vt < 8 ml /kg (ideal weight) and Plateau pressure < 30 H_2O
Population	Patients with ALI/ARDS undergoing invasive MV > 24 h in the period reviewed
Type	Process
Source of data	Clinical records from the critical care department / Nursing registries
Standard	95%
Comments	References: : • (1) Bernard GR, Artigas A, Brigham KL, Carlet J, Falke K, Hudson L, Lamy M, Legall JR, Morris A, Spragg R. The American-European Consensus Conference on ADRS. Definitions, mechanisms, relevant outcomes, and clinical trial coordination. Am J Respir Crit Care Med 1994;149:818-24 • Petrucci N, Iacovelli W. Lung protective ventilation strategy for the acute respiratory distress syndrome. Cochrane Database Syst Rev. 2007 Jul 18;(3):CD003844 • Meade MO, Cook DJ, Guyatt GH, Slutsky AS, Arabi YM, Cooper DJ, Davies AR, Hand LE, Zhou Q, Thabane L, Austin P, Lapinsky S, Baxter A, Russell J, Skrobik Y, Ronco JJ, Stewart TE; Lung Open Ventilation Study Investigators. Ventilation strategy using low tidal volumes, recruitment maneuvers, and high positive end-expiratory pressure for acute lung injury and acute respiratory distress syndrome: a randomized controlled trial. JAMA. 2008 Feb 13;299(6):637-45. • Checkley W, Brower R, Korpak A, Thompson BT; Acute Respiratory Distress Syndrome Network Investigators. Effects of a clinical trial on mechanical ventilation practices in patients with acute lung injury. Am J Respir Crit Care Med. 2008 Jun 1;177(11):1215-22

NEUROINTENSIVE CARE AND TRAUMATOLOGY

INDICATOR NUMBER 25

Name of the indicator	EXAMINATION OF POTENTIALLY SEVERE TRAUMA PATIENTS BY INTENSIVISTS
Dimension	Effectiveness and safety.
Justification	Examination by intensivists can improve care in patients with potentially severe trauma (PST), regardless of where patients are.
Formula	Nº. of PST patients examined by an intensivist on admission ---------- x 100 Total Nº. of PST patients in the hospital (emergency department and ICU)
Explanation of terms	PST: trauma resulting in serious lesions scoring ≤ 11 on the Revised Trauma Score (RTS)[1] at triage and/or ≥ 16 on the Injury Severity Score (ISS) [2]
Population	Patients with PST discharged from the hospital during the period reviewed
Type	Process
Source of data	Clinical records
Standard	95 %
Comments	References: [1] Champion HR, Sacco WJ, Copes WS, Gann DS, Gennarelli TA, Flanagan ME. A revision of the Trauma Score.J Trauma. 1989 May;29(5):623-9. [2] Baker SP, O'Neill B, Haddon W, Long WB. The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care.J Trauma. 1974 Mar;14(3):187-96. • Marco P. Asistencia al paciente politraumatizado: el liderazgo del intensivista. Med Intensiva 1999;23:111-113 • Brain Trauma Foundation; American Association of Neurological Surgeons; Congress of Neurological Surgeons. Guidelines for the management of severe traumatic brain injury. J Neurotrauma. 2007;24 Suppl 1:S1-106. • Alted López E, Bermejo Aznárez S, Fernández MC. [Updates on severe traumatic brain injury management] Med Intensiva. 2009 Jan-Feb;33(1):16-30 • Alerta seguridad Fundación Avedis Donabedian: Traumatismo infravalorado en urgencias. http://fad.onmedic.net/Portals/0/SeguridadAt/Alerta%202%20Trauma_v2.PDF

SEMICYUC

INDICATOR NUMBER 26

Name of the indicator	**TRACHEAL INTUBATION IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY AND GLASGOW COMA SCORE < 9 DURING THE FIRST 24 HOURS**
Dimension	Safety
Justification	Inadequate control of hypoxemia in severe traumatic brain injury (TBI) increases secondary brain lesions, worsening the prognosis for survival and function. Tracheal intubation in patients with severe TBI is well established in clinical guidelines.
Formula	Nº. of patients with severe TBI intubated ---------- x 100 Nº. of patients with severe TBI
Explanation of terms	• Severe TBI: Glasgow Coma Score (GCS) < 9 • This indicator should be evaluated only within 24 h of the traumatic incident
Population	Patients with severe TBI (GCS <9) discharged from the critical care department during the period reviewed Exclusion criteria: patients admitted to critical care more than 24 h after the traumatic incident
ype	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Brain Trauma Foundation; American Association of Neurological Surgeons; Congress of Neurological Surgeons. Guidelines for the management of severe traumatic brain injury. J Neurotrauma. 2007;24 Suppl 1:S1-106. • Alted López E, Bermejo Aznárez S, Fernández MC. [Updates on severe traumatic brain injury management] Med Intensiva. 2009 Jan-Feb;33(1):16-30

INDICATOR NUMBER 27

Name of the indicator	**SURGICAL INTERVENTION IN TRAUMATIC BRAIN INJURY (TBI) WITH SUBDURAL HEMATOMA (SDH) AND/OR EPIDURAL HEMATOMA (EDH)**
Dimension	Safety and effectiveness
Justification	Delays in surgical treatment of subdural and epidural hematomas in TBI with signs of intracranial hypertension are associated with worse outcomes and increased mortality.
Formula	Nº. of patients with TBI and SDH/EDH with intracranial hypertension undergoing surgical intervention within 2 h / Nº. of patients with TBI and SDH/EDH with intracranial hypertension and indications for surgery x 100
Explanation of terms	• 2 h: time period from CT examination (time stated on CT images) to surgery • Indications for surgery: based on clinical criteria for intracranial hypertension and on radiological criteria for SDH/EDH ✓ Clinical criteria: GCS <9; focal deficit, anisocoria or dilated pupils; ICP > 20 mmHg ✓ Radiological criteria: o EDH: > 30 cc volume; > 15 mm thickness; > 5 mm displacement of the midline o SDH: > 10 mm thickness; > 5 mm displacement of the midline
Population	All patients with TBI and SDH/EDH and indications for surgical intervention discharged from the critical care department during the period reviewed Exclusion criteria: patients with orders to withhold life support
Type	Process
Source of data	Clinical records
Standard	100 %
Comments	References: • Compagnone C, Murray GD, Teasdale GM, Maas AI, Esposito D, Princi P, D'Avella D, Servadei F. The management of patients with intradural post-traumatic mass lesions: a multicenter survey of current approaches to surgical management in 729 patients coordinated by the European Brain Injury Consortium. Neurosurgery. 2007 Jul;61(1 Suppl):232-40 • Brain Trauma Foundation; American Association of Neurological Surgeons; Congress of Neurological Surgeons. Guidelines for the management of severe traumatic brain injury. J Neurotrauma. 2007;24 Suppl 1:S1-106. • Alted López E, Bermejo Aznárez S, Fernández MC. [Updates on severe traumatic brain injury management] Med Intensiva. 2009 Jan-Feb;33(1):16-30

SEMICYUC

INDICATOR NUMBER 28

Name of the indicator	**INCIDENCE OF ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS) IN SEVERE TRAUMA**
Dimension	Effectiveness and safety
Justification	ARDS is a complication in patients with severe traumatic injuries that is associated with high morbidity and mortality. Although the development of ARDS is related to various factors, early and appropriate resuscitation of patients with severe trauma can reduce the incidence of this complication
Formula	Nº. of patients with severe trauma who develop ARDS ---------- x 100 Total number of patients with severe trauma discharged from the ICU
Explanation of terms	• ARDS (1) : respiratory failure of abrupt onset characterized by PaO2/FiO2 < 200 mm Hg, bilateral lung infiltrates on chest films with pulmonary capillary pressure (PCwP) < 18 mm Hg or without clinical or radiologic signs of elevated left atrial pressure • Severe trauma: trauma resulting in severe injuries scoring ≤ 11 on the Revised Trauma Score (RTS) at triage and/or ≥ 16 on the Injury Severity Score (ISS)
Population	All patients with severe trauma discharged from the critical care department during the period reviewed.
Type	Outcome
Source of data	Clinical records
Standard	10 %
Comments	References: • (1) Bernard GR, Artigas A, Brigham KL, Carlet J, Falke K, Hudson L, Lamy M, Legall JR, Morris A, Spragg R. The American-European Consensus Conference on ADRS. Definitions, mechanisms, relevant outcomes, and clinical trial coordination. Am J Respir Crit Care Med 1994;149:818-24 • Navarrete-Navarro P, Ruiz-Bailén M, Rivera-Fernández R, Guerrero-López F, Pola-Gallego-de-Guzmán MD, Vázquez-Mata G. Acute respiratory distress syndrome in trauma patients: ICU mortality and prediction factors. Intensive Care Med. 2000 Nov;26(11):1624-9. • Wu J, Sheng L, Ma Y, Gu J, Zhang M, Gan J, Xu S, Jiang G.The analysis of risk factors of impacting mortality rate in severe multiple trauma patients with posttraumatic acute respiratory distress syndrome.Am J Emerg Med. 2008 May;26(4):419-24. • O'Toole RV, O'Brien M, Scalea TM, Habashi N, Pollak AN, Turen CH.Resuscitation before stabilization of femoral fractures limits acute respiratory distress syndrome in patients with multiple traumatic injuries despite low use of damage control orthopedics.J Trauma. 2009 Nov;67(5):1013-21 • Ingraham AM, Xiong W, Hemmila MR, Shafi S, Goble S, Neal ML, Nathens AB.The attributable mortality and length of stay of trauma-related complications: a matched cohort study.Ann Surg. 2010 Aug;252(2):358-62. • Marina-Martínez L, Sánchez-Casado M, Hortiguela-Martin V, Taberna-Izquierdo MA, Raigal-Caño A, Pedrosa-Guerrero A, Quintana-Díaz M, Rodríguez-Villa S. RETRATO(REgistro de TRAuma grave de la provincia de TOledo): general view and mortality]. Med Intensiva. 2010 Aug-Sep;34(6):379-87

INDICATOR NUMBER 29

Name of the indicator	MONITORING INTRACRANIAL PRESSURE (ICP) IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY WITH PATHOLOGIC CT FINDINGS
Dimension	Safety and effectiveness
Justification	Monitoring ICP helps in the management of patients with severe traumatic brain injury (TBI). High ICP is associated to worse prognosis and monitoring ICP is useful for orienting specific treatment options involving different therapeutic measures. Including ICP monitoring in TBI protocols has decreased mortality in this group of patients.
Formula	Nº. of patients with severe TBI and pathologic CT findingsin whom ICP was monitored ---------- x 100 Nº. of patients with severe TBI and pathologic CT findings
Explanation of terms	• Severe TBI: GCS < 9 • Pathologic CT findings: at least one of the following signs: hematomas, contusions, edema, or compression of the basal cisterns • ICP monitoring: using any standardized technique
Population	All patients with severe TBI and pathologic CT findings discharged from the critical care department during the period reviewed • Exclusion criterion: orders to withhold life support
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Brain Trauma Foundation; American Association of Neurological Surgeons; Congress of Neurological Surgeons. Guidelines for the management of severe traumatic brain injury. J Neurotrauma. 2007;24 Suppl 1:S1-106. • Andrews PJ, Citerio G, Longhi L, Polderman K, Sahuquillo J, Vajkoczy P; Neuro-Intensive Care and Emergency Medicine (NICEM) Section of the European Society of Intensive Care Medicine.NICEM consensus on neurological monitoring in acute neurological disease. Intensive Care Med. 2008 Aug;34(8):1362-70. • Alted López E, Bermejo Aznárez S, Fernández MC. [Updates on severe traumatic brain injury management] Med Intensiva. 2009 Jan-Feb;33(1):16-30

SEMICYUC

INDICATOR NUMBER 30

Name of the indicator	**MORTALITY IN SEVERE TRAUMATIC BRAIN INJURY (TBI)**
Dimension	Safety
Justification	Standardized treatment based on clinical guidelines significantly decreases mortality in patients with severe TBI.
Formula	Nº. of in-hospital deaths among patients with severe TBI ---------- x 100 Total Nº. of patients with severe TBI discharged from the critical care department
Explanation of terms	• Severe TBI: GCS < 9. • In-hospital death: regardless of where it occurs in the hospital
Population	All patients with severe TBI discharged from the critical care department
Type	Outcome
Source of data	Clinical records
Standard	< 40%
Comments	References: • Reviejo K, Arcega I, Txoperena G, Azaldegui F, Alberdi F, Lara G. Análisis de factores pronósticos de la mortalidad en el traumatismo craneoencefálico grave. Proyecto Poliguitania. Med Intensiva 2002;26(5):241-247 • Brain Trauma Foundation; American Association of Neurological Surgeons; Congress of Neurological Surgeons. Guidelines for the management of severe traumatic brain injury. J Neurotrauma. 2007;24 Suppl 1:S1-106. • Mauritz W, Steltzer H, Bauer P, Dolanski-Aghamanoukjan L, Metnitz P. Monitoring of intracranial pressure in patients with severe traumatic brain injury: an Austrian prospective multicenter study. Intensive Care Med. 2008 Jul;34(7):1208-1 • Alted López E, Bermejo Aznárez S, Fernández MC. [Updates on severe traumatic brain injury management] Med Intensiva. 2009 Jan-Feb;33(1):16-30

SEMICYUC

INDICATOR NUMBER 31

Name of the indicator	**EARLY OSTEOSYNTHESIS IN FRACTURES OF THE FEMORAL DIAPHYSIS**
Dimension	Safety, continuity of care, and effectiveness
Justification	Early stabilization of fractures of the femur in multiple trauma patients reduces mortality by decreasing the associated complications: sepsis, organ dysfunction, fat embolism, pulmonary thromboembolism, deterioration of the nutritional state, decubitus ulcers, etc. It also allows the patient to be moved earlier, reduces the needs for analgesics, facilitates nursing care, and reduces the length of the hospital stay.
Formula	Nº. of fractured femurs treated surgically within 24 h ---------- x 100 Nº. of fractured femurs with indications for surgery
Explanation of terms	• 24 h: time from the moment of fracture to surgery • Femoral fracture with indications for surgery: closed fracture of the femoral diaphysis • Exclusion criterion: instability contraindicating surgery
Population	Patients with closed fractures of the femoral diaphysis discharged from the critical care department during the period reviewed
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Dunham CM, Bosse MJ, Clancy TV, Cole FJ Jr, Coles MJ, Knuth T, Luchette FA, Ostrum R, Plaisier B, Poka A, Simon RJ; EAST Practice Management Guidelines Work Group.Practice management guidelines for the optimal timing of long-bone fracture stabilization in polytrauma patients: the EAST Practice Management Guidelines Work Group. J Trauma. 2001 May;50(5):958-67 • O'Brien PJ. Fracture fixation in patients having multiple injuries.Can J Surg. 2003 Apr;46(2):124-8. • Bone LB, Johnson KD, Weigelt J, Scheinberg R.Early versus delayed stabilization of femoral fractures: a prospective randomized study. 1989. Clin Orthop Relat Res. 2004 May;(422):11-6. • Stelfox HT, Bobranska-Artiuch B, Nathens A, Straus SE. Quality indicators for evaluating trauma care: a scoping review. Arch Surg. 2010 Mar;145(3):286-95.

SEMICYUC

INDICATOR NUMBER 32

Name of the indicator	**EARLY SURGICAL FIXATION OF OPEN FRACTURES**
Dimension	Safety
Justification	Early stabilization of open fractures reduces mortality by reducing associated complications, especially the risk of wound infection. It also allows the patient to be moved earlier, reduces the needs for analgesics, facilitates nursing care, and reduces the length of the hospital stay.
Formula	Nº. of open fractures with surgical fixation within 24 h of admission ---------- x 100 Nº. of open fractures
Explanation of terms	• Early (within 24 h): time from fracture to surgical intervention • Surgical fixation includes external fixation • Open fracture: any lesion in which the focus of the fracture communicates with the exterior through an opening through the skin and the rest of the tissues
Population	All patients with open fractures (femur, tibia, or upper limbs) discharged from the critical care department during the period reviewed ✓ Exclusion criteria: catastrophic injuries
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Muñoz Sánchez, MA, Rincón Ferrari, Murillo Cabezas F, Jiménez P, Navarrete Navarro P. Grupo Gitan. Traumatismos graves: análisis de calidad asistencial. Med Intensiva, 2002; 26 : 7-12. • Border JR. Death from Severe Trauma: Open Fractures to Multiple Organ Dysfunction Syndrome. J Trauma 1995 July;39(1):12-22. • Kazakos KJ, Verettas DJ, Tilkeridis K, Galanis VG, Xarchas KC, Dimitrakopoulou A.External fixation of femoral fractures in multiply injured intensive care unit patients. Acta Orthop Belg. 2006 Jan;72(1):39-43. • Evans C, Howes D, Pickett W, Dagnone L. Audit filters for improving processes of care and clinical outcomes in trauma systems. Cochrane Database Syst Rev. 2009 Oct 7;(4):CD007590. • Stelfox HT, Bobranska-Artiuch B, Nathens A, Straus SE. Quality indicators for evaluating trauma care: a scoping review. Arch Surg. 2010 Mar;145(3):286-95.

INDICATOR NUMBER 33

Name of the indicator	**EARLY CEREBRAL ANGIOGRAPHY IN SUBARACHNOID HEMORRHAGE (SAH)**
Dimension	Effectiveness and safety
Justification	Current trends favor early exclusion of the aneurysm in SAH to reduce the rate of rebleeding, which is highest in the first days of SAH. Early exclusion of the aneurysm helps prevent severe complications. This is supported by level II evidence
mula	Nº. of patients with SAH undergoing cerebral angiography within 48 h ---------- x 100 Nº. of patients with SAH admitted to critical care
Explanation of terms	• Angiography: angiography performed for the diagnosis and definitive treatment (exclusion) of the cerebral aneurysm, regardless of the hospital to which the patient is admitted • 48 h: time from the onset of SAH symptoms (NOT from admission)
Population	Patients with spontaneous SAH treated by the critical care department during the period reviewed, regardless of the severity of the SAH on hospital admission. • Exclusion criteria: ✓ patients admitted > 48 h after onset of symptoms ✓ orders to withhold life support
Type	Process
Source of data	Clinical records
Standard	90%
Comments	References: • Suarez JI, Tarr RW, Selman WR. Aneurysmal subarachnoid hemorrhage. N Engl J Med. 2006 Jan 26;354(4):387-96. • Guerrero López F, de la Linde Valverde CM, Pino Sánchez FI. [General management in intensive care of patient with spontaneous subarachnoid hemorrhage] Med Intensiva. 2008 Oct;32(7):342-53. • Bederson JB, Connolly ES Jr, Batjer HH, Dacey RG, Dion JE, Diringer MN, Duldner JE Jr, Harbaugh RE, Patel AB, Rosenwasser RH; American Heart Association. Guidelines for the management of aneurysmal subarachnoid hemorrhage: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke. 2009 Mar;40(3):994-1025.

SEMICYUC

INDICATOR NUMBER 34

Name of the indicator	**ADMINISTRATION OF NIMODIPINE IN SUBARACHNOID HEMORRHAGE (SAH)**
Dimension	Effectiveness and safety
Justification	Early nimodipine administration is efficacious (level I evidence) in reducing ischemic neurologic sequelae in patients with subarachnoid hemorrhage (SAH). The efficacy of nimodipine seems to be more related to a direct cellular mechanism than to reduced cerebral vasospasm.
Formula	Nº. of patients with SAH treated with nimodipine ---------- x 100 Total Nº. of patients with SAH admitted to critical care
Explanation of terms	• SAH: spontaneous, not traumatic. • Treatment with nimodipine: oral or intravenous, initiated within 24 h of diagnosis
Population	All patients with spontaneous SAH treated by the critical care department during the period reviewed, regardless of their severity on admission to the hospital. Exclusion criterion: intolerance to the treatment due to extreme hypotension
Type	Process
Source of data	Clinical records
Standard	100 %
Comments	References: • Dorhout Mees SM, Rinkel GJ, Feigin VL, Algra A, van den Bergh WM, Vermeulen M, van Gijn J. Calcium antagonists for aneurysmal subarachnoid haemorrhage. Cochrane Database Syst Rev. 2007 Jul 18;(3):CD000277 • Guerrero López F, de la Linde Valverde CM, Pino Sánchez FI. [General management in intensive care of patient with spontaneous subarachnoid hemorrhage] Med Intensiva. 2008 Oct;32(7):342-53 • Bederson JB, Connolly ES Jr, Batjer HH, Dacey RG, Dion JE, Diringer MN, Duldner JE Jr, Harbaugh RE, Patel AB, Rosenwasser RH; American Heart Association. Guidelines for the management of aneurysmal subarachnoid hemorrhage: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke. 2009 Mar;40(3):994-1025 • Rabinstein AA, Lanzino G, Wijdicks EF. Multidisciplinary management and emerging therapeutic strategies in aneurysmal subarachnoid haemorrhage. Lancet Neurol. 2010 May;9(5):504-19.

SEMICYUC

INDICATOR NUMBER 35

Name of the indicator	**CRITICAL ILLNESS POLYNEUROPATHY**
Dimension	Safety
Justification	Critical illness polyneuropathy (CIP) is especially common in septic patients with organ dysfunction undergoing sedation and treatment with muscle relaxants. It is associated with increased mortality as well as with prolonged mechanical ventilation (MV) and significant long-term sequelae.
Formula	Nº. of patients with MV > 72 h developing CIP ---------- x 100 Nº. of patients with MV > 72 h
Explanation of terms	• Critical illness polyneuropathy (CIP): Appearance of signs and symptoms meeting neurophysiologic diagnostic criteria for polyneuropathy
Population	All patients undergoing MV for more than 72 h during the period reviewed
Type	Outcome
Source of data	Clinical records
Standard	< 50 %
Comments	References: bibliográficas: • Garnacho-Montero J, Amaya-Villar R, García-Garmendía JL, Madrazo-Osuna J, Ortiz-Leyba C. Effect of critical illness polyneuropathy on the withdrawal from mechanical ventilation and the length of stay in septic patients. Crit Care Med. 2005 Feb;33(2):349-54. • Latronico N, Shehu I, Seghelini E. Neuromuscular sequelae of critical illness. Curr Opin Crit Care. 2005 Aug;11(4):381-90 • Bird SJ.Diagnosis and management of critical illness polyneuropathy and critical illness myopathy. Curr Treat Options Neurol. 2007 Mar;9(2):85-92. • Amaya Villar R, Garnacho-Montero J, Rincón Ferrari MD. [Neuromuscular abnormalities in critical illness] Med Intensiva. 2009 Apr;33(3):123-33

SEMICYUC

INDICATOR NUMBER 36

Name of the indicator	**IMMEDIATE CT EXAMINATION IN ISCHEMIC STROKE**
Dimension	Effectiveness and appropriateness
Justification	Intravenous thrombolysis within 3 h of ischemic stroke reduces neurologic deficit and improves the quality of life. To enable intravenous thrombolysis within 3 h, CT examination should be performed immediately after clinical suspicion in candidates for cerebral thrombolysis.
Formula	Nº. of patients with ischemic strokes susceptible to fibrinolysis in patients examined by CT within 2 h ---------- x 100 Nº. of patients with ischemic strokes susceptible to fibrinolysis in patients undergoing CT
Explanation of terms	• 2 h: time from onset of stroke symptoms (NOT from admission) • Susceptible to fibrinolysis: according to standardized criteria [(1)]
Population	All patients with ischemic stroke susceptible to fibrinolysis attended by the critical care department during the period reviewed
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: bibliográficas: • [(1)] National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group Tissue plasminogen activator for acute ischemic stroke. N Engl J Med 1995; 333: 1.581-1.587 • Holloway RG, Vickrey BG, Benesch C, Hinchey JA, Bieber J; National Expert Stroke Panel. Development of performance measures for acute ischemic stroke. Stroke. 2001 Sep;32(9):2058-74 • Adams HP Jr, del Zoppo G, Alberts MJ, et al. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups: The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. Circulation. 2007 May 22;115(20):e478-534. • Navarrete Navarro P, Pino Sánchez F, Rodríguez Romero R, Murillo Cabezas F, Jiménez Hernández MD. [Current management of acute isquemic stroke] Med Intensiva. 2008 Dec;32(9):431-43. • Reeves MJ, Parker C, Fonarow GC, Smith EE, Schwamm LH.Development of stroke performance measures: definitions, methods, and current measures. Stroke. 2010 Jul;41(7):1573-8

INDICATOR NUMBER 37

Name of the indicator	**INTRAVENOUS FIBRINOLYSIS IN ACUTE ISCHEMIC STROKE**
Dimension	Effectiveness
Justification	Intravenous fibrinolysis performed within 3 h of onset of symptoms reduces sequelae in these patients, leading to better quality of life. Some studies suggest the therapeutic window can be extended to 4.5 h.
Formula	Nº. of patients with ischemic strokes undergoing intravenous fibrinolysis ---------- x 100 Nº. of patients with ischemic strokes
Explanation of terms	Fibrinolysis: Administration according to standardized criteria [1,2]
Population	All patients with acute ischemic strokes attended by the critical care department during the period reviewed • Exclusion criterion: Contraindications for fibrinolysis
Type	Process
Source of data	Clinical records
Standard	100 %
Comments	References: Level I evidence Recommended door-needle time < 60 minutes from arrival at the emergency department • [1] National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group Tissue plasminogen activator for acute ischemic stroke. N Engl J Med 1995; 333: 1.581-1.587 • [2] Wardlaw, JM; del Zoppo, G; Yamaguchi, T; Berge, E. Thrombolysis for acute ischaemic stroke. Cochrane Database of Systematic Reviews. 3, 2003. • Adams HP Jr, del Zoppo G, Alberts MJ, et al. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups: The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. Circulation. 2007 May 22;115(20):e478-534. • Navarrete Navarro P, Pino Sánchez F, Rodríguez Romero R, Murillo Cabezas F, Jiménez Hernández MD. [Current management of acute isquemic stroke] Med Intensiva. 2008 Dec;32(9):431-43. • Hacke W, Kaste M, Bluhmki E, Brozman M, Dávalos A, Guidetti D, Larrue V, Lees KR, Medeghri Z, Machnig T, Schneider D, von Kummer R, Wahlgren N, Toni D; ECASS Investigators. Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. N Engl J Med. 2008 Sep 25;359(13):1317-29 • Reeves MJ, Parker C, Fonarow GC, Smith EE, Schwamm LH.Development of stroke performance measures: definitions, methods, and current measures. Stroke. 2010 Jul;41(7):1573-8

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INDICATOR NUMBER 38

Name of the indicator	USE OF SOMATOSENSORY EVOKED POTENTIALS (SEP) IN POST-ANOXIC ENCEPHALOPATHY
Dimension	Appropriateness
Justification	Performing SEP helps estimate the long-term prognosis from the third day (specificity 100%). The bilateral absence of the N20 component of the SEP in patients with absent photomotor reflexes and no response to pain orients the treatment of these patients, including the decision to withhold or withdraw life support.
Formula	Nº. of patients with post-anoxic encephalopathy undergoing SEP ---------- X 100 Nº. of patients with post-anoxic encephalopathy *
Explanation of terms	SEP: ideally should not be performed before the third day
Population	All patients with post-anoxic encephalopathy during the period reviewed • Inclusion criteria: All patients with post-anoxic encephalopathy lasting more than 3 days and with no photomotor response and no response to pain • Exclusion criteria: Brain death
Type	Process
Source of data	Clinical records
Standard	90%
Comments	References: • Recomendaciones de la 6º Conferencia de Consenso de la SEMICYUC. Estado vegetativo persistente postanoxia en el adulto. Med Intensiva 2003 27(8)544-555 • Rothstein TL.The utility of median somatosensory evoked potentials in anoxic-ischemic coma. Rev Neurosci. 2009;20(3-4):221-33. • Young GB.Clinical practice. Neurologic prognosis after cardiac arrest. N Engl J Med. 2009 Aug 6;361(6):605-11. • Guérit JM.Neurophysiological testing in neurocritical care. Curr Opin Crit Care. 2010 Feb 17 • Lee YC, Phan TG, Jolley DJ, Castley HC, Ingram DA, Reutens DC.Accuracy of clinical signs, SEP, and EEG in predicting outcome of hypoxic coma: a meta-analysis. Neurology. 2010 Feb 16;74(7):572-80

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INFECTIOUS DISEASES

INDICATOR NUMBER 39 (FUNDAMENTAL INDICATOR)

Name of the indicator	BACTEREMIA RELATED TO CENTRAL VENOUS CATHETER
Dimension	Safety and effectiveness
Justification	The use of central venous catheters (CVC) is indispensable in the treatment of hospitalized patients. Infection is one of the most important complications of CVC use. Bacteremia due to CVC is the main cause of nosocomial bacteremia in ICUs, being the third cause of nosocomial infection (after pneumonia and urinary infections). Although its real impact has not been well established, it is estimated that bacteremia related to CVCs results in 10% mortality, ICU stays prolonged by 5-8 days, and increased use of ICU resources. Like all nosocomial infections, bacteremia due to CVC can be prevented.
Formula	Nº. of episodes of bacteremia related to CVC ---------- x 1000 days CVC Total Nº. of days with a CVC in place
Explanation of terms	• Bacteremia related to CVC: according to the CDC criteria and those used in the ENVIN-UCI study • ENVIN: from the Spanish acronym for National Study to Invigilate Nosocomial Infection
Population	All days of CVC in patients discharged after having spent > 24 h in the ICU during the period reviewed
Type	Outcome
Source of data	Clinical records or ENVIN program
Standard	4 episodes per 1000 days with a CVC in place
Comments	Source of the standard: results of the ENVIN-UCI study (2009 report). http://hws.vhebron.net/envin-helics/ References: • Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM CDC definitions for nosocomial infections, 1988. Am J Infect Control. 1988 Jun;16(3):128-40 • Pronovost P, Needham D, Berenholtz S, Sinopoli D, Chu H, Cosgrove S, Sexton B, Hyzy R, Welsh R, Roth G, Bander J, Kepros J, Goeschel C. An intervention to decrease catheter-related bloodstream infections in the ICU. N Engl J Med. 2006 Dec 28;355(26):2725-32 • Palomar M, Vaque J, Alvarez Lerma F, Pastor V, Olaechea P, Fernández-Crehuet J.[Nosocomial infection indicators] Med Clin (Barc). 2008 Dec;131 Suppl 3:48-55 • Pronovost PJ, Goeschel CA, Colantuoni E, Watson S, Lubomski LH, Berenholtz SM, Thompson DA, Sinopoli DJ, Cosgrove S, Sexton JB, Marsteller JA, Hyzy RC, Welsh R, Posa P, Schumacher K, Needham D.Sustaining reductions in catheter related bloodstream infections in Michigan intensive care units: observational study. BMJ. 2010 Feb 4;340:c309. doi: 10.1136/bmj.c309. • Palomar Martínez M, Alvarez Lerma F, Riera Badía MA, León Gil C, López Pueyo MJ, Díaz Tobajas C, Sierra Camerino R, Benítez Ruiz L, Agra Varela Y; Grupo de Trabajo del Estudio Piloto «Bacteriemia Zero». [Prevention of bacteriema related with ICU catheters by multifactorial intervention: A report of the pilot study.] Med Intensiva. 2010 Dec;34(9):581-58

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INDICATOR NUMBER 40

Name of the indicator	URINARY TRACT INFECTION (UTI)RELATED TO URETHRAL CATHETER
Dimension	Safety and effectiveness
Justification	UTI related to urethral catheterization is one of the most common nosocomial infections in critical care (usually the second most common, after ventilator-associated pneumonia associated to mechanical ventilation). Although its impact on mortality is low, UTI significantly increases morbidity, length of stay, and costs. Like all nosocomial infections, UTI can be prevented.
Formula	Nº. of episodes of UTI ---------- x 1000 days of urethral catheter use Total Nº. of days of urethral catheter use
Explanation of terms	• Urinary tract infection: Meeting the criteria published by the Centers for Disease Control (CDC) and used in the ENVIN-UCI study
Population	All days of urethral catheter use in patients discharged after being in the ICU for more than 24 h during the period reviewed
Type	Outcome
Source of data	Clinical records or ENVIN program
Standard	4.5 episodes per 1000 days of urethral catheter use
Comments	Source of the standard: results of the ENVIN-UCI study (2009 report). http://hws.vhebron.net/envin-helics/ References: • Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infections, 1988. Am J Infect Control. 1988 Jun;16(3):128-40 • Bagshaw SM, Laupland KB.Epidemiology of intensive care unit-acquired urinary tract infections. Curr Opin Infect Dis. 2006 Feb;19(1):67-71 • Olaechea PM, Insausti J, Blanco A, Luque P. [Epidemiology and impact of nosocomial infections.]Med Intensiva. 2010 May;34(4):256-267 • Hooton TM, Bradley SF, Cardenas DD, Colgan R, Geerlings SE, Rice JC, Saint S, Schaeffer AJ, Tambayh PA, Tenke P, Nicolle LE; Infectious Diseases Society of America. Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. Clin Infect Dis. 2010 Mar 1;50(5):625-63.

INDICATOR NUMBER 41 (FUNDAMENTAL INDICATOR)

Name of the indicator	VENTILATOR-ASSOCIATED PNEUMONIA (VAP)
Dimension	Safety and effectiveness
Justification	Ventilator-associated pneumonia (VAP) is normally the most common nosocomial infection in the ICU. The importance of monitoring this indicator derives both from its impact on mortality (approximately one third of patients developing VAP die as a result of the infection) and on morbidity, with an average increase of ICU stay of 4 days and increased costs. Like all nosocomial infections, VAP can be prevented.
Formula	Nº. of episodes of VAP ---------- x 1000 days MV Total Nº. days invasive mechanical ventilation
Explanation of terms	• Ventilator-associated pneumonia: meeting the criteria published by the Centers for Disease Control and Prevention (CDC) and used in the ENVIN-UCI study and in the GTEI-SEMICYUC consensus document
Population	All days of invasive mechanical ventilation in patients spending > 24 h in the ICU during the period reviewed
Type	Outcome
Source of data	Clinical records or ENVIN program
Standard	12 episodes per 1000 days MV
Comments	Source of the standard: results of the ENVIN-UCI study (2009 report). http://hws.vhebron.net/envin-helics/ References: • Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM CDC definitions for nosocomial infections, 1988. Am J Infect Control. 1988 Jun;16(3):128-40 • Lisboa T, Rello J. Ventilator-associated pneumonia prevalence: to benchmark or not to benchmark. Crit Care Med. 2009 Sep;37(9):2657-9 • Rello J, Lode H, Cornaglia G, Masterton R; VAP Care Bundle Contributors. A European care bundle for prevention of ventilator-associated pneumonia. Intensive Care Med. 2010 May;36(5):773-80. Epub 2010 Mar 18. • Olaechea PM, Insausti J, Blanco A, Luque P. [Epidemiology and impact of nosocomial infections.] Med Intensiva. 2010 May;34(4):256-267

INDICATOR NUMBER 42

Name of the indicator	EARLY RESUSCITATION IN SEVERE SEPSIS / SEPTIC SHOCK
Dimension	Effectiveness
Justification	Severe sepsis (SeS) and septic shock (SS) are common in critical care departments, leading to high morbidity, mortality, and use of resources. Different therapeutic measures in the first hours of SeS / SS are effective in decreasing mortality among patients.
Formula	Nº. of patients with SeS/SS in whom early resuscitation was optimized ---------- x 100 Nº. of patients with SeS/SS discharged from the critical care department
Explanation of terms	• SeS and SS are defined according to standardized criteria [(1)] • Optimized early resuscitation: Reaching all the following therapeutic goals in the first 6 h: ✓ MAP: > 65 mmHg ✓ Diuresis: > 0.5 ml/Kg/h ✓ CVP: 8-12 mmHg or 12-15 mmHg if mechanical ventilation is used First 6 h: from the onset of symptoms, regardless of the patient's location: emergency department (entrance door), ICU, or others (diagnosis of SeS or SS)
Population	All patients with SeS or SS discharged from the critical care department during the period reviewed
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: [(1)] Levy MM, Fink MP, Marshall JC, Abraham E, Angus D, Cook D, Cohen J, Opal SM, Vincent JL, Ramsay G; 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference.International Sepsis Definitions Conference.Intensive Care Med. 2003 Apr;29(4):530-8 • Ferrer R, Artigas A, Levy MM, Blanco J, González-Díaz G, Garnacho-Montero J, Ibáñez J, Palencia E, Quintana M, de la Torre-Prados MV; Edusepsis Study Group. Improvement in process of care and outcome after a multicenter severe sepsis educational program in Spain. JAMA. 2008 May 21;299(19):2294-303. • Dellinger RP, Levy MM, Carlet JM, Bion J, Parker MM, Jaeschke R, Reinhart K, Angus DC, Brun-Buisson C, Beale R, Calandra T, Dhainaut JF, Gerlach H, Harvey M, Marini JJ, Marshall J, Ranieri M, Ramsay G, Sevransky J, Thompson BT, Townsend S, Vender JS, Zimmerman JL, Vincent JL.Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock: 2008. Intensive Care Med. 2008 Jan;34(1):17-60 • Levy MM, Dellinger RP, Townsend SR, Linde-Zwirble WT, Marshall JC, Bion J, Schorr C, Artigas A, Ramsay G, Beale R, Parker MM, Gerlach H, Reinhart K, Silva E, Harvey M, Regan S, Angus DC; Surviving Sepsis Campaign. The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis. Crit Care Med. 2010 Feb;38(2):367-74

INDICATOR NUMBER 43

Name of the indicator	INAPPROPRIATE EMPIRICAL ANTIBIOTIC TREATMENT FOR INFECTIONS TREATED IN THE ICU
Dimension	Safety and effectiveness
Justification	The administration of inappropriate empirical antibiotic treatment in infections is associated to increased mortality.
Formula	Nº. of patients with infections administered inappropriate empirical antibiotic treatment ---------- x 100 Nº. of patients with infections
Explanation of terms	• Empirical treatment**:** administration of antibiotics within 24 h of onset of infection when the microorganism responsible is unknown • Inappropriate empirical antibiotic treatment: 1. When the antibiogram after starting treatment shows that: ✓ according to accepted standards, none of the antibiotics administered acts against the microorganism identified ✓ the microorganism identified is resistant to the antibiotics administered 2. Incorrect dosage or mode of administration of antibiotics 3. The antibiotics do not penetrate the focus of infection well When combinations of antibiotics are administered, at least one of them must meet the above-mentioned criteria.
Population	All patients with infection who are discharged from the critical care department during the period reviewed. Exclusion criterion: infections in which no microorganism has been identified
Type	Outcome
Source of data	Clinical records
Standard	10%
Comments	References: • Garnacho-Montero J, Ortiz-Leyba C, Herrera-Melero I, Aldabó-Pallás T, Cayuela-Dominguez A, Marquez-Vacaro JA, Carbajal-Guerrero J, Garcia-Garmendia JLMortality and morbidity attributable to inadequate empirical antimicrobial therapy in patients admitted to the ICU with sepsis: a matched cohort study. Crit Care Med. 2003 Dec;31(12):2742-51. • Alvarez-Lerma F, Alvarez B, Luque P, Ruiz F, Dominguez-Roldan JM, Quintana E, Sanz-Rodriguez C; ADANN Study Group. Empiric broad-spectrum antibiotic therapy of nosocomial pneumonia in the intensive care unit: a prospective observational study.Crit Care. 2006;10(3):R78. • Gaieski DF, Mikkelsen ME, Band RA, Pines JM, Massone R, Furia FF, Shofer FS, Goyal M. Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department. Crit Care Med. 2010 Apr;38(4):1045-53. • Levy MM, Dellinger RP, Townsend SR, Linde-Zwirble WT, Marshall JC, Bion J, Schorr C, Artigas A, Ramsay G, Beale R, Parker MM, Gerlach H, Reinhart K, Silva E, Harvey M, Regan S, Angus DC; Surviving Sepsis Campaign. The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis. Crit Care Med. 2010 Feb;38(2):367-74.

INDICATOR NUMBER 44

Name of the indicator	METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS INFECTIONS (MRSA)
Dimension	Safety and effectiveness
Justification	The development of resistant strains of bacteria is a growing problem. This is especially important in the ICU owing to the difficulties involved in adequate control of the infection (critically ill patients, multiple invasive maneuvers, lack of asepsis, admission of carriers) and the frequency of antibiotic use. The appearance of multi-resistant microorganisms, particularly methicillin-resistant Staphylococcus aureus (MRSA), is associated with increased morbidity and mortality. Applying an appropriate antibiotic policy and a system for monitoring infection can help to reduce the magnitude of the problem.
Formula	No. of episodes of MRSA infection ---------- x 100 Total no. of infections*
Explanation of terms	• MRSA infection**:** according to the criteria published by the CDC and used in the ENVIN-UCI study. • The following infections are included*: ventilator-associated pneumonia, urethral catheter-related UTI, primary bacteremia, and catheter-related blood stream infections • Resistance to methicillin/oxacillin**:** *S. aureus* with MIC > 2 µg/ml.
Population	All patients who spend more than 24 h in the ICU discharged during the period reviewed.
Type	Outcome
Source of data	Clinical records
Standard	< 2.5 %
Comments	References: • Estudio ENVIN-UCI. Informe del año 2009 http://hws.vhebron.net/envin-helics/ • Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infections, 1988. Am J Infect Control. 1988 Jun;16(3):128-40 • McLaws ML, Pantle AC, Fitzpatrick KR, Hughes CF. More than hand hygiene is needed to affect methicillin-resistant Staphylococcus aureus clinical indicator rates: clean hands save lives, part IV. Med J Aust. 2009 Oct 19;191(8 Suppl):S26-31. • Thompson DS, Workman R, Strutt M. Decline in the rates of meticillin-resistant Staphylococcus aureus acquisition and bacteraemia in a general intensive care unit between 1996 and 2008. J Hosp Infect. 2009 Apr;71(4):314-9

INDICATOR NUMBER 45

Name of the indicator	INDICATIONS FOR ISOLATION
Dimension	Safety and appropriateness
Justification	To prevent cross-transmission of infections / colonization by microorganisms considered of epidemiological risk
Formula	Nº. of patients for whom isolation is indicated who are actually isolated ---------- x 100 Nº. of patients for whom isolation is indicated
Explanation of terms	• Isolation: Application of contact isolation measures • Indications for isolation: 1) Preventive isolation: ✓ patients transferred to the ICU from other centers ✓ patients transferred from other wards or other centers who have risk factors (prolonged hospitalization, decubitus ulcers, surgical wound infection, etc.) ✓ patients coming from nursing homes ✓ patients with a history of cultures positive for microorganisms with epidemiological risk (*M. Tuberculosis*, Meningococcus, MRSA, ESL-producing GNB, multiresistant Pseudomonas / Acinetobacter, vancomycin-resistant enterococci, H1N1 influenza….) 2) Documented isolation: ✓ Patients with any positive culture for microorganisms that represent an epidemiological risk
Population	All patients with indications for isolation who are discharged from the ICU during the period reviewed
Type	Process
Source of data	Clinical records Microbiology department
Standard	100 %
Comments	References: • Cooper BS, Stone SP, Kibbler CC, Cookson BD, Roberts JA, Medley GF, Duckworth G, Lai R, Ebrahim S. Isolation measures in the hospital management of methicillin resistant Staphylococcus aureus (MRSA): systematic review of the literature. BMJ. 2004 Sep 4;329(7465):533. • Loveday HP, Pellowe CM, Jones SR, Pratt RJ. A systematic review of the evidence for interventions for the prevention and control of meticillin-resistant Staphylococcus aureus (1996-2004): report to the Joint MRSA Working Party (Subgroup A). Hosp Infect. 2006 May;63 Suppl 1:S45-70 • Coia JE, Duckworth GJ, Edwards DI, Farrington M, Fry C, Humphreys H, Mallaghan C, Tucker DR; Joint Working Party of the British Society of Antimicrobial Chemotherapy; Hospital Infection Society; Infection Control Nurses Association. Guidelines for the control and prevention of meticillin-resistant Staphylococcus aureus (MRSA) in healthcare facilities. J Hosp Infect. 2006 May;63 Suppl 1:S1-44 • Tacconelli E.Screening and isolation for infection control. J Hosp Infect. 2009 Dec;73(4):371-7

INDICATOR NUMBER 46 (FUNDAMENTAL INDICATOR)

Name of the indicator	EARLY ANTIBIOTIC TREATMENT IN SEVERE SEPSIS
Dimension	Effectiveness and safety
Justification	Early administration of antibiotics improves the prognosis in severe sepsis. Clinical guidelines recommend the administration of antibiotics within 1 h of diagnosing sepsis. (Grade E recommendation).
Formula	Nº. of patients with severe sepsis administered antibiotics early ---------- x 100 Nº. of patients with severe sepsis
Explanation of terms	• Severe sepsis: defined according to standardized criteria [1] • Early administration: administration of antibiotics within 1 h of diagnosis of severe sepsis, regardless of where the diagnosis was reached (ICU, emergency department, or hospital ward)
Population	All patients with severe sepsis discharged from the ICU during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	Prior to the administration of antibiotics, blood cultures and samples must be obtained in function of the suspected septic focus. References: • (1) Levy MM, Fink MP, Marshall JC, Abraham E, Angus D, Cook D, Cohen J, Opal SM, Vincent JL, Ramsay G; 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference.International Sepsis Definitions Conference.Intensive Care Med. 2003 Apr;29(4):530-8 • Dellinger RP, Levy MM, Carlet JM, Bion J, Parker MM, Jaeschke R, Reinhart K, Angus DC, Brun-Buisson C, Beale R, Calandra T, Dhainaut JF, Gerlach H, Harvey M, Marini JJ, Marshall J, Ranieri M, Ramsay G, Sevransky J, Thompson BT, Townsend S, Vender JS, Zimmerman JL, Vincent JL.Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock: 2008.Intensive Care Med. 2008 Jan;34(1):17-60 • Ferrer R, Artigas A, Suarez D, Palencia E, Levy MM, Arenzana A, Pérez XL, Sirvent JM; Edusepsis Study Group. Effectiveness of treatments for severe sepsis: a prospective, multicenter, observational study. Am J Respir Crit Care Med. 2009 Nov 1;180(9):861-6 • Gaieski DF, Mikkelsen ME, Band RA, Pines JM, Massone R, Furia FF, Shofer FS, Goyal M. Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department. Crit Care Med. 2010 Apr;38(4):1045-53.

METABOLISM AND NUTRITIÓN

INDICATOR NUMBER 47

Name of the indicator	**COMPLICATIONS OF TOTAL PARENTERAL NUTRITION (TPN):** • **HYPERGLYCEMIA** • **LIVER DYSFUNCTION**
Dimension	Safety
Justification	TPN has been associated with different complications in critical patients, most commonly hyperglycemia and liver dysfunction. In cases of liver dysfunction, other factors, such as sepsis, may be involved. These complications must be managed, and treating them can reduce morbidity and the length of hospital stay.
Formula	Nº. of complications (hyperglycemia / liver dysfunction) in patients receiving TPN ---------- x 100 Total nº. Days TPN
Explanation of terms	Complications attributable to TPN (excluding complications attributed to other causes) • Hyperglycemia: Plasma glucose > 180 mg/dl in any determination • Liver dysfunction: bilirubin > 2 mg/dl, or GOT, GPT, or alkaline phosphatase ≥ twice the normal value, or INR ≥ twice the normal value (provided the patient is not receiving anticoagulant treatment)
Population	All patients receiving TPN who are discharged from the critical care department during the period reviewed
Type	Outcome
Source of data	Clinical records
Standard	- Hyperglycemia: ≤ 10% - Liver dysfunction: < 25%
Comments	References: • Grau T, Bonet A, Rubio M, Mateo D, Farré M, Acosta JA, Blesa A, Montejo JC, de Lorenzo AG, Mesejo A; Working Group on Nutrition and Metabolism of the Spanish Society of Critical Care. Liver dysfunction associated with artificial nutrition in critically ill patients. Crit Care. 2007;11(1):R10.. Crit Care. 2007;11(1):R10 • NICE-SUGAR Study Investigators, Finfer S, Chittock DR, Su SY, Blair D, Foster D, et al. Intensive versus conventional glucose control in critically ill patients. N Engl J Med. 2009; 360:1283-97. • Preiser JC, Devos P, Ruiz-Santana S, Mélot C, Annane D, Groeneveld J, Iapichino G, Leverve X, Nitenberg G, Singer P, Wernerman J, Joannidis M, Stecher A, Chioléro R. A prospective randomised multi-centre controlled trial on tight glucose control by intensive insulin therapy in adult intensive care units: the Glucontrol study. Intensive Care Med. 2009 Oct;35(10):1738-48 • Grau T, Bonet A. Caloric intake and liver dysfunction in critically ill patients.Curr Opin Clin Nutr Metab Care. 2009;12:175-9.

INDICATOR NUMBER 48

Name of the indicator	MAINTAINING APPROPRIATE BLOOD GLUCOSE LEVELS
Dimension	Effectiveness and safety
Justification	Hyperglycemia in critical patients is associated with increased morbimortality and infectious complications. Studies of strict control of glycemia using insulin infusion to maintain glucose levels between 80 and 110 mg/dL have found a high incidence of severe hypoglycemia and contradictory results concerning the effect of this treatment approach on mortality. Current evidence suggests that blood glucose levels should be maintained between 80 and 150 mg/dl with insulin therapy and that protocols aimed at strict glycemic control (80-110 mg/dL) should be avoided.
Formula	Nº of patients with blood glucose **> 150 mg/dL** treated with insulin ----------x 100 Nº. of patients with blood glucose > 150 mg/dL and indications for blood glucose control
Explanation of terms	• Indications for insulin treatment: blood glucose > 150 mg/dl • Patients with indications for blood glucose control: -Mechanical ventilation -Postoperative -Severe sepsis /septic shock -Multiple organ dysfunction syndrome -Artificial nutrition -Type I or type II diabetes
Population	All patients that require blood glucose control during the period reviewed
Type	Process
Source of data	Clinical records
Standard	80%
Comments	References: • Van den Berghe G, Wilmer A, Hermans G, et al. Intensive insulin therapy in the medical ICU. N Engl J Med 2006; 354:449-61. • Van den Berghe G, Wilmer A, Milants I et al. Intensive insulin therapy in mixed medical/surgical intensive care units: benefit versus harm.Diabetes 2006; 55:3151-9. • Preiser JC, Devos P, Ruiz-Santana S, Mélot C, Annane D, Groeneveld J, Iapichino G, Leverve X, Nitenberg G, Singer P, Wernerman J, Joannidis M, Stecher A, Chioléro R. A prospective randomised multi-centre controlled trial on tight glucose control by intensive insulin therapy in adult intensive care units: the Glucontrol study. Intensive Care Med. 2009 Oct;35(10):1738-48 • Finfer S, Chittock DR, Su SY et al. NICE-SUGAR Study Investigators. Intensive versus conventional glucose control in critically ill patients. N Engl J Med 2009; 360:1283-1297.

INDICATOR NUMBER 49

Name of the indicator	SEVERE HYPOGLYCEMIA
Dimension	Safety
Justification	There is no universal device that can infuse IV insulin effectively without compromising patients' safety. Therefore, it is necessary to measure the percentage of severe hypoglycemias to establish adequate measures to help to limit them as far as possible. Standardization of protocols for perfusion of insulin, disseminated so that all personnel are familiar with them, improves the efficiency and safety of glucose control in critical patients.
Formula	Total Nº. of glucose determinations with values <40mg/dl ----------x100 Total Nº. of glucose determinations performed
Explanation of terms	All determinations carried out in patients with indications for strict control of blood glucose should be counted <u>Indications for strict control of blood glucose:</u> -Mechanical ventilation -Postoperative -Severe sepsis /septic shock -Multiple organ dysfunction syndrome -Artificial nutrition -Type I or type II diabetes
Population	All blood glucose determinations carried out in patients who require glucose control during the period reviewed
Type	Outcome
Source of data	Clinical records
Standard	0.5%
Comments	References: • Brunkhorst FM, Engel C, Bloos F, Meier-Hellmann A, Ragaller M, Weiler N, Moerer O, Gruendling M, Oppert M, Grond S, Olthoff D, Jaschinski U, John S, Rossaint R, Welte T, Schaefer M, Kern P, Kuhnt E, Kiehntopf M, Hartog C, Natanson C, Loeffler M, Reinhart K; German Competence Network Sepsis (SepNet). Intensive insulin therapy and pentastarch resuscitation in severe sepsis. N Engl J Med. 2008 Jan 10;358(2):125-39. • Finfer S, Chittock DR, Su SY et al. NICE-SUGAR Study Investigators. Intensive versus conventional glucose control in critically ill patients. N Engl J Med 2009; 360:1283-1297. • Preiser JC, Devos P, Ruiz-Santana S, Mélot C, Annane D, Groeneveld J, Iapichino G, Leverve X, Nitenberg G, Singer P, Wernerman J, Joannidis M, Stecher A, Chioléro R. A prospective randomised multi-centre controlled trial on tight glucose control by intensive insulin therapy in adult intensive care units: the Glucontrol study. Intensive Care Med. 2009 Oct;35(10):1738-48 • Arabi YM, Tamim HM, Rishu AH.Hypoglycemia with intensive insulin therapy in critically ill patients: predisposing factors and association with mortality. Crit Care Med. 2009 Sep;37(9):2536-44.

INDICATOR NUMBER 50

Name of the indicator	IDENTIFICATION OF PATIENTS WITH NUTRITIONAL RISK
Dimension	Effectiveness and safety
Justification	The evaluation of nutritional risk (NR) is the first step in the treatment of malnutrition-related diseases. It enables the population requiring a complete nutritional evaluation to be identified and complementary nutritional treatment to be employed. The evaluation of a patient's NR should be done routinely on admission and repeated, depending on the degree of risk, periodically during the hospital stay.
Formula	Nº. of patients with an initial evaluation of NR ---------- x 100 Nº. of patients discharged from the critical care department
Explanation of terms	NR can be assessed with scales validated for this purpose (e.g., NRS 2002). If validated scales are not used, the presence of any of the following factors in an adult constitutes NR: • Presence or possible presence of malnutrition (involuntary weight loss > 10% of habitual body weight in the last 3-6 months or ≥ 5% of habitual body weight in 1 month, or body weight 20% below ideal weight) and presence of chronic disease or increased metabolic requirements • Inadequate ingestion maintained for at least 7 days (swallowing and absorption dysfunctions). • Altered oral ingestion (enteral or parenteral nutrition, recent surgery, disease). Initial evaluation: performed within 48 h of admission (periodic reevaluation is recommended thereafter).
Population	All patients admitted to critical care during the period reviewed**.** Exclusion criterion: ICU stay < 48 h
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Kondrup J, Allison SP, Elia M, Vellas B, Plauth M; Educational and Clinical Practice Committee, European Society of Parenteral and Enteral Nutrition (ESPEN). ESPEN guidelines for nutrition screening 2002. Clin Nutr. 2003 Aug;22(4):415-21. • Kondrup J, Rasmussen HH, Hamberg O, Stanga Z; Ad Hoc ESPEN Working Group. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. Clin Nutr. 2003 Jun;22(3):321-36. • ASPEN Board of Directors and the American College of Critical Care Medicine. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.).. 2009; 33: 277-316

INDICATOR NUMBER 51

Name of the indicator	ASSESSMENT OF NUTRITIONAL STATUS
Dimension	Effectiveness
Justification	The evaluation of nutritional status (NS) is the first step in nutritional treatment. It enables us to determine whether or not a patient is affected by malnutrition, classify and quantify the type and degree of malnutrition, reach a metabolic-nutritional diagnosis, choose the manner of administration, monitor the results of nutrition, and evaluate the efficacy of a determinate nutritional therapy.
Formula	Nº. of patients with nutrition risk and NS assessment ---------- x 100 Nº. of patients admitted with nutritional risk
Explanation of terms	In patients with nutritional risk (NR) identified using validated scales (e.g. NRS 2002) or by the presence of one or more of the factors listed in **indicator Nº. 50**, nutritional status should be assessed using: 1. Subjective Global Assessment (SGA) 2. If SGA is not used, the following are required: • General and nutritional history • Physical examination • Anthropometric determinations: weight, height • Determination of biochemical parameters related with the metabolism of proteins, sugars, and fats, and with the status of certain vitamins and minerals
Population	All patients with nutritional risk admitted to the critical care department during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Planas M, Bonet A, Farré M. Valoración nutricional. Influencia de la malnutrición sobre las funciones fisiológicas. En Monografías de Medicina Crítica Práctica SEMICYUC. García de Lorenzo A. Soporte Nutricional en paciente grave. EdikaMed 2002. • Acosta Escribano J, Gómez-Tello V, Ruiz Santana S.[Nutritional assessment of the severely ill patient]. Nutr Hosp. 2005 Jun;20 Suppl 2:5-8 • Barbosa-Silva MCG, Barros AJD. Indications and limitations of the use of subjective global assessment in clinical practice: an update. Curr Opin Clin Nutr Metab Care. 2006 May;9(3):263-9.

INDICATOR NUMBER 52

Name of the indicator	CALORIE AND PROTEIN REQUIREMENTS IN CRITICAL PATIENTS
Dimension	Appropriateness and safety
Justification	Critical patients are in a hypermetabolic state with increased consumption of different substrates. Their calorie requirements depend on anthropometric factors and on the type and severity of disease, as well as on whether or not malnutrition was present before illness. There is sufficient clinical evidence that both providing too many and providing too few calories increase the risk of infection and of organ dysfunction. Thus, calculating these patients' calorie requirements is recommended.
Formula	Nº. of patients receiving artificial nutrition in whom requirements are correctly calculated ---------- x 100 Total Nº. patients receiving artificial nutrition
Explanation of terms	Calorie requirements can be calculated using one of the following methods: 1. Indirect calorimetry 2. Formulas for estimating calorie requirements: A. Harris – Benedict formula, adjusted for disease factors B. Penn State equation. Indicated in patients undergoing mechanical ventilation 3. Adjusted for weight and degree of stress Between 25-30 Kcal/kg in severe patients Nitrogen requirements rise with the intensity of the lesion and are calculated as follows: 1. in the proportion non-protein calories to grams of nitrogen: 1gr/N for every 80/120 Kcal. The greater the lesion the greater the proportion of nitrogen to calories 2. Between 0.15-0.25 g N_2/kg/day
Population	All patients who receive artificial nutrition in the Intensive Care Unit in the period reviewed
Type	Process
Source of dataType	Clinical records
Standard	85 %
Comments	References: • Faisy C, Guerot E, Diehl JL, Labrousse J, Fagon JY. Assessment of resting energy expenditure in mechanically ventilated patients. Am J Clin Nutr. 2003 Aug;78(2):241-9. • Kreymann KG, Berger MM, Deutz NE, Hiesmayr M, Jolliet P, Kazandjiev G, Nitenberg G, van den Berghe G, Wernerman J; DGEM (German Society for Nutritional Medicine), Ebner C, Hartl W, Heymann C, Spies C; ESPEN (European Society for Parenteral and Enteral Nutrition).ESPEN Guidelines on Enteral Nutrition: Intensive care. Clin Nutr. 2006 Apr;25(2):210-23 • Frankenfield D, Hise M, Malone A, Russell M, Gradwell E, Compher C; Evidence Analysis Working Group. Prediction of resting metabolic rate in critically ill adult patients: results of a systematic review of the evidence. J Am Diet Assoc. 2007 Sep;107(9):1552-61 • Ortiz Leyba C, Gómez-Tello V, Serón Arbeloa C.[Requeriments of macronutrients and micronutrients] Nutr Hosp. 2005 Jun;20 Suppl 2:13-7. • A.S.P.E.N. Board of Directors; American College of Critical Care Medicine; Society of Critical Care Medicine. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). JPEN J Parenter Enteral Nutr. 2009 May-Jun;33(3):277-316

INDICATOR NUMBER 53 (FUNDAMENTAL INDICATOR)

Name of the indicator	EARLY ENTERAL NUTRITION
Dimension	Effectiveness and safety
Justification	Early (within 24 h- 48 h of admission) initiation of enteral nutrition (EN) is associated with a reduction in infectious complications and in mortality in critical patients.
Formula	Nº. of patients with EN and early initiation of EN ---------- x 100 Nº. of patients with EN
Explanation of terms	Early initiation: within 24 h of admission to the ICU Indications for EN: all patients in whom a complete oral diet is not possible who do not have contraindications for EN
Population	All patients discharged from the critical care department during the period reviewed who have received EN during the ICU stay
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Ortiz Leyba C, Montejo Gonzalez JC, Jiménez Jiménez FJ, Lopez Martinez J, García de Lorenzo y Mateos A, Grau Carmona T, Acosta Escribano J, Mesejo Arizmendi A, Fernandez Ortega F, Ordoñez Gonzalez FJ, Bonet Saris A, Blesa Malpica A; Grupo de Trabajo de Metabolismo y Nutricion de la SEMICYUC.[Recommendations for nutritional assessment and specialized nutritional support of critically ill patients] Nutr Hosp. 2005 Jun;20 Suppl 2:1-3 • Kreymann KG, Berger MM, Deutz NE, Hiesmayr M, Jolliet P, Kazandjiev G, Nitenberg G, van den Berghe G, Wernerman J; DGEM (German Society for Nutritional Medicine), Ebner C, Hartl W, Heymann C, Spies C; ESPEN (European Society for Parenteral and Enteral Nutrition).ESPEN Guidelines on Enteral Nutrition: Intensive care. Clin Nutr. 2006 Apr;25(2):210-23 • Doig GS, Heighes PT, Simpson F, Sweetman EA, Davies AR. Early enteral nutrition, provided within 24 h of injury or intensive care unit admission, significantly reduces mortality in critically ill patients: a meta-analysis of randomised controlled trials.Intensive Care Med. 2009 Dec;35(12):2018-27 • McClave SA, Martindale RG, Vanek VW, McCarthy M, Roberts P, Taylor B, Ochoa JB, Napolitano L, Cresci G; A.S.P.E.N. Board of Directors; American College of Critical Care Medicine; Society of Critical Care Medicine. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). JPEN J Parenter Enteral Nutr. 2009 May-Jun;33(3):277-316

SEMICYUC

INDICATOR NUMBER 54

Name of the indicator	MONITORING ENTERAL NUTRITION
Dimension	Effectiveness
Justification	Tolerance to enteral nutrition (EN) enables the goals for caloric intake to be reached effectively. It is important to identify the presence of factors that can act as potential barriers to the tolerance of EN so that they can be corrected. The appropriate knowledge, definition, and management of the complications that can occur during EN are also important.
Formula	Nº. of patients with EN correctly monitored ---------- x 100 Nº. of patients admitted with EN
Explanation of terms	Monitoring EN must include all of the following: • Checking the amount administered in 24 h • Checking the position of the feeding tube • Checking the patient's position: semiseated (30º-45º) • Identification and management of the gastrointestinal complications of EN: increased volume of gastric residue, constipation, EN-associated diarrhea, vomiting, regurgitation, abdominal distension, bronchoaspiration of the diet. • Blood glucose control according to the critical care department's protocol • Serum electrolytes / 24 h • Triglycerides, cholesterol, protein electrophoresis / 7 days
Population	All patients who receive EN during the ICU stay during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Ortiz Leyba C, Montejo Gonzalez JC, Jiménez Jiménez FJ, Lopez Martinez J, García de Lorenzo y Mateos A, Grau Carmona T, Acosta Escribano J, Mesejo Arizmendi A, Fernandez Ortega F, Ordoñez Gonzalez FJ, Bonet Saris A, Blesa Malpica A; Grupo de Trabajo de Metabolismo y Nutricion de la SEMICYUC.[Recommendations for nutritional assessment and specialized nutritional support of critically ill patients] Nutr Hosp. 2005 Jun;20 Suppl 2:1-3 • Kreymann KG, Berger MM, Deutz NE, Hiesmayr M, Jolliet P, Kazandjiev G, Nitenberg G, van den Berghe G, Wernerman J; DGEM (German Society for Nutritional Medicine), Ebner C, Hartl W, Heymann C, Spies C; ESPEN (European Society for Parenteral and Enteral Nutrition).ESPEN Guidelines on Enteral Nutrition: Intensive care. Clin Nutr. 2006 Apr;25(2):210-23 • McClave SA, Martindale RG, Vanek VW, McCarthy M, Roberts P, Taylor B, Ochoa JB, Napolitano L, Cresci G; A.S.P.E.N. Board of Directors; American College of Critical Care Medicine; Society of Critical Care Medicine. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). JPEN J Parenter Enteral Nutr. 2009 May-Jun;33(3):277-316

INDICATOR NUMBER 55

Name of the indicator	APPROPRIATE USE OF PARENTERAL NUTRITION
Dimension	Effectiveness
Justification	Nutritional support is essential in critical patients to avoid rapid undernourishment due to metabolic stress. Parenteral nutrition (PN) is the alternative when a feeding tube cannot be used partly or completely for any reason. The objective of PN is to supply the macronutrients or micronutrients to meet the nutritional needs of the critical patient. PN can provide 100% of the calories required or it can be administered as a complement to enteral nutrition (EN).
Formula	Nº. patients with indications for parenteral nutrition ---------- x 100 Total Nº. patients that need artificial nutrition
Explanation of terms	Indications for PN: -All patients admitted to the ICU without prospects of obtaining nutrition from oral or enteral feeding in 3 days - Bowel rest - Hypercatabolism and severe metabolic stress if EN is insufficient - To complement inadequate oral or enteral nutrition for any reason
Population	All patients admitted to critical care who need artificial nutrition
Type	Process
Source of data	Clinical records
Standard	According to ICOMEP, 25% of patients admitted to critical care
Comments	References: • Bonet A, Grau T; Grupo de Trabajo de Metabolismo y Nutrición de la Sociedad Española de; Medicina Intensiva Critica y Unidades Coronarias. [Multicenter study on incidence of total parenteral nutrition complications in the critically-ill patient. ICOMEP study. Part I]Nutr Hosp. 2005 Jul-Aug;20(4):268-77. • Singer P, Berger MM, Van den Berghe G, Biolo G, Calder P, Forbes A, Griffiths R, Kreyman G, Leverve X, Pichard C, ESPEN.ESPEN Guidelines on Parenteral Nutrition: intensive care. Clin Nutr. 2009 Aug;28(4):387-400

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INDICATOR NUMBER 56 (FUNDAMENTAL INDICATOR)

Name of the indicator	PROPHYLAXIS AGAINST GASTROINTESTINAL BLEEDING IN PATIENTS UNDERGOING INVASIVE MECHANICAL VENTILATION (MV)
Dimension	Safety and effectiveness
Justification	Gastrointestinal bleeding (GIB) is a relatively uncommon complication in critical patients. The main cause of GIB is acute lesions of the gastric mucosa related to stress. Different strategies have proven effective in preventing GIB in selected critical patients, such as patients undergoing invasive MV for more than 48 h. The appearance of GIB increases the risk of death and prolongs the stay.
Formula	Nº. patients undergoing invasive MV > 48 h who receive prophylaxis against GIB ---------- x 100 Total Nº. patients undergoing invasive MV > 48 h discharged from the critical care department
Explanation of terms	• Prophylaxis against GIB: protocolized administration of one of the following from the start of invasive MV: ✓ Proton pump inhibitors ✓ H_2 receptor antagonists ✓ Enteral nutrition aimed at preventing GIB Failure to administer one of the above for > 24 h counts as no prophylaxis
Population	All patients admitted to the critical care department undergoing invasive MV during the period reviewed Exclusion criterion: invasive MV < 48 h
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Cook DJ, Griffith LE, Walter SD, Guyatt GH, Meade MO, Heyland DK, Kirby A, Tryba M; Canadian Critical Care Trials Group. The attributable mortality and length of intensive care unit stay of clinically important gastrointestinal bleeding in critically ill patients.Crit Care. 2001 Dec;5(6):368-75 • Ojiako K, Shingala H, Schorr C, Gerber DR. Famotidine versus pantoprazole for preventing bleeding in the upper gastrointestinal tract of critically ill patients receiving mechanical ventilation. Am J Crit Care. 2008 Mar;17(2):142-7. • Ali T, Harty RF.Stress-induced ulcer bleeding in critically ill patients. Gastroenterol Clin North Am. 2009 Jun;38(2):245-65.

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NEFROLÓGIC CARE

INDICATOR NUMBER 57

Name of the indicator	**MONITORING CONTINUOUS RENAL REPLACEMENT THERAPY**
Dimension	Effectiveness and safety
Justification	Although continuous renal replacement therapy (CRR) have not proven more effective than intermittent dialysis techniques in reducing mortality, they may lead to better outcome (better tolerance) and be more suitable given the resources available for critical patients. CRR therapy are especially indicated for patients with cardiovascular dysfunction, multiple organ failure, or intracranial hypertension. Some parameters should be monitored to ensure the effectiveness and safety of continuous techniques.
Formula	Total Nº. of correctly monitored CRR treatments ---------- x 100 Total Nº. of CRR treatments
Explanation of terms	Appropriate monitoring: 1. Prescription of the dialysis dose in function of the patient's weight 2. Median filter duration (hours) 3. Unplanned time without treatment (hours/day) 4. Effective treatment time (hours/day) 5. Estimated blood loss due to system coagulation (ml/day) 6. Real daily dose received by the patient: absolute (ml/Kg/day) and relative (% of the prescribed dose) 7. Incidence of electrolyte disturbances in treatment > 48 h (Na, K, Cl, P, Mg, HCO3) 8. Incidence of complications (mechanical, hemorrhagic, infectious, hypothermia) A treatment includes all sessions carried out without changes in the modality of the procedure.
Population	All dialysis treatments carried out in the period reviewed
Type	Process
Source of data	Clinical records
Standard	80-90%
Comments	References: • Rabindranath K, Adams J, Macleod AM, Muirhead N. Intermittent versus continuous renal replacement therapy for acute renal failure in adults. Cochrane Database Syst Rev. 2007 Jul 18;(3):CD003773 • Ghahramani N, Shadrou S, Hollenbeak C. A systematic review of continuous renal replacement therapy and intermittent haemodialysis in management of patients with acute renal failure. Nephrology (Carlton). 2008 Oct;13(7):570-8 • Bagshaw SM, Berthiaume LR, Delaney A, Bellomo R. Continuous versus intermittent renal replacement therapy for critically ill patients with acute kidney injury: a meta-analysis. Crit Care Med. 2008 Feb;36(2):610-7. • Herrera Gutiérrez ME.[Intermittent versus continuous renal replacement techniques: pro continuous] Med Intensiva. 2009 Mar;33(2):88-92

INDICATOR NUMBER 58

Name of the indicator	**DOPAMINE USE IN ACUTE RENAL FAILURE (ARF)**
Dimension	Safety and effectiveness
Justification	Dopamine at renal doses (< 5 ug/kg/min) has not proven effective for prophylaxis or treatment of ARF. (Level of evidence: IA). Moreover, its possible adverse effects are well known and more unpredictable in ARF due to the lower rate of clearing of this molecule in this condition.
Formula	Nº. of patients treated with renal doses of dopamine ---------- X 100 Total Nº. of patients treated with vasoactive drugs discharged from the critical care department
Explanation of terms	• Renal dose of dopamine: perfusion of dopamine < 5mg/kg/min indicated for prophylaxis against ARF or for treatment of ARF
Population	All patients discharged from the critical care department during the period reviewed. • Exclusion criterion: use of dopamine for indications other than ARF
Type	Process
Source of data	Clinical records
Standard	0%
Comments	References: • Kellum JA, Decker JM. Use of dopamine in acute renal failure: A meta-analysis. Crit Care Medicine 2001; 29:1526-1531. • Holmes ChL, Walley KR. Bad medicine: low-dose dopamine in the ICU. Chest 2003; 123:1266-1275. • Bellomo R, Chapman M, Finfer S, Hickling K, Myburgh J. Low-dose dopamine in patients with early renal dysfunction: A placebo-controlled randomised trial. Australian and new Zealand Intensive Care Society (ANZICS) Clinical Trial Group. Lancet 2000;356:2139-2143 • Friedrich JO, Adhikari N, Herridge MS, Beyene J. Meta-analysis: low-dose dopamine increases urine output but does not prevent renal dysfunction or death. Ann Intern Med. 2005 Apr 5;142(7):510-24 • Abay MC, Reyes JD, Everts K, Wisser J. Current literature questions the routine use of low-dose dopamine. AANA J. 2007 Feb;75(1):57-63 • Joannidis M, Druml W, Forni LG, Groeneveld AB, Honore P, Oudemans-van Straaten HM, Ronco C, Schetz MR, Woittiez AJ. Prevention of acute kidney injury and protection of renal function in the intensive care unit Expert opinion of the working group for nephrology, ESICM. Intensive Care Med. 2010 Mar;36(3):392-411.

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INDICATOR NUMBER 59

Name of the indicator	**INCIDENCE OF ACUTE RENAL FAILURE (ARF) IN NON-CORONARY CRITICAL PATIENTS**
Dimension	Safety and efficiency
Justification	The development of ARF in "non-coronary" critical patients is a serious complication that doubles the probability of death. It also entails increased consumption of resources.
Formula	Nº. of non-coronary patients with ARF ---------- x 100 Total Nº. of non-coronary patients discharged from the critical care department
Explanation of terms	Non-coronary patients: All patients whose main diagnosis is NOT acute coronary syndrome ARF according to the RIFLE criteria: • 3-fold increase in blood levels of creatinine or a > 75% decrease in glomerular filtration rate (GFR) or • Creatinine > 4 mg / dl (acute elevation ≥0.5 mg/dl) or • Diuresis < 0.3 ml /kg/h (24 h) or anuria (12 h)
Population	All patients whose main diagnosis is not acute coronary syndrome admitted to the ICU during the period reviewed. Exclusion criteria: < 12 years; chronic renal failure
Type	Outcome
Source of data	Clinical records
Standard	8%
Comments	The standard is based on the results of the epidemiologic study carried out by the SEMICYUC in 1999-2000. References: • Schetz M. Epidemiología de fracaso renal agudo en la unidad de cuidados intensivos. En: Net A, Roglan A. Depuración extrarenal en el paciente grave. 2004; Masson SA. Barcelona. P.99-108 • Venkataraman R, Kellum JA. Acute renal failure in the critically ill. Curr Opin Anaesthesiol. 2005 Apr;18(2):117-22. • Herrera-Gutiérrez ME, Seller-Pérez G, Maynar-Moliner J, Sánchez-Izquierdo-Riera JA; Grupo de trabajo "Estado actual del fracaso renal agudo y de las técnicas de reemplazo renal en UCI. Estudio FRAMI".[Epidemiology of acute kidney failure in Spanish ICU. Multicenter prospective study FRAMI] Med Intensiva. 2006 Aug-Sep;30(6):260-7. • Bellomo R, Kellum JA, Ronco C .Defining and classifying acute renal failure: from advocacy to consensus and validation of the RIFLE criteria. Intensive Care Med. 2007 Mar;33(3):409-13 • Hoste EA, Schurgers M. Epidemiology of acute kidney injury: how big is the problem? Crit Care Med. 2008 Apr;36(4 Suppl):S146-51

INDICATOR NUMBER 60

Name of the indicator	**INCIDENCE OF ACUTE RENAL FAILURE (ARF) IN PATIENTS WITH ACUTE CORONARY SYNDROME**
Dimension	Safety and efficiency
Justification	Acute renal failure is a rare complication in acute coronary patients; however, when it develops it doubles the probability of death. ARF also increases the use of ICU resources.
Formula	Nº. of acute coronary patients with ARF ---------- x 100 Total Nº. of acute coronary patients discharged from the critical care department
Explanation of terms	Acute coronary patients: All patients whose main diagnosis is acute coronary syndrome ARF according to RIFLE criteria: • 3-fold increase in blood levels of creatinine or a > 75% decrease in glomerular filtration rate (GFR) or • Creatinine > 4 mg / dl (acute elevation ≥0.5 mg/dl) or • Diuresis < 0.3 ml /kg/h (24 h) or anuria (12 h)
Population	All patients whose main diagnosis is acute coronary syndrome admitted to the critical care department during the period reviewed Exclusion criteria: chronic renal failure
Type	Outcome
Source of data	Clinical records
Standard	1.5%
Comments	References: • Schetz M. Epidemiología de fracaso renal agudo en la unidad de cuidados intensivos. En: Net A, Roglan A. Depuración extrarenal en el paciente grave. 2004; Masson SA. Barcelona. P.99-108 • Venkataraman R, Kellum JA. Acute renal failure in the critically ill. Curr Opin Anaesthesiol 2005;18:117-122 • Herrera-Gutiérrez ME, Seller-Pérez G, Maynar-Moliner J, Sánchez-Izquierdo-Riera JA; Grupo de trabajo "Estado actual del fracaso renal agudo y de las técnicas de reemplazo renal en UCI. Estudio FRAMI".[Epidemiology of acute kidney failure in Spanish ICU. Multicenter prospective study FRAMI] Med Intensiva. 2006 Aug-Sep;30(6):260-7. • Bellomo R, Kellum JA, Ronco C .Defining and classifying acute renal failure: from advocacy to consensus and validation of the RIFLE criteria. Intensive Care Med. 2007 Mar;33(3):409-13 • Hoste EA, Schurgers M. Epidemiology of acute kidney injury: how big is the problem? Crit Care Med. 2008 Apr;36(4 Suppl):S146-51

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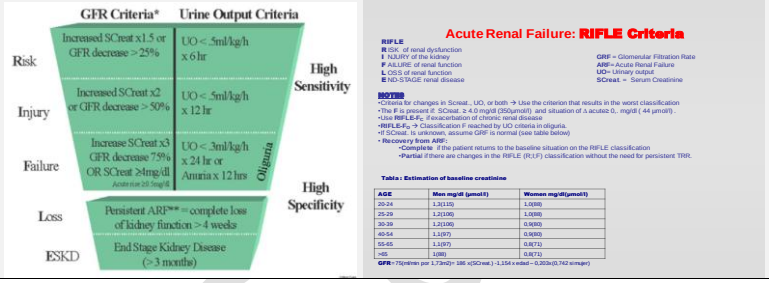
INDICATOR NUMBER 61

Name of the indicator	**PREVENTION OF CONTRAST-INDUCED NEPHROPATHY IN CARDIAC CATHETERIZATION**
Dimension	Safety
Justification	Contrast-induced nephrotoxicity is a common cause of acute renal failure. The use of contrast media is associated to increased morbidity, mortality, and stays. The main risk factor for the development of nephrotoxicity is previously existing renal failure (RF). Appropriate hydration before and after the procedure reduces the risk of nephrotoxicity.
Formula	Nº. of patients with pre-existing RF undergoing cardiac catheterization with appropriate hydration ---------- x 100 Nº. of patients with pre-existing RF undergoing cardiac catheterization
Explanation of terms	• Pre-existing RF: creatinine > 2 mg /dl. Appropriate hydration: administration of 0.9 % saline solution 1 ml/kg/h during the 12 h before and after the procedure (1B). In urgent situations, isotonic bicarbonate solutions can be used (2B).
Population	Patients with pre-existing RF undergoing cardiac catheterization during the period reviewed. Exclusion criterion: patients that require dialysis before the procedure
Type	Process
Source of data	Clinical records
Standard	90%
Comments	References: • Solomon R, Werner C, Mann D, D'Elia J, Silva P. Effects of saline, mannitol, and furosemide to prevent acute decreases in renal function induced by radiocontrast agents. N Engl J Med. 1994;331:1416-20 • Levine GN, Kern MJ, Berger PB, Brown DL, Klein LW, Kereiakes DJ, Sanborn TA, Jacobs AK; American Heart Association Diagnostic and Interventional Catheterization Committee and Council on Clinical Cardiology. Management of Patients Undergoing Percutaneous Coronary Revascularization. Ann Intern Med 2003;139:123-136 • Gleson TG, Bulugahapitiya. Contrast-induced nephropathy. Am J Roetgenol 2004; 183(6):16731689 • Kelly AM, Dwamena B, Cronin P, Bernstein SJ, Carlos RC. Meta-analysis: effectiveness of drugs for preventing contrast-induced nephropathy. Ann Intern Med. 2008 Feb 19;148(4):284-94 • Venkataraman R. Can we prevent acute kidney injury? Crit Care Med. 2008 Apr;36(4 Suppl):S166-71

SEMICYUC

INDICATOR NUMBER 62

Name of the indicator	**STRATIFICATION OF ACUTE RENAL FAILURE (ARF) IN CRITICAL PATIENTS**
Dimension	Appropriateness
Justification	Correct stratification of ARF requires accurate diagnostic tools that are easy to use at the bedside. In critical patients, we cannot base management on serum levels of molecules whose concentration can vary not only in function of their renal clearance but also in function of their production; thus, it is recommendable to also calculate the glomerular filtration rate and to measure the fractional excretion of sodium (FENa). The RIFLE scale makes it possible to stratify the severity of ARF in critical patients.
Formula	Nº. of patients with ARF discharged from the critical care department stratified using the RIFLE scale ---------- x 100 Nº. of patients diagnosed with ARF discharged from the critical care department
Explanation of terms	
Population	Patients diagnosed with acute renal failure discharged from the critical care department during the period reviewed Inclusion criteria: All patients whose main or secondary diagnosis in the discharge report is renal insufficiency or acute renal failure
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Mehta RL, Chertow GM. Acute renal failure definitions and classification: time for change? J Am Soc Nephrol. 2003 Aug;14(8):2178-87. • Bellomo R, Ronco C, Kellum JA, Mehta RL, Palevsky P; Acute Dialysis Quality Initiative workgroup. Acute renal failure - definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group. Crit Care. 2004 Aug;8(4):R204-12. • Kellum JA. Acute kidney injury. Crit Care Med. 2008 Apr;36(4 Suppl):S141-5.

SEDATION AND ANALGESIA

INDICATOR NUMBER 63

Name of the indicator	MONITORING SEDATION
Dimension	Safety and effectiveness
Justification	Inappropriate sedation (both oversedation and undersedation) has adverse effects on mechanically ventilated patients, including prolongation of mechanical ventilation (MV) and hospital stays, as well as increased morbidity, mortality, and use of resources. Validated sedation scales are useful in the management of MV patients, and their use is recommended in clinical guidelines.
Formula	Nº. of 6-h periods of MV with monitoring of sedation ---------- x 100 Nº. of 6-h periods of MV with continuous sedation (days of MV and continuous sedation x 4)
Explanation of terms	• Monitoring: evaluation of the level of sedation using one of the validated scales every 6 h or when the clinical situation changes • Inclusion criteria: ✓ Mechanical ventilation: > 12 h and continuous sedation
Population	All 6-h periods (or days x 4) in mechanically ventilated patients under continuous sedation during the period reviewed
Type	Process
Source of data	Clinical records (Nursing registries)
Standard	95%
Comments	* Validated scales: Ramsay Sedation Scale, the Sedation Agitation Scale, the Motor Activity Assessment Scale, the Richmond Agitation-Sedation Scale (RASS), the Adaptation to the Intensive Care Environment (ATICE) instrument, and the Minnesota Sedation Assessment Tool (MSAT). There may be others. References: • Jacobi J, et al. Task Force of the American College of Critical Care Medicine (ACCM) of the Society of Critical Care Medicine (SCCM), American Society of Health-System Pharmacists (ASHP), American College of Chest Physicians. Clinical practice guidelines for the sustained use of sedatives and analgesics in the critically ill adult. Crit Care Med 2002, 30: 119-141 • Celis-Rodríguez E, Besso J, Birchenall C, de la Cal MA, Carrillo R, Castorena G, et al; Federación Panamericana e Ibérica de Sociedades de Medicina Crítica y Cuidados Intensivos. [Clinical practice guideline based on the evidence for the management of sedoanalgesia in the critically ill adult patient] Med Intensiva. 2007 Nov;31(8):428-71 • Pun BT, Dunn J. The sedation of critically ill adults: Part 1: Assessment. The first in a two-part series focuses on assessing sedated patients in the ICU. Am J Nurs. 2007 Jul;107(7):40-8 • Estébanez-Montiel MB, Alonso-Fernández MA, Sandiumenge A, Jiménez-Martín MJ; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC. [Prolonged sedation in Intensive Care Units] Med Intensiva. 2008 Feb;32 Spec Nº. 1:19-30. • Chamorro C, Martínez-Melgar JL, Barrientos R; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC. [Monitoring of sedation] Med Intensiva. 2008 Feb;32 Spec Nº. 1:45-52. • Sessler CN, Pedram S. Protocolized and target-based sedation and analgesia in the ICU. Crit Care Clin. 2009 Jul;25(3):489-513

INDICATOR NUMBER 64 (FUNDAMENTAL INDICATOR)

Name of the indicator	APPROPRIATE SEDATION
Dimension	Safety and effectiveness
Justification	Inappropriate sedation (both oversedation and undersedation) has adverse effects on mechanically ventilated patients. Inappropriately low levels of sedation increase oxygen requirements, favor pain and agitation, hinder mechanical ventilation (MV), and increase the risk of accidental extubation. Excessive sedation leads to hypotension, bradycardia, ileus, and venous stasis; it hinders neurologic assessment, prolongs MV and hospital stay, and increases the consumption of resources.
Formula	Nº. of MV patients with appropriate sedation ---------- x 100 Nº. of MV patients with sedation in the ICU
Explanation of terms	• Appropriate sedation: maintaining at least 80% of the successive results on the sedation scales within the range prescribed for each patient
Population	All continuously sedated MV patients in the ICU during the period reviewed Exclusion criteria: MV < 24 h
Type	Outcome
Source of data	Clinical records
Standard	85%
Comments	References:. • Jacobi J, et al. Task Force of the American College of Critical Care Medicine (ACCM) of the Society of Critical Care Medicine (SCCM), American Society of Health-System Pharmacists (ASHP), American College of Chest Physicians. Clinical practice guidelines for the sustained use of sedatives and analgesics in the critically ill adult. Crit Care Med 2002, 30: 119-141 • Celis-Rodríguez E, Besso J, Birchenall C, de la Cal MA, Carrillo R, Castorena G, et al; Federación Panamericana e Ibérica de Sociedades de Medicina Crítica y Cuidados Intensivos. [Clinical practice guideline based on the evidence for the management of sedoanalgesia in the critically ill adult patient] Med Intensiva. 2007 Nov;31(8):428-71 • Estébanez-Montiel MB, Alonso-Fernández MA, Sandiumenge A, Jiménez-Martín MJ; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC. [Prolonged sedation in Intensive Care Units] Med Intensiva. 2008 Feb;32 Spec Nº. 1:19-30. • Sessler CN, Pedram S. Protocolized and target-based sedation and analgesia in the ICU. Crit Care Clin. 2009 Jul;25(3):489-513

INDICATOR NUMBER 65

Name of the indicator	DAILY INTERRUPTION OF SEDATION
Dimension	Effectiveness and efficiency
Justification	Daily interruption of sedation in critical patients undergoing mechanical ventilation (MV) is associated to a decrease in the duration of MV and in the ICU stay. Moreover, no late psychological sequelae are associated with this practice.
Formula	Nº. of days in which sedation is interrupted ----------x 100 Nº. of days on MV under sedation
Explanation of terms	• Interruption of sedation: suspension/decrease in the sedation regimen until the patient regains consciousness, obeys orders, or becomes agitated
Population	All days of MV under sedation during the period reviewed
Type	Process
Source of data	Clinical records
Standard	80%
Comments	The authors would like to emphasize that the references expressly state that there are no exclusion criteria for daily interruption of sedation in this type of patients. Nevertheless, the standard of 80% allows the exclusion of patients with intracranial hypertension, status asthmaticus, ARDS, or other conditions in which daily interruption of sedation might be considered contraindicated. References: • Kress JP, Pohlman AS, O'Connor MF, Hall JB. Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. N Engl J Med. 2000 May 18;342(20):1471-7 • Schweickert WD, Gehlbach BK, Pohlman AS, Hall JB, Kress JP. Daily interruption of sedative infusions and complications of critical illness in mechanically ventilated patients.Crit Care Med. 2004 Jun;32(6):1272-6. • Girard TD, Kress JP, Fuchs BD, Thomason JW, Schweickert WD, Pun BT, Taichman DB, Dunn JG, Pohlman AS, Kinniry PA, Jackson JC, Canonico AE, Light RW, Shintani AK, Thompson JL, Gordon SM, Hall JB, Dittus RS, Bernard GR, Ely EW. Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial): a randomised controlled trial. Lancet. 2008 Jan 12;371(9607):126-34. • Mehta S, Burry L, Martinez-Motta JC, Stewart TE, Hallett D, McDonald E, Clarke F, Macdonald R, Granton J, Matte A, Wong C, Suri A, Cook DJ; Canadian Critical Care Trials Group. A randomized trial of daily awakening in critically ill patients managed with a sedation protocol: a pilot trial. Crit Care Med. 2008 Jul;36(7):2092-9.

SEMICYUC

INDICATOR NUMBER 66 (FUNDAMENTAL INDICATOR)

Name of the indicator	PAIN MANAGEMENT IN UNSEDATED PATIENTS
Dimension	Effectiveness and safety
Justification	Critical patients are exposed to multiple pain-causing stimuli. Inadequate pain control causes stress and increases morbidity. Freedom from pain should be a quality-of-care objective in the ICU. Pain should be measured on a validated scale and monitored to ensure the desired level of analgesia is achieved and maintained.
Formula	Nº. of patients monitored according to the protocol ---------- x 100 Nº. of patients without sedation who might need analgesia
Explanation of terms	• Patients who might need analgesia: All patients admitted to the ICU • Monitored according to the protocol: ✓ Pain should be measured using a validated scale (e.g., VAS, NRS) at least every 4 h (or more often in patients complaining of pain) without disturbing the patient's sleep ✓ VAS or NRS scores should not be higher than 3 more than once every 24 h
Population	All patients who might need analgesia discharged from the critical care department during the period reviewed Exclusion criteria: Sedation by continuous perfusion + mechanical ventilation
Type	Process
Source of data	Clinical records
Standard	100%
Comments	Explanation of the acronyms for the scales: • VAS: visual analogue scale • NRS: numeric rating scale The authors consider the indicator to be fulfilled when at least two thirds of the measurements planned are carried out during the entire stay (and analgesics are administered if the results so indicate). References: • Jacobi J, et al. Task Force of the American College of Critical Care Medicine (ACCM) of the Society of Critical Care Medicine (SCCM), American Society of Health-System Pharmacists (ASHP), American College of Chest Physicians. Clinical practice guidelines for the sustained use of sedatives and analgesics in the critically ill adult. Crit Care Med 2002, 30: 119-141 • Celis-Rodríguez E, Besso J, Birchenall C, de la Cal MA, Carrillo R, Castorena G, et al; Federación Panamericana e Ibérica de Sociedades de Medicina Crítica y Cuidados Intensivos. [Clinical practice guideline based on the evidence for the management of sedoanalgesia in the critically ill adult patient] Med Intensiva. 2007 Nov;31(8):428-71 • Pardo C, Muñoz T, Chamorro C; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC. [Monitoring of pain. Recommendations of the Analgesia and Sedation Work Group of SEMICYUC] Med Intensiva. 2008 Feb;32 Spec Nº. 1:38-44 • Sessler CN, Pedram S. Protocolized and target-based sedation and analgesia in the ICU. Crit Care Clin. 2009 Jul;25(3):489-513

INDICATOR NUMBER 67

Name of the indicator	PAIN MANAGEMENT IN VENTILATED PATIENTS
Dimension	Effectiveness
Justification	Pain is a prevalent symptom in the ICU; it affects over 70% of patients and must be treated appropriately. Inadequate pain control causes stress and increases morbidity. Pain in patients that are unable to express themselves might go undetected.
Formula	Nº. of mechanical ventilation (MV) patients administered analgesics ---------- x 100 Nº. of MV patients with cognitive deterioration
Explanation of terms	• Analgesics administered: according to the protocol in effect with respect to indication, type of drug, dose, method of administration, and interval • With cognitive deterioration: unable to communicate or express the presence of pain and / or undergoing sedation
Population	All MV patients with cognitive deterioration during the period reviewed • Exclusion criteria: 1. Brain death 2. Vegetative state
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Chamorro C, Romera MA, Silva JA. Importancia de la sedoanalgesia en los enfermos en ventilación mecánica. Med Intensiva 2003;1 (Supl 1):1-2 • Celis-Rodríguez E, Besso J, Birchenall C, de la Cal MA, Carrillo R, Castorena G, et al; Federación Panamericana e Ibérica de Sociedades de Medicina Crítica y Cuidados Intensivos. [Clinical practice guideline based on the evidence for the management of sedoanalgesia in the critically ill adult patient] Med Intensiva. 2007 Nov;31(8):428-71 • Sessler CN, Varney K. Patient-focused sedation and analgesia in the ICU. Chest. 2008 Feb;133(2):552-65. • Pardo C, Muñoz T, Chamorro C; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC. [Monitoring of pain. Recommendations of the Analgesia and Sedation Work Group of SEMICYUC] Med Intensiva. 2008 Feb;32 Spec Nº. 1:38-44 • Sessler CN, Pedram S. Protocolized and target-based sedation and analgesia in the ICU. Crit Care Clin. 2009 Jul;25(3):489-513

SEMICYUC

INDICATOR NUMBER 68

Name of the indicator	INAPPROPRIATE USE OF MUSCLE RELAXANTS
Dimension	Safety
Justification	The incorrect use of neuromuscular-blocking drugs can be associated to serious complications. Clinical guidelines recommend using muscle relaxants only in specific clinical situations (difficulties in mechanical ventilation, tetanus, increased intracranial pressure, and decreased oxygen consumption) and only after other measures have failed. (Grade C recommendation).
Formula	Nº. of mechanically ventilated patients with PO2/FiO2 > 200 and continuous muscle relaxation ---------- x 100 Nº. of mechanically ventilated patients with PO2/FiO2 > 200
Explanation of terms	• Continuous muscle relaxation: includes bolus administration at intervals ≤ 2 h and/or continuous perfusion of neuromuscular-blocking drugs
Population	All mechanically ventilated patients with PO_2/FiO_2 > 200 during the period reviewed • Exclusion criteria: 1. ARDS during the first 48 h of mechanical ventilation 2. Tetanus 3. Intracranial hypertension
Type	Process
Source of data	Clinical records
Standard	2%
Comments	References: • Murray MJ et al. Task Force of the American College of Critical Care Medicine (ACCM) of the Society of Critical Care Medicine (SCCM), American Society of Health-System Pharmacists, American College of Chest Physicians. Clinical practice guidelines for sustained neuromuscular blockade in the adult critically ill patient. Crit Care Med 2002; 30(1):142-156 • Mehta S, Burry L, Fischer S, Martinez-Motta JC, Hallett D, Bowman D, Wong C, Meade MO, Stewart TE, Cook DJ; Canadian Critical Care Trials Group. Canadian survey of the use of sedatives, analgesics, and neuromuscular blocking agents in critically ill patients. Crit Care Med. 2006 Feb;34(2):374-80. • Sandiumenge A, Anglés R, Martínez-Melgar JL, Torrado H; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC.[Use of neuromuscular blockers in the critical patient] Med Intensiva. 2008 Feb;32 Spec Nº. 1:69-76. • Papazian L, Forel JM, Gacouin A, Penot-Ragon C, Perrin G, Loundou A, Jaber S, Arnal JM, Perez D, Seghboyan JM, Constantin JM, Courant P, Lefrant JY, Guérin C, Prat G, Morange S, Roch A; ACURASYS Study Investigators. Neuromuscular blockers in early acute respiratory distress syndrome. N Engl J Med. 2010 Sep 16;363(12):1107-16.

SEMICYUC

INDICATOR NUMBER 69

Name of the indicator	MONITORING NEUROMUSCULAR BLOCKAGE (NMB)
Dimension	Effectiveness and safety
Justification	The use of neuromuscular-blocking drugs is associated to serious complications. Clinical guidelines recommend monitoring neuromuscular blockage: it enables the dose administered to be adjusted and unwanted effects to be controlled.
Formula	Nº. of patients with continuous NMB monitored ---------- x 100 Nº. of patients with continuous NMB
Explanation of terms	• Monitoring NMB: periodic clinical evaluation and Train-of-Four (TOF) measurements • Continuous NMB: includes bolus administration at intervals ≤ 2 h and/or continuous perfusion of neuromuscular-blocking drugs
Population	All patients with continuous NMB during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Murray MJ et al. Task Force of the American College of Critical Care Medicine (ACCM) of the Society of Critical Care Medicine (SCCM), American Society of Health-System Pharmacists, American College of Chest Physicians. Clinical practice guidelines for sustained neuromuscular blockade in the adult critically ill patient. Crit Care Med 2002; 30(1):142-156 • Mehta S, Burry L, Fischer S, Martinez-Motta JC, Hallett D, Bowman D, Wong C, Meade MO, Stewart TE, Cook DJ; Canadian Critical Care Trials Group. Canadian survey of the use of sedatives, analgesics, and neuromuscular blocking agents in critically ill patients. Crit Care Med. 2006 Feb;34(2):374-80. • Chamorro C, Silva JA; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC. [Monitoring of neuromuscular blocking] Med Intensiva. 2008 Feb;32 Spec Nº. 1:53-8. • Sandiumenge A, Anglés R, Martínez-Melgar JL, Torrado H; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC.[Use of neuromuscular blockers in the critical patient] Med Intensiva. 2008 Feb;32 Spec Nº. 1:69-76. • Ariño-Irujo JJ, Calbet-Mañueco A, De la Calle-Elguezabal PA, Velasco-Barrio JM, López-Timoneda F, Ortiz-Gómez JR, Fabregat-López J, Palacio-Abizanda FJ, Fornet-Ruiz I, Pérez-Cajaraville J. [Neuromuscular blockade monitoring. Part 1] Rev Esp Anestesiol Reanim. 2010 Mar;57(3):153-60.

SEMICYUC

INDICATOR NUMBER 70

Name of the indicator	IDENTIFICATION OF DELIRIUM
Dimension	Effectiveness
Justification	Delirium has a high incidence; it is associated to significant morbidity and increased costs in critical patients. It can be difficult to identify and the use of systems that allow it to be identified and treated appropriately is recommended. The Confusion Assessment Method for the ICU (CAM-ICU) and the Intensive Care Delirium Screening Checklist (ICDSC) are useful for diagnosing delirium in critical patients.
Formula	Nº. of mechanically ventilated patients evaluated for the presence of delirium ---------- x 100 Nº. of patients undergoing mechanical ventilation > 48 h
Explanation of terms	• Evaluated for the presence of delirium: daily assessment with the CAM-ICU or ICDSC
Population	All patients undergoing mechanical ventilation > 48 h during the period reviewed. Exclusion criteria: Richmond Agitation Sedation Scale < -2 or the equivalent score on another validated scale
Type	Process
Source of data	Clinical records
Standard	90%
Comments	References: • Ely EW, Margolin R, Francis J, May L, Truman B, Dittus R, Speroff T, Gautam S, Bernard GR, Inouye SK. Delirium in mechanically ventilated patients: validity and reliability of the confusion assessment method for the intensive care unit (CAM-ICU). Crit Care Med. 2001; 29:1370-9 • Celis-Rodríguez E, Besso J, Birchenall C, de la Cal MA, Carrillo R, Castorena G, et al; Federación Panamericana e Ibérica de Sociedades de Medicina Crítica y Cuidados Intensivos. [Clinical practice guideline based on the evidence for the management of sedoanalgesia in the critically ill adult patient] Med Intensiva. 2007 Nov;31(8):428-71 • Palencia-Herrejón E, Romera MA, Silva JA; Grupo de Trabajo de Analgesia y Sedación de la SEMICYUC. [Delusion in the critical patient] Med Intensiva. 2008 Feb;32 Spec Nº. 1:77-9 • Palencia Herrejón E. [Diagnosis of delirium in the critical ill] Med Intensiva. 2010 Jan-Feb;34(1):1-3. • Toro AC, Escobar LM, Franco JG, Díaz-Gómez JL, Muñoz JF, Molina F, Bejarano J, Yepes D, Navarro E, García A, Wesley Ely E, Esteban A. [Spanish version of the CAM-ICU (Confusion Assessment Method for the Intensive Care Unit). Pilot study of validation] Med Intensiva. 2010 Jan-Feb;34(1):14-21.

SEMICYUC

BLOOD COMPONENTS

INDICATOR NUMBER 71

Name of the indicator	INFORMED CONSENT FOR THE TRANSFUSION OF BLOOD COMPONENTS
Dimension	Satisfaction and appropriateness
Justification	The administration of blood components is a therapeutic procedure that involves a risk to the patient's health. Current legislation requires written informed consent before this procedure. Failure to ask for written consent violates the patient's or family's right to decide.
Formula	Nº. of patients administered blood components in the ICU after obtaining written informed consent ---------- x 100 Nº. of patients administered blood components in the ICU
Explanation of terms	• Blood components: Packed red blood cells, plasma, and platelet-rich plasma • Written informed consent: document stating the need for transfusion, its benefits and risks, and alternatives. The document must be understood and signed by the patient or his legal representative. It may be registered directly in the patient's history. • Life-threatening emergency: clinical situation requiring the immediate transfusion of blood components in which it is impossible to inform the patient, legal representative, or family
Population	All patients administered blood components for the first time in the ICU during the period reviewed • Exclusion criterion: life-threatening emergencies (the family must be informed as soon as possible)
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: Se recomienda solicitar el CI por cada una de las indicaciones de transfusión (pudiendo incluir la trasnfusión de varias unidades de hemoderivados) • Ley 41/2002, de 14 de noviembre, básica reguladora de la autonomía del paciente y de derechos y obligaciones en materia de información y documentación clínica. BOE 15 noviembre 2002. http://www.boe.es/boe/dias/2002/11/15/pdfs/A40126-40132.pdf • Real Decreto 1854/1993. BOE 20 noviembre1993;num 278 (página 32630) http://www.boe.es/boe/dias/1993/11/20/pdfs/A32630-32636.pdf • Solsona JF, Cabré L, Abizanda R, Campos JM, Sainz A, Martín MC, Sánchez JM, Bouza C, Quintana M, Saralegui I, Monzón JL y grupo de bioética de la SEMICYUC. Recomendaciones del grupo de bioética de la SEMICYUC sobre el Consentimiento Informado en UCI. Med. Intensiva 2002; 26 (5):254-255

INDICATOR NUMBER 72

Name of the indicator	INAPPROPRIATE TRANSFUSION OF FRESH-FROZEN PLASMA (FFP)
Dimension	Effectiveness and safety
Justification	FFP is thought to be the blood component that is most often transfused erroneously. Transfusion of FFP can have the same adverse effects as transfusion of packed red blood cells. Transfusion of FFP is rarely if ever indicated in patients without blood loss and without lengthened coagulation times.
Formula	Nº. of patients without bleeding and with normal coagulation times administered FFP ---------- x 100 Nº. of patients administered FFP
Explanation of terms	• Normal coagulation times: Prothrombin time (PT) > 70% and/or partial thromboplastin time (PTT) ≤1.5 times the control
Population	All patients transfused with FFP during the period reviewed. Exclusion criteria: patients without bleeding needing to undergo surgery in whom FFP is administered to reverse the effects of oral anticoagulation (dicoumarol / warfarin) or the deficit of congenital factors for which no purified or inactivated concentrate is available; and thrombotic thrombocytopenic purpura (TTP).
Type	Process
Source of data	Clinical records
Standard	0%
Comments	References: • Nuttall GA, Stehling LC, Beighley CM, Faust RJ; American Society of Anesthesiologists Committee on Trasfusion Medicine. Current transfusion practices of members of the american society of anesthesiologists: a survey. Anesthesiology 2003;99:1433-1443. • Ortiz P, Mingo A, Lozano M, Vesga MA, Grigols JR, Castrillo A, Algora M, Romón I, Cárdenas JM por la Sociedad Española de Transfusión Sanguínea. [Guide for transfusion of blood components]. Med Clin 2005; 125: 389-96. • American Society of Anesthesiologists Task Force on Perioperative Blood Transfusion and Adjuvant Therapies. Practice guidelines for perioperative blood transfusion and adjuvant therapies: an updated report by the American Society of Anesthesiologists Task Force on Perioperative Blood Transfusion and Adjuvant Therapies. Anesthesiology 2006; 105:198–208 • Wong MP, Droubatchevskaia N, , Chipperfield KM, Wadsworth LD, Ferguson DJ. Guidelines for frozen plasma transfusion. BC Medical Journal 2007; 49: 311-319. • The Blood Observational Study Investigators on behalf of the ANZICS-Clinical Trials Group. Transfusion practice and guidelines in Australian and New Zealand intensive care units. Intensive Care Med. 2010 Jul;36(7):1138-46.

SEMICYUC

INDICATOR NUMBER 73

Name of the indicator	INAPPROPRIATE TRANSFUSION OF PLATELET-RICH PLASMA (PRP)
Dimension	Effectiveness and safety
Justification	Transfusion of platelet-rich plasma (PRP) is common in critical patients. The indications for this procedure are limited to bleeding patients with platelet deficiency and or platelet dysfunction. Transfusion of PRP has the same risks as transfusion of packed red blood cells or plasma, with the additional risks that the patient is exposed to multiple donors and that this product is not frozen (greater possibility of bacterial contamination).
Formula	Nº. nonbleeding patients without thrombocytopenia and/or platelet dysfunction transfused with PRP ---------- x 100 Nº. of patients transfused with PRP
Explanation of terms	• Thrombocytopenia: < 50,000/µL • Platelet dysfunction: meeting one of the following criteria: ✓ Ingestion of antiplatelet drugs in the 10 previous days ✓ Having undergone extracorporeal circuits
Population	All patients transfused with PRP during the period reviewed Exclusion criterion: patients without bleeding who have thrombocytopenia (<50,000/µL or <100,000/µL if CNS or eyeball surgery) or platelet dysfunction and who are scheduled to undergo surgery
Type	Process
Source of data	Clinical records
Standard	0%
Comments	References: • Nuttall GA, Stehling LC, Beighley CM, Faust RJ; American Society of Anesthesiologists Committee on Trasfusion Medicine. Current transfusion practices of members of the american society of anesthesiologists: a survey. Anesthesiology 2003;99:1433-1443. • Ortiz P, Mingo A, Lozano M, Vesga MA, Grigols JR, Castrillo A, Algora M, Romón I, Cárdenas JM por la Sociedad Española de Transfusión Sanguínea. [Guide for transfusion of blood components]. Med Clin 2005; 125: 389-96. • American Society of Anesthesiologists Task Force on Perioperative Blood Transfusion and Adjuvant Therapies. Practice guidelines for perioperative blood transfusion and adjuvant therapies: an updated report by the American Society of Anesthesiologists Task Force on Perioperative Blood Transfusion and Adjuvant Therapies. Anesthesiology 2006; 105:198–208 • Wong MP, Droubatchevskaia N, , Chipperfield KM, Wadsworth LD, Ferguson DJ. Guidelines for frozen plasma transfusion. BC Medical Journal 2007; 49: 311-319. • The Blood Observational Study Investigators on behalf of the ANZICS-Clinical Trials Group. Transfusion practice and guidelines in Australian and New Zealand intensive care units. Intensive Care Med. 2010 Jul;36(7):1138-46.

SEMICYUC

INDICATOR NUMBER 74 (FUNDAMENTAL INDICATOR)

Name of the indicator	INAPPROPRIATE TRANSFUSION OF PACKED RED BLOOD CELLS (PRBC)
Dimension	Effectiveness and safety
Justification	Transfusion with a hemoglobin threshold > 9 gm/dL has not been proven efficacious in reducing morbidity and mortality. Restrictive transfusion policies (Hb < 7 gm/dL) reduce morbidity and mortality at 30 and 60 days in young patients (< 55 yrs) of moderate severity (APACHE < 20).
Formula	Nº. of patients with hemoglobin > 7 gm/dL prior to transfusion of PRBC ---------- x 100 Nº. of patients transfused
Explanation of terms	• The maximum period between hemoglobin determination prior to transfusion and transfusion of the first PRBC unit is 24 h .
Population	All patients transfused in ICUduring the period reviewed • Exclusion criteria: – Massive bleeding; acute coronary syndrome; severe sepsis grave /septic shock in the resuscitation phase; severe hypoxemia – Brain death or imminent brain death – Pregnancy – In children < 16 y: hemodynamic instability, acute bleeding, or cardiovascular disease
Type	Process
Source of data	Clinical records
Standard	3%
Comments	References: • Hébert PC, Wells G, Blajchman MA, Marshall J, Martin C, Pagliarello G, Tweeddale M, Schweitzer I, Yetisir E. A multicenter, randomized, controlled clinical trial of transfusion requirements in critical care. Transfusion Requirements in Critical Care Investigators, Canadian Critical Care Trials Group. N Engl J Med 1999;340:409-417. • Leal Noval SR, Muñoz Gómez M, Campanario García A. Trasfusión en el paciente crítico. Med Intensiva 2004;28:464-469 • Lacroix J, Hébert PC, Hutchison JS, Hume HA, Tucci M, Ducruet T, et al TRIPICU Investigators; Canadian Critical Care Trials Group; Pediatric Acute Lung Injury and Sepsis Investigators Network. Transfusion strategies for patients in pediatric intensive care units. N Engl J Med. 2007 Apr 19;356(16):1609-19. • Marik PE, Corwin HL. Efficacy of red blood cell transfusion in the critically ill: a systematic review of the literature.Crit Care Med 2008;36: 2667-2674). • The Blood Observational Study Investigators on behalf of the ANZICS-Clinical Trials Group. Transfusion practice and guidelines in Australian and New Zealand intensive care units. Intensive Care Med. 2010 Jul;36(7):1138-46. • Hajjar LA, Vincent JL, Galas FR, Nakamura RE, Silva CM, Santos MH, et al. Transfusion requirements after cardiac surgery: the TRACS randomized controlled trial. JAMA. 2010 Oct 13;304(14):1559-67.

SEMICYUC

TOXICOLOGY

INDICATOR NUMBER 75

Name of the indicator	CORRECT INDICATIONS AND METHODS OF DIGESTIVE DECONTAMINATION (DD) IN ACUTE INTOXICATION
Dimension	Effectiveness and appropriateness
Justification	Digestive decontamination (DD) is one of the preferred techniques in the arsenal of treatments for intoxication. Appropriate DD reduces toxicity in intoxications brought about by oral ingestion. Delay reduces the efficacy of the measure. However, its use in patients without indications can increase morbidity and mortality. The appropriate indications depend on: the type of drug, the dose, the time since ingestion, and the clinical status.
Formula	Nº. of correct DD in drug intoxications ---------- x 100 Total Nº. of drug intoxications in patients discharged from the critical care department
Explanation of terms	• Digestive decontamination: any substance administered or procedure performed with the aim of preventing the digestive absorption of a toxic substance: syrup of ipecac, activated carbon, polyethylene glycol, gastric lavage / aspiration, or cathartic • Correct indications and methods: according to established criteria (1). Correct means that DD was not performed when not indicated and was performed when indicated using the right method as specified in the algorithm.
Population	Patients intoxicated by oral ingestion discharged from the critical care department during the period reviewed • Exclusion criteria: Ingestion of caustic substances, whether acids or bases, or other corrosive substances. Clinical presentation suggestive of acute abdomen. Mild intoxication. Excessive delay between ingestion and medical attention.
Type	Process
Source of data	Clinical records
Standard	>90%
Comments	The respiratory tract must be protected and adequate ventilation must be ensured. References: (1) Amigó M, Nogué S, Sanjurjo E, Faro J, Ferró I, Miró O. [Efficacy and safety of gut decontamination in patients with acute therapeutic drug overdose]. Med Clin (Barc). 2004 Apr 10;122(13):487-92. • Vale JA, Kulig K; American Academy of Clinical Toxicology; European Association of Poisons Centres and Clinical Toxicologists. Position paper: gastric lavage.J Toxicol Clin Toxicol. 2004;42(7):933-43 • Zimmerman JL.Poisonings and overdoses in the intensive care unit: general and specific management issues. Crit Care Med. 2003 Dec;31(12):2794-801

INDICATOR NUMBER 76

Name of the indicator	MINIMUM STOCK OF ANTIDOTES IN THE CRITICAL CARE DEPARTMENT AND/OR HOSPITAL PHARMACY
Dimension	Safety
Justification	It is necessary to define and protocolize the minimum stock of antidotes in accordance with the level of care provided at each center. The absence of essential antidotes can increase morbidity and mortality in intoxicated patients.
Formula	Nº. of recommended antidotes in stock (adequately accessible) ---------- x 100 Nº. of recommended antidotes according to hospital type
Explanation of terms	• Antidote: drug used to counteract the effects of a toxic substance or that is used for the specific treatment of an intoxicated patient. Antidotes should be readily available for healthcare staff 24 h/day, 365 days/year. • Sufficient amount: to treat one patient for 24 h • Recommended antidotes: List elaborated by the expert committee, adjusted to the level of care provided by the center [(1)] (See Annex I). Expired antidotes should be considered unavailable.
Population	All departments providing urgent care that might attend an intoxicated patient: Primary Care Centers; Level I, II, or III hospitals, 061, emergency ambulances.
Type	Structure
Source of data	Hospital pharmacy registry or person in charge of antidote stocks Data from the Intoxication Surveillance Commission or similar
Standard	95%
Comments	References: • (1) Lloret J, Nogue S, Jiménez X. Protocols, Codis d'Activació i Circuits d'atenció urgent a Barcelona Ciutat. Malalt amb intoxicacions agudes greus. Consorci Sanitari de Barcelona. Barcelona 2004 • Nogué S, Munné P, Soy D, Millá J.[Availability, use and cost of antidotes in Catalonia].Med Clin (Barc). 1998 May 9;110(16):609-13 • Ries NL, Dart RC. New developments in antidotes. Med Clin North Am. 2005 Nov;89(6):1379-97 • Burns MJ, Schwartzstein RM. General approach to drug intoxications in adults. UpToDate 2005. http://uptodateonline.com

Annex I. Minimum stock of antidotes

Primary Care Center	Non-Hospital Emergency Clinic	Company Clinic	Penitentiary Clinic
Atropine	Folinic acid (leucovorin)	Ascorbic acid	All those listed for non-hospital emergency clinics
Biperiden	Apomorphine	**In addition to all those listed for non-hospital emergency clinics**	
Activated carbon	Methylene blue		
Diazepam	1M sodium bicarbonate		
Flumazenil	IV absolute ethanol		
Glucagon	Calcium gluconate		
Hypertonic glucose	Hydroxocobalamin		
Naloxone	Pyridoxine		
Normobaric oxygen	Protamine		
Vitamin K	Magnesium sulfate		
Ipecac syrup	**in addition to all those listed for primary care centers**		

Level I Hospital	Level II Hospital	Level III Hospital
N-acetylcysteine	Bromocriptine	Digoxin antidote
Ascorbic acid	Dantrolene	Prothrombin complex
Physostigmine	Dimercaprol (BAL)	Hyperbaric oxygen (1)
Penicillin	Calcium disodium EDTA	Snake anti-venom
Fresh plasma	Phentolamine	Antibotulinum
Long-chain polyethylene glycol	Glucagon	Sodium thiosulfate
In addition to all those listed for non-hospital emergency clinics	Oximes	**In addition to all those listed for Level II hospitals.**
	Penicillamine	(1) in specialized centers
	Silibinin	
	In addition to all those listed for Level I hospitals	

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INDICATOR NUMBER 77

Name of the indicator	EARLY APPROPRIATE RENAL REPLACEMENT THERAPY IN ACUTE INTOXICATION
Dimension	Safety
Justification	Renal replacement therapy (RRT) aims to extract toxins that have already been absorbed. RRT is indicated in few intoxicated patients, but it is sometimes a very useful treatment option (Annex II). It requires specific tools, qualified staff, and frequent controls; it is always a risk for the patient.
Formula	Nº. of appropriately indicated RRT procedures ---------- x 100 Total Nº. of RRT procedures in the same period in the ICU
Explanation of terms	• RRT: peritoneal dialysis, hemodialysis, hemoperfusion, hemofiltration, hemodiafiltration, plasmapheresis, and blood replacement (exanguinotransfusion). • Appropriately indicated: based on Lloret et al.'s criteria (Annex III) • Appropriate: Indicated and correct. Catheters that allow blood flow >100 mL/min placed in large caliber veins (femoral, jugular, or subclavian). Dedicated area (ICU or dialysis unit) with the necessary equipment and qualified staff. Optimal clinical control of the patient when the technique is being performed. • Early: < 3 h
Population	Renal replacement techniques carried out in the ICU to treat acute intoxications during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Nogué S, Marruecos L, Morán I, Net A. Indicaciones de la depuración extrarrenal en el tratamiento de las intoxicaciones agudas. En: Net A, Roglán A. Depuración extrarrenal en el paciente grave. Masson,SA. Barcelona. 2004. Pg: 281-289 • Lloret J, Nogue S, Jiménez X. Protocols, Codis d'Activació i Circuits d'atenció urgent a Barcelona Ciutat. Malalt amb intoxicacions agudes greus. Consorci Sanitari de Barcelona. Barcelona 2004 • de Pont AC.Extracorporeal treatment of intoxications. Curr Opin Crit Care. 2007 Dec;13(6):668-73

Annex II.- Clinical criteria to indicate renal replacement therapy

• Intoxication with clinical signs of severity (coma, seizures, respiratory failure, cardiorespiratory failure, multiple organ failure)
• Failure of the organ that clears the toxin (liver or kidney)
• Expected development of structural lesions (neurologic, hepatic, renal) or life-threatening risk (malignant arrhythmias), whether due to the dose absorbed or to the concentrations of the toxic substance in the blood.
• No response to general supportive treatment
• No response to the antidote or no antidote available

Annex III.- Indications for renal replacement therapy

Type of technique	Toxic substance	Orientative plasma level for indication of the technique
Hemodialysis	2,4 dichlorophenoxyacetic acid	> 10 mg/dL
	phenobarbital	> 100 mg/dL
	ethylene glycol	> 0.5 g/L
	lithium	> 2.5 mEq/L
	methanol	> 0.5 g/L
	procainamide	> 20 µg/mL
	salicylates	> 80 mg/dL
	thallium	> 0.5 mg/L
	theophylline	> 60 mg/L
	valproate	> 1 g/L
Hemoperfusion	phenobarbital	> 100 mg/dL
	carbamazepine	> 60 µg/mL
	digitoxin	> 60 ng/mL
Plasmapheresis	digitoxin	> 60 ng/mL
	thyroxin	Not established
Blood replacement	agents increasing methemoglobin production	Metahemoglobin > 40%

SEMICYUC

INDICATOR NUMBER 78

Name of the indicator	APPROPRIATE INDICATION OF FORCED DIURESIS
Dimension	Effectiveness, appropriateness, safety, and continuity
Justification	Forced diuresis is a renal replacement technique rarely indicated in intoxicated patients; however, it is occasionally useful. Forced diuresis requires strict control and always represents a risk for the patient.
Formula	
Explanation of terms	Nº of appropriately indicated forced diuresis procedures ---------- x 100 Total number of forced diuresis procedures in the same period
Population	Level I, II, III hospitals. Primary care centers and ambulances are excluded.
Type	Process.
Source of data	Clinical records
Standard	> 95%
Comments	References: • Lloret J, Nogué S, Jiménez X. Protocols, Codis d'Activació i Circuits d'atenció urgent a Barcelona Ciutat. Malalt amb intoxicacions agudes greus. Consorci Sanitari de Barcelona. Barcelona 2004 • Nogué S, Marruecos L, Lloret J. Indicaciones de la depuración renal y extrarrenal en el tratamiento de las intoxicaciones. En: Net A, Marruecos L. Intoxicaciones agudas graves. Ars Medica. Barcelona. 2006. Pg: 81-92

Annex IV.- Indications for forced diuresis

Type de diuresis	Agente tóxico	Nivel plasmático orientativo tributarío de indicar la técnica
Alkaline	Salicylates	> 50 mg/dL
Forced alkaline diuresis	2,4 dichlorophenoxyacetic acid Phenobarbital Mecoprop Methotrexate	> 3.5 mg/dL > 7.5 mg/dL Not established > 100 µmol/L
Forced neutral diuresis	Amatoxins Lithium Paraquat Thallium	> 1 ng/mL > 1.5 mEq/L > 0.1 mg/L > 0.3 mg/L

INDICATOR NUMBER 79

Name of the indicator	MORTALITY DUE TO ACUTE (MEDICAL) DRUG POISONING OR TO OTHER POISONS
Dimension	Effectiveness and appropriateness
Justification	To evaluate the overall outcome of the healthcare process in patients with acute medical drug poisoning (ADP) and in those intoxicated by other poisons or drugs of abuse (OP).
Formula	Nº. of patients who die as a result of ADP (or of OP) ---------- x 100 Total Nº. of patients with ADP (or OP) attended in the same time period
Explanation of terms	• Acute drug poisoning (ADP): Accidental or voluntary oral ingestion of an unfractionated toxic dose of one or more medical drugs, regardless of whether accompanied by alcoholic beverages. Includes parenteral administration of insulin or other medications. The simultaneous ingestion or consumption of other drugs of abuse (heroin, cocaine, MDMA, etc) or household, agricultural, or industrial products. • Other poisons or drugs of abuse (OP): Accidental or voluntary intoxication resulting from the ingestion, inhalation, or parenteral absorption of nonmedical (household, agricultural, industrial) products or drugs of abuse. Includes intoxication due to the ingestion of plants or mushrooms and poisoning by land (snakes, spiders, scorpions) or marine (scorpion fish, sea spiders, jellyfish) animals.
Population	All departments that might attend or admit intoxicated patients: Primary care, level I, II, or III hospitals, emergency services, ambulances
Type	Outcome.
Source of data	Clinical reports or Mortality Commission reports / Poison control surveillance
Standard	ADP < 1%; OP < 3%
Comments	Due to space restrictions, we have grouped mortality into a single indicator. However, mortality due to ADP and OP require different standards. References: • Zimmerman JL. Poisonings and overdoses in the intensive care unit: general and specific management issues. Crit Care Med. 2003 Dec;31(12):2794-801 • Schwake L, Wollenschlager I, Stremmel W, Encke J. Adverse drug reactions and deliberate self-poisoning as cause of admission to the intensive care unit: a 1-year prospective observational cohort study. Intensive Care Med. 2009 Feb;35(2):266-74. • Palomar M, Socias A. Epidemiología de las intoxicaciones agudas que requieren ingreso en UCI. Intoxicaciones Agudas Graves. A Net, L. Marruecos. Ars Médica. Barcelona 2006;17-26.

TRANSPLANTS

INDICATOR NUMBER 80 (FUNDAMENTAL INDICATOR)

Name of the indicator	ORGAN DONORS
Dimension	Effectiveness
Justification	Critical care departments play a leading role in ensuring the acquisition of as many organs as possible.
Formula	Nº. of real donors ---------- x 100 Nº. of brain dead patients in the ICU
Explanation of terms	• Real donor: Donor taken to the operating room for the removal of organs (even if none of the organs removed are subsequently transplanted) • Potential donor: patients diagnosed with brain death without absolute contraindications for donation • Brain death: clinical situation in which the function of both the cerebral hemispheres and the brainstem has ceased completely and irreversibly • Real donor includes patients lost due to: ✓ Clinical contraindication ✓ Family and/or judicial refusal ✓ Problems during the maintenance of the donor
Population	All brain dead patients during the period reviewed
Type	Outcome
Source of data	Clinical records and transplantation coordination service
Standard	60%
Comments	References: • Escudero D, Matesanz R, Soratti CA, Flores JI; nombre de la Red/Consejo Iberoamericano de Donación y Trasplante. [General considerations on brain death and recommendations on the clinical decisions after its diagnosis. Red/Consejo Iberoamericano de Donación y Trasplante] Med Intensiva. 2009 Dec;33(9):450-4 • Escudero D. [Brain death diagnosis] Med Intensiva. 2009 May;33(4):185-95 • Seller Pérez G, Herrera-Gutiérrez ME, Lebrón-Gallardo M, Quesada-García G. [General planning for the maintenance of the organ donor] Med Intensiva. 2009 Jun-Jul;33(5):235-42 • Seller Pérez G, Hinojosa Pérez R. [Maintenance of the organ donor] Med Intensiva. 2009 Jun-Jul;33(5):233-4 • Programa de calidad en la donación de órganos. El Modelo español de Coordinación y Trasplantes Editorial Grupo Aula Médica S.L. ISBN: 978-84-7885-456-1 / Depósito Legal: M-22.757-2008.http://www.ont.es/publicaciones/Documents/modeloespanol.pdf • Guide of recommendations for Quality Assurance Programmes in the Deceased Donation Process Developed by: Dopki project Funded by the European Commision. 2009 http://www.ont.es/publicaciones/Documents/DOPKI%20GUIA.pdf

INDICATOR NUMBER 81

Name of the indicator	ASSESSMENT FOR LIVER TRANSPLANTATION IN ACUTE LIVER FAILURE
Dimension	Effectiveness
Justification	Before the introduction of liver transplantation, acute liver failure (ALF) was associated to high mortality (40%-80%). Liver transplantation is currently the only curative treatment for ALF, with a survival rate of 70% or higher vs. 10%-15% with conventional treatment. Early diagnosis of ALF is essential. The King's College London and/or Clichy criteria and indications for liver transplantation are used to diagnose ALF.
Formula	Nº. of patients with ALF in whom the criteria for liver transplantation have been applied ---------- x 100 Total Nº. of patients with ALF
Explanation of terms	• Criteria for liver transplantation: King´s College London and Clichy criteria (parameters defining at an early time which patients with ALF would benefit from liver transplantation) • ALF: acute liver failure of any etiology
Population	All patients with ALF during the period reviewed
Type	Process
Source of data	Clinical records
Standard	95 %
Comments	References: • Stravitz RT, Kramer AH, Davern T, Shaikh AO, Caldwell SH, Mehta RL, Blei AT, Fontana RJ, McGuire BM, Rossaro L, Smith AD, Lee WM; Acute Liver Failure Study Group.Intensive care of patients with acute liver failure: recommendations of the U.S. Acute Liver Failure Study Group. Crit Care Med. 2007 Nov;35(11):2498-508. • Stravitz RT.Critical management decisions in patients with acute liver failure. Chest. 2008 Nov;134(5):1092-102. • Bernal W, Auzinger G, Dhawan A, Wendon J. Acute liver failure. Lancet. 2010 Jul 17;376(9736):190-201. • Steadman RH, Van Rensburg A, Kramer DJ. Transplantation for acute liver failure: perioperative management. Curr Opin Organ Transplant. 2010 Jun;15(3):368-73 • Craig DG, Lee A, Hayes PC, Simpson KJ. Review article: the current management of acute liver failure. Aliment Pharmacol Ther. 2010 Feb 1;31(3):345-58

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INDICATOR NUMBER 82

Name of the indicator	MONITORING POTENTIAL ORGAN DONORS
Dimension	Appropriateness
Justification	Organ donor management aims to obtain as many viable organs as possible and optimize their function. Therefore, a "maintenance protocol" is necessary in the ICU for multiple organ donors. The significant and frequent hemodynamic, metabolic, and thermoregulatory alterations inherent in this situation can endanger the viability of the organs to be transplanted at a later time.
Formula	Total Nº. of brain-dead potential donors who are correctly monitored ---------- x 100 Total number of brain-dead potential donors
Explanation of terms	• Brain death: clinical condition characterized by complete and irreversible cessation of the function of both the brainstem and both cerebral hemispheres. • Potential donor: brain-dead patient without absolute contraindications for donation. • Correctly monitored: minimum requirements: ✓ Invasive arterial pressure ✓ Central venous pressure ✓ Heart rate ✓ Central temperature ✓ Diuresis ✓ Blood gases ✓ Complete blood count and coagulation ✓ Biochemical parameters: serum electrolytes, glucose, renal and liver function, systematic urinary analysis, and urinary sediment
Population	All brain-dead potential donors discharged from the critical care department during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Wood KE, Becker BN, McCartney JG, D'Alessandro AM, Coursin DB. Care of the potential organ donor. N Engl J Med. 2004 Dec 23;351(26):2730-9 • Salim A, Velmahos GC, Brown C, Belzberg H, Demetriades D. Aggressive organ donor management significantly increases the number of organs available for transplantation. J Trauma. 2005 May;58(5):991-4. • Salim A, Martin M, Brown C, Rhee P, Demetriades D, Belzberg H. The effect of a protocol of aggressive donor management: Implications for the national organ donor shortage. J Trauma. 2006 Aug;61(2):429-33 • Seller Pérez G, Herrera-Gutiérrez ME, Lebrón-Gallardo M, Quesada-García G. [General planning for the maintenance of the organ donor] Med Intensiva. 2009 Jun-Jul;33(5):235-42 • Seller Pérez G, Hinojosa Pérez R. [Maintenance of the organ donor] Med Intensiva. 2009 Jun-Jul;33(5):233-4

INDICATOR NUMBER 83

Name of the indicator	DIAGNOSIS OF BRAIN DEATH
Dimension	Effectiveness
Justification	Over 95% of the organs transplanted in Spain come from brain dead donors. These data confirm the importance of brain death (BD) for procuring organs for transplantation. Ample, correct clinical knowledge about the diagnosis of BD will undoubtedly contribute to an increase in the number of donors and therefore to the number of transplants.
Formula	Total Nº. of patients diagnosed with BD ---------- x 100 Total Nº. of deaths in the ICU
Explanation of terms	In Spain, approximately 14% of patients that die in ICUs are brain dead; this percentage could reach 30% in referral centers for neurosurgery. • Brain death: clinical condition characterized by complete and irreversible cessation of the function of both the brainstem and both cerebral hemispheres. • The diagnosis can only be reached by means of clinical neurologic examination or instrumental diagnostic tests in accordance with the legislation in force (RD 2070/1999).
Population	All patients diagnosed with brain death during the period reviewed
Type	Outcome
Source of data	Clinical records and transplantation coordination service
Standard	5%-30% Results below 5% represent a poor level of diagnosis.
Comments	References: • Wijdicks EFM. The diagnosis of brain death. N Engl J Med 2001; 344: 1215-21 • Escudero D, Matesanz R, Soratti CA, Flores JI; nombre de la Red/Consejo Iberoamericano de Donación y Trasplante. [General considerations on brain death and recommendations on the clinical decisions after its diagnosis. Red/Consejo Iberoamericano de Donación y Trasplante] Med Intensiva. 2009 Dec;33(9):450-4 • Escudero D. [Brain death diagnosis] Med Intensiva. 2009 May;33(4):185-95 • Real Decreto 2070/1999, de 30 de Diciembre, por el que se regulan las actividades de obtención y utilización clínica de órganos humanos y la coordinación territorial en materia de donación y trasplante de órganos y tejidos. BOE 3/2000 de 04-01-2000, pág. 179-190.

NURSING CARE

INDICATOR NUMBER 84

Name of the indicator	**REMOVAL OF ENTERAL FEEDING TUBE (EFT) DUE TO OBSTRUCTION**
Dimension	Safety
Justification	Failure to fulfill established guidelines for the administration of drugs and alimentation via enteral feeding tube (EFT) can cause it to become obstructed, with clinical consequences ranging from the risk of bronchoaspiration to the interruption of the prescribed treatment. All of this increases morbidity and costs.
Formula	Nº. of EFTs requiring removal due to obstruction ---------- x 100 Total Nº. of EFTs removed
Explanation of terms	EFT obstruction: loss of patency of the EFT that requires its removal
Population	All patients with EFTs during the period reviewed
Type	Outcome
Source of data	Clinical records / Nursing graphs
Standard	4%
Comments	References: • Marcos M, Ayuso d, González B, Carrión MI, Robles P, Muñoz F. de la Cal MA. Análisis de la retirada accidental de tubos, sondas y catéteres como parte del programa de control de calidad. Enferm Intensiva 1994;5:115-20. • Magnuson BL, Clifford TM, Hoskins LA, Bernard AC.Enteral nutrition and drug administration, interactions, and complications. Nutr Clin Pract. 2005 Dec;20(6):618-2 • Phillips NM, Nay R. A systematic review of nursing administration of medication via enteral tubes in adults. J Clin Nurs. 2008 Sep;17(17):2257-65. • Williams NT. Medication administration through enteral feeding tubes. Am J Health Syst Pharm. 2008 Dec 15;65(24):2347-5 • Bourgault AM, Halm MA. Feeding tube placement in adults: safe verification method for blindly inserted tubes. Am J Crit Care. 2009 Jan;18(1):73-6. Review • Yardley IE, Donaldson LJ. Patient safety matters: reducing the risks of nasogastric tubes. Clin Med. 2010 Jun;10(3):228-30.

INDICATOR NUMBER 85

Name of the indicator	**APPROPRIATE BRONCHIAL ASPIRATION**
Dimension	Safety
Justification	Using the proper technique in bronchial aspiration helps to reduce the incidence of ventilator-associated pneumonia (VAP). VAP is associated with increased mortality, augmenting the length of stay and thereby costs. Following evidence-based recommendations helps to reduce morbidity due to VAP.
Formula	Nº. of aspirations performed following the recommendations ---------- x 100 Total Nº. of aspirations through the artificial airway
Explanation of terms	Evidence-based recommendations: • Aspirate secretions only when necessary • Use an aspiration tube that occupies less than half the lumen of the artificial airway • Use the lowest possible aspiration pressure (normally about 80-120 mmHg) • The procedure should not take longer than 15''. • Hyperoxygenate and hyperventilate before and after bronchial aspiration (at least for 30'') • Use a sterile technique and sterile material (a sterile tube for each aspiration, gloves after hand washing) • Aspirate the oropharynx to finalize the procedure • Check the pressure of the ventilator cuff Artificial airway: endotracheal tube and tracheostomy tube.
Population	All aspirations in patients with an artificial airway during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	References: • Coffin SE, Klompas M, Classen D, Arias KM, Podgorny K, Anderson DJ et al. Strategies to prevent ventilator-associated pneumonia in acute care hospitals. Infect Control Hosp Epidemiol. 2008 Oct;29 Suppl 1:S31-40 • Tablan OC, Anderson LJ, Besser R, Bridges G, Hajjeh R. CDC guidelines for prevent health care associated pneumonia. 2004;53(RR03):1-36. Disponible en: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm. • Pedersen CM, Rosendahl-Nielsen M, Hjermind J, Egerod I. Endotracheal suctioning of the adult intubated patient--what is the evidence? Intensive Crit Care Nurs. 2009 Feb;25(1):21-30 • Caruso P, Denari S, Ruiz SA, Demarzo SE, Deheinzelin D. Saline instillation before tracheal suctioning decreases the incidence of ventilator-associated pneumonia. Crit Care Med. 2009 Jan;37(1):32-8.

INDICATOR NUMBER 86

Name of the indicator	**INFORMATION FROM NURSING STAFF TO PATIENTS' FAMILIES**
Dimension	Satisfaction and appropriateness
Justification	Families have a priority need to receive information from the multidisciplinary team. Nursing staff members have a more holistic view of the patient and more contact with patients' families. Protocolized transmission of information from nursing staff to patients' families helps to reduce family members' stress and anxiety and can help achieve greater cooperation from the family in the critical patients' healthcare process.
Formula	Nº. of families informed by nursing staff ---------- x 100 Nº. of patients discharged from the critical care department
Explanation of terms	The information transmitted should include at least the following aspects: • Information about the care provided for the patient by the nursing staff • Information about the patient's condition and comfort, including physical, psychological, and emotional aspects • Emotional support for the families • Families should be informed on a daily basis • Families should be informed in the appropriate physical space (office or bedside, depending on the patient's situation) • The provision of information should be documented in the clinical records Nursing staff should not provide information about prognostics, diagnostics, or treatment; this is the physicians' role.
Population	Families of all patients admitted during the period reviewed • Exclusion criteria: ✓ Patients without families or similar relations ✓ Patients who have formally expressed the desire that information be withheld from their families
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Zaforteza C, Gastaldo D, de Pedro JE, Sánchez-Cuenca P, Lastra P. The process of giving information to families of critically ill patients: a field of tension. Int J Nurs Stud. 2005;42(2):135-45. • Hidalgo Fabrellas I, Vélez Pérez Y, Pueyo Ribas E. Qué es importante para los familiares de los pacientes de una Unidad de Cuidados Intensivos. Enferm Intensiva 2007; 18(3): 106-14. • Zaforteza C, Sánchez C, Lastra P. Análisis de la literatura sobre los familiares del paciente crítico: es necesario desarrollar investigación en cuidados efectivos. Enferm Intensiva. 2008;19(2):61-70. • Olsen KD, Dysvik E, Hansen BS. The meaning of family members' presence during intensive care stay: a qualitative study. Intensive Crit Care Nurs. 2009;25(4):190-8. • Nelson DP, Plost G. Registered nurses as family care specialists in the intensive care unit. Crit Care Nurse. 2009;29(3):46-52.

INDICATOR NUMBER 87

Name of the indicator	**INTRAHOSPITAL TRANSPORT**
Dimension	Safety, appropriateness, and continuity of care
Justification	Intrahospital transport and movement of critical patients for diagnostic or therapeutic procedures increases the risk of complications due to the discontinuity in care. Transport should be carried out using the right equipment (including life support and monitoring devices in accordance with the criteria for clinical safety and quality) and with enough trained personnel to immediately resolve unforeseen problems that might threaten the patient's life. It is essential to register the most serious adverse events that occur during intrahospital transport.
Formula	A protocol for intrahospital transport should be in effect.
Explanation of terms	The protocol should include: • Assessment of the risks and benefits of moving the patient • Minimum equipment requirements for monitoring and life support (stratified according to patient severity) • Professionals accompanying the patient with a definition of the responsibilities of each • Checklist • Register of severe adverse events including at least: death, cardiac arrest, accidental extubation, accidental withdrawal of catheters, lines drains, etc., interruption of oxygen supply, and falls
Population	Census of up-to-date protocols in the department
Type	Structure
Source of data	Protocol registry
Standard	Yes o 100 %
Comments	References: • Warren J, Fromm RE Jr, Orr RA, Rotello LC, Horst HM. Guidelines for the inter- and intrahospital transport of critically ill patients. Crit Care Med. 2004;32(1):256-62. • Beckmann U, Gillies DM, Berenholtz SM, Wu AW, Pronovost P. Incidents relating to the intra-hospital transfer of critically ill patients. An analysis of the reports submitted to the Australian Incident Monitoring Study in Intensive Care. Intensive Care Med. 2004 Aug;30(8):1579-85 • Löw M, Jaschinski U. [Intrahospital transport of critically ill patients]. Anaesthesist. 2009 Jan;58(1):95-105 • Winter MW. Intrahospital transfer of critically ill patients; a prospective audit within Flinders Medical Centre. Anaesth Intensive Care. 2010 May; 38(3):545-9 • Fanara B, Manzon C, Barbot O, Desmettre T, Capellie G. Recommendations for the intra-hospital transport of critically ill patients. Crit Care. 2010;14(3):R87.

SEMICYUC

INDICATOR NUMBER 88

Name of the indicator	**CUFF PRESSURE**
Dimension	Safety
Justification	One fundamental function of cuff pressure is to seal the airway and prevent the aspiration of the contents of the pharynx into the trachea. Thus, excessively low endotracheal-tube or tracheostomy-tube cuff pressure does not permit efficacious mechanical ventilation, increases the risk of bronchoaspiration and thus of VAP, and makes the patient more susceptible to accidental extubation and displacement of the artificial airway. On the other hand, excessively high cuff pressure could cause ischemia, thereby increasing the risk of tracheobronchial lesions.
Formula	Nº. of cuff-pressure measurement controls within the recommended range ---------- x 100 Total Nº. of cuff measurement controls
Explanation of terms	<u>Evidence-based recommendations:</u> Maintain cuff pressure on the artificial airway between 20 and 30 cm H_2O. Check cuff pressure once every shift and whenever the endotracheal tube is moved.
Population	All cuff pressure controls during the period reviewed in patients with an artificial airway and inflatable cuff
Type	Process
Source of data	Clinical records
Standard	95%
Comments	References: • Tablan OC, Anderson LJ, Besser R, Bridges G, Hajjeh R. CDC guidelines for prevent health care associated pneumonia. 2004;53(RR03):1-36. Disponible en: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm. • Valencia M, Ferrer M, Farré R, Navajas D, Badía JR, Nicolás JM, et al.Automatic control of tracheal tube cuff pressure in ventilated patients in semirecumbent position: a randomized trial.Crit Care Med. 2007 Jun;35(6):1543-9 • Duguet A, D'Amico L, Biondi G, Prodanovic H, Gonzalez-Bermejo J, Similowski T. Control of tracheal cuff pressure: a pilot study using a pneumatic device.Intensive Care Med 2007; 33: 128-132. • Rose L, Redl L. Survey of cuff management practices in intensive care units in Australia and New Zealand. Am J Crit Care. 2008;17(5):428-35. • Rose L, Redl L. Minimal occlusive volume cuff inflation: a survey of current practice.Intensive Crit Care Nurs. 2008;24(6):359-65. • Sole ML, Penoyer DA, Su X, Jimenez E, Kalita SJ, Poalillo E, et al. Assessment of endotracheal cuff pressure by continuous monitoring: a pilot study. Am J Crit Care. 2009;18(2):133-43.

INDICATOR NUMBER 89

Name of the indicator	**MANAGEMENT OF MONITORING ALARMS**
Dimension	Safety and appropriateness
Justification	Inappropriate alarm management increases morbidity and mortality due to delayed response, thus reducing the quality of care and patient safety. Appropriate alarm management requires specific training.
Formula	Nº. of monitored patients who present an adverse event due to inappropriate alarm management ---------- x 100 Nº. of patients monitored
Explanation of terms	• Adverse event: any undesired event attributable to inappropriate alarm management that harms a critical patient. • Inappropriate alarm management: ✓ Unattended alarm ✓ Alarm not adapted to each patient ✓ Alarm canceled without appropriate attention ✓ Inaudible alarm ✓ Excessive alarm volume during the patient's sleep period
Population	All patients admitted to the ICU who are monitored during the period reviewed. Study period: we recommend working with sampling days.
Type	Outcome
Source of data	Clinical records. Nursing registry of adverse events.
Standard	5%
Comments	References: • Görges M, Markewitz BA, Westenskow DR. Improving alarm performance in the medical intensive care unit using delays and clinical context. Anesth Analg. 2009;108(5):1546-52. • Korniewicz DM, Clark T, David Y. A national online survey on the effectiveness of clinical alarms. Am J Crit Care. 2008;17(1):36-41 • American College of Clinical Engineering Healthcare Technology Foundation. Impact of Clinical Alarms on Patient Safety. Journal of Clinical Engineering. 2007; 22-33. • Phillips J, Barnsteiner JH. Clinical alarms: improving efficiency and effectiveness. Crit Care Nurs Q. 2005;28(4):317-23. (Abstract) • Blum JM, Kruger GH, Sanders KL, Gutierrez J, Rosenberg AL. Specificity improvement for network distributed physiologic alarms based on a simple deterministic reactive intelligent agent in the critical care environment. J Clin Monit Comput. 2009 Feb; 23(1):21-30.

INDICATOR NUMBER 90

Name of the indicator	**ACCIDENTAL FALLS**
Dimension	Safety and satisfaction
Justification	Falls can injure patients and lower perceived quality. Falls can be avoided. The use of protocols and restraining measures can reduce the incidence of falls.
Formula	Nº. of falls occurring ---------- x 1000 Nº. of stays
Explanation of terms	• All falls should be counted, whether the patient was in bed, sitting, or walking without the support necessary. Falls registered during movement/transport of patients should be included.
Population	All stays of patients discharged from the critical care department during the period reviewed
Type	Outcome
Source of data	Clinical records. Specific registry for falls.
Standard	0‰
Comments	References: • Maccioli GA, Dorman T, Brown BR, Mazuski JE, McLean BA, Kuszaj JM, Rosenbaum SH, Frankel LR, Devlin JW, Govert JA, Smith B, Peruzzi WT; American College of Critical Care Medicine, Society of Critical Care Medicine. Clinical practice guidelines for the maintenance of patient physical safety in the intensive care unit: use of restraining therapies--American College of Critical Care Medicine Task Force 2001-2002. Crit Care Med 2003;31:2655-2676 • Flanders SA, Harrington L, Fowler RJ. Falls and patient mobility in critical care: keeping patients and staff safe. AACN Adv Crit Care. 2009 • Kolin MM, Minnier T, Hale KM, Martin SC, Thompson LE. Fall Initiatives: Redesigning Best Practice. J Nurs Adm. 2010 Sep;40(9):384-391.

SEMICYUC

INDICATOR NUMBER 91

Name of the indicator	**NURSING REGISTRIES IN THE ICU**
Dimension	Continuity of care
Justification	Nursing registers form part of the patient's clinical records. They assure the quality and continuity of care. They help to avoid errors and repetition of procedures. They provide a record of the activity planned and carried out by the nursing staff and all the information generated in the nursing staff's relations with the patient. Nursing registers improve interdisciplinary communication. Nursing registers are legal documents.
Formula	Nº. of duly completed registers ---------- x100 Nº. of registers evaluated
Explanation of terms	• Nursing registers: computerized or paper charts where all pertinent information about the patient are registered (from admission to discharge from the critical care department) as well as all annexed documents accepted by the hospital's clinical documentation commission • Duly completed: ✓ Containing all data specified in the regulations for the use of clinical records at each hospital ✓ Brief summary of the patient's condition during each shift and registry of all activities planned and executed by the nursing staff, duly signed by the registered nurse responsible for the patient
Population	All registers of patients discharged to the critical care department during the period reviewed
Type	Outcome
Source of data	Clinical records
Standard	100%
Comments	References: • González Sánchez JA, Cosgaya García O, Simón García MJ, Blesa Malpica AL. Registros de enfermería: convencional frente a informatizado. Unidad de cuidados críticos. Enferm Intensiva. 2004;15(2):53-62 • Perpiñá Galvan J. Análisis de los registros de enfermería del Hospital General Universitario de Alicante y pautas para mejorar su cumplimentación Enferm Clin. 2005;15:95-102. • Del Olmo-Núñez SM, Casas-De la Cal L, Mejías-Delgado A. El registro de enfermería: un sistema de comunicación. Enferm Clin. 2007; 17(3): 142-5. • Donati A, Gabbanelli V, Pantanetti S, Carletti P, Principi T, Marini B, Nataloni S, Sambo G, Pelaia P. The impact of a clinical information system in an intensive care unit. J Clin Monit Comput. 2008 Feb;22(1):31-6.

INDICATOR NUMBER 92

Name of the indicator	**MEDICATION ERRORS IN THE ICU**
Dimension	Safety
Justification	Errors in the administration of medication are the most common incidents in the ICU; these errors increase morbidity, mortality, stays, and costs. Communicating these errors enables action to be taken to prevent them.
Formula	Total Nº. of errors in medication reported ---------- x 100 Total Nº. of administrations of medication
Explanation of terms	• Total Nº. of administrations: derived by calculating the mean number of patients in the ICU in one year and the mean number of administrations of medication per patient (approximately 15 administrations per day). • Error in medication: errors occurring in any of the phases involved in the use of the medication.
Population	All patients admitted to the ICU during the period reviewed Exclusion criteria: adverse reactions to medication
Type	Outcome
Source of data	Direct observation "Medication errors" memorandum. Clinical records.
Standard	5%
Comments	References: • C. Lacasa, C.Humet y R.Cot. Errores de Medicación. Ed. EASO. 2001. Programa de garantía de calidad en el Servicio de Farmacia del Hospital de Barcelona (II), Farm Hosp.1998;22 (6):271-278. • Holzmuller CG, Pronovost PJ, Dickman F, Thompson DA, Wu AW, Lubomski LH, Fahey M, Steinwachs DM, Engineer L, Jaffrey A, Morlock LL, Dorman T. Creating the Web-Based Intensive Care Unit Safety Reporting System (ICUSRS). J Am Med Inform 2003; doi:10.1197/jamia. M1408 • Valentin A, Capuzzo M, Guidet B, Moreno R, Metnitz B, Bauer P, Metnitz P; Research Group on Quality Improvement of the European Society of Intensive Care Medicine (ESICM); Sentinel Events Evaluation (SEE) Study Investigators. Errors in administration of parenteral drugs in intensive care units: multinational prospective study. BMJ. 2009 Mar 12;338:b814 • SEMICYUC. Adverse incidents and events in intensive care medicine. Safety and risk factors for critically ill patients. SYREC 2007. Madrid: Ministry of Health and Social Policy;2009. http://www.seguridaddelpaciente.es/contenidos/english2/2009/SYREC_study_summary.pdf

INDICATOR NUMBER 93 (FUNDAMENTAL INDICATOR)

Name of the indicator	COMPLIANCE WITH HAND-WASHING PROTOCOLS
Dimension	Safety and effectiveness
Justification	Hand washing is the most important measure for reducing nosocomial infections. These infections increase morbidity, mortality, and the costs of care. Using alcohol-based solutions reduces the incidence of nosocomial infections by 40%.
Formula	Nº. of hand washes carried out ---------- x 100 Nº. of opportunities for hand washes in the department
Explanation of terms	Evidence-based recommendations: Hygienic wash: - Procedure: with water and neutral soap. Duration: 20 seconds. - Indicated: **Before**: starting the shift, going to eat, having contact with the patient, manipulating systems that should be sterile, preparing medication or food, performing procedures of short duration (less than 10 minutes), and whenever dirt is visible. **After**: using the lavatory, eating, manipulating material contaminated with secretions, touching a patient, and finishing the shift. **Before and after**: contact with wounds and handling drainage systems. **Between**: contact with different patients. Antiseptic wash: - Procedure: alcohol-based solution. Duration: 2 minutes. - Indicated: before performing invasive procedures of long duration (20 min.) and any maneuver in immunodepressed patients. Wearing gloves does NOT mean hand washing is unnecessary.
Population	All healthcare staff during the period reviewed (physicians, registered nurses, nurse's aides, and all others)
Type	Process
Source of data	Direct observation
Standard	90%
Comments	References: Hand washing should be done correctly whenever indicated. • World alliance for patient safety. WHO directives about hand hygiene in health care. Clean care is safer care. Available at: http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf • Centers for Disease Control and Prevention. Guidelines for hand hygiene in health-care settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. MMWR. 2002:51(No. RR-16). Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm. • Kampf G, Löffler H, Gastmeier P. Hand hygiene for the prevention of nosocomial infections. Dtsch Arztebl Int. 2009;106(40):649-55. • Joint Commission. Measurement hand hygiene adherence overcoming the challenges. 2009. Available at: http://www.jointcommission.org/NR/rdonlyres/68B9CB2F-789F-49DB-9E3F-2FB387666BCC/0/hh_monograph.pdf. • Elola P, Aroca J, Huertas MV, Díez J, Rivas L, Martínez G, et al. [A hand hygiene education program. Comparison between handwashing and the use of alcohol solutions]. Enferm Clin. 2008;18(1):5-10.

INDICATOR NUMBER 94

Name of the indicator	**ACCIDENTAL REMOVAL OF VASCULAR CATHETERS**
Dimension	Safety and effectiveness
Justification	The accidental removal of catheters directly affects the patient's safety; it increases the risk of complications, the staff's workload, and the length of stay (and thus costs for material and human resources).
Formula	Nº. of vascular catheters accidentally removed ---------- x 1000 days Nº. of vascular catheter days
Explanation of terms	• Accidental catheter removal includes: ✓ Removal by the patient ✓ Removal by staff in performing a maneuver ✓ Obstruction of the catheter • Inclusion criteria: ✓ Central venous or arterial catheter (central or peripheral insertion) ✓ Catheters inserted in the ICU or elsewhere
Population	All vascular catheter days in patients discharged who have spent more than 24 h in the ICU during the period reviewed • Exclusion criteria: ✓ Patients admitted for less than 24 h
Type	Outcome
Source of data	Clinical records
Standard	Arterial catheter: 15 catheters per 1000 days Central venous catheter: 6 catheters per 1000 days
Comments	References: • Carrion MI, Ayuso D, Marcos M, Robles MP, de la Cal MA, Alía I, Esteban A. Accidental removal of endotracheal and nasogastric tubes and intravascular catheters. Critical Care Med 2000;28:63-66. • Goñi R, García MP, Vázquez M, Margall MA, Asiain MC. [Evaluation of care quality in the ICU through a computerized nursing care plan]. Enferm Intensiva 2004,15:76-85. • Amo MD, Carmona FJ, Gómez I, Bonilla G, Gordo F. [Assessment of the efficacy of the implementation of an arterial cannulation protocol as quality assurance method]. Enferm Intensiva 2004;15:159-164. • Lorente L, Huidobro MS, Martin MM, Jiménez A, Mora ML. Accidental catheter removal in critically ill patients: a prospective and observational study. Critical Care 2004;8 (4): 229-33. • S Arias-Rivera, MM Sánchez-Sánchez, R Sánchez-Izquierdo, MJ Gallardo-Murillo, RI Santos-Díaz, F Frutos-Vivar. [Establishment of a nursing-driven sedation protocol: effect on the sedation level and accidental withdrawal of tubes and catheters]. Enferm Intensiva. 2008;19(2):71-77.

INDICATOR NUMBER 95

Name of the indicator	**CRASH CART REVIEW**
Dimension	Safety and appropriateness
Justification	The correct maintenance of crash carts ensures that material is available when needed. This indicator measures the level of prevention for the potential response to an emergency.
Formula	Nº. of reviews performed according to protocol ---------- x 100 Nº. of reviews indicated (days x 3)
Explanation of terms	• Crash cart review "according to protocol" includes: ✓ Time: 3 times /day (8 h nursing shift) ✓ Contents: o Check the cart's seal. o If sealed, sign and record the date of review. o If not sealed, use the checklist to review the amount of medications and material for airways and circulatory support. o Check that the monitor and defibrillator are working (according to the manufacturer's instructions and specifications).
Population	All planned reviews (3/day) during the period reviewed • Exclusion criteria: reviewing the cart after using it
Type	Process
Source of data	Specific crash cart review checklist
Standard	100%
Comments	References: • Requirement: compliance with UNE 60601. Safety requirements for electrical medical equipment (Regulations of the Spanish Society of Electronics in Medicine and Clinical Engineering, SEEIC) • Agency for Healthcare Research and Quality: www.ahrq.gov • Joint Commission. International standards for hospital accreditation. 2000. • Calvo Macías C et al. [Material for the pediatric resuscitation trolley]. An Pediatr (Barc). 2007;66:51-4. • Rodríguez-Borrajo S. and cols [Hospital nurses' knowledge of the patient care plan for immediate life threatening situations]. Enferm Clin. 2008;18:190-6.

BIOETICHS

INDICATOR NUMBER 96

Name of the indicator	APPROPRIATE END-OF-LIFE CARE
Dimension	Effectiveness and satisfaction
Justification	The appropriateness of end-of-life care should be considered in all patients who die in the Intensive Care Unit (ICU), where a significant percentage die after the decision to withhold or withdraw life support (WLS). End-of-life care practices vary widely. Protocols based on recommendations of the scientific societies can reduce variability and improve quality.
Formula	Nº. of WLS patients dying in the ICU in whom the protocol was applied ----------x 100 Total Nº. of WLS patients dying in the ICU
Explanation of terms	The minimum aspects that must be included in the protocol for end-of-life care: ✓ Justification for WLS ✓ Life support withheld or withdrawn ✓ Sedation in WLS ✓ Incorporation of advance directives ✓ Use of WLS forms ✓ Advice and support for staff and families ✓ Process of communication
Population	All patients with orders to WLS who die in the ICU during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%
Comments	The measurement of this indicator requires the existence of a specific protocol for end-of-life care and its application in patients in whom life support is withdrawn or withheld. References: • Clarke EB, Curtis JR, Luce JM, Levy M, Danis M, Nelson J, Solomon MZ; Robert Wood Johnson Foundation Critical Care End-Of-Life Peer Workgroup Members. Quality indicators for end-of-life care in the intensive care unit. Crit Care Med. 2003 Sep;31(9):2255-62. • Cabré Ll, Abizanda R, Baigorri F, Blanch L, Campos JM, Irribaren S, Mancebo J, Martín MC, Martínez K, Monzón JL, Nolla M, Rodriguez A, Sánchez JM, Saralegui I, Solsona JF y Grupo de trabajo de la SEMICYUC. Código ético de la Sociedad Española de Medicina Intensiva Crítica y Unidades Coronarias (SEMICYUC). Med Intensiva 2006; 30: 1-5. • Truog RD, Campbell ML, Curtis JR, Haas CE, Luce JM, Rubenfeld GD, Rushton CH, Kaufman DC; American Academy of Critical Care Medicine. Recommendations for end-of-life care in the intensive care unit: a consensus statement by the American College [corrected] of Critical Care Medicine.Crit Care Med. 2008 Mar;36(3):953-63. • Monzón Marín JL, Saralegui Reta I, Abizanda i Campos R, Cabré Pericas L, Iribarren Diarasarri S, Martín Delgado MC, Martínez Urionabarrenetxea K; Grupo de Bioética de la SEMICYUC.[Treatment recommendations at the end of the life of the critical patient].Med Intensiva. 2008 Apr;32(3):121-33.

INDICATOR NUMBER 97 (FUNDAMENTAL INDICATOR)

Name of the indicator	INFORMATION TO FAMILIES OF ICU PATIENTS
Dimension	Satisfaction
Justification	Patients' rights to information are regulated by current legislation.A significant percentage of critical patients are incapacitated, which means that this information must be given to family members or other persons to whom the patient has a close relation.In critical patients, given the severity and variability in the clinical situation, this information should fulfill a set of criteria.
Formula	Nº. of patients/families informed according to the criteria ---------- x 100 Nº. of patients admitted to the ICU
Explanation of terms	• Families: immediate family members or those designated or authorized by the patient • Criteria for information to families: ✓ If the patient is competent, he or she must be informed. ✓ Information should be provided **on a daily basis** (including on weekends and holidays), and ample time should be taken to explain the most important changes occurring and to respond to the families' queries. This also applies to the information provided on admission. ✓ Information should be given in a comfortable place, ensuring **privacy**. ✓ The information should be provided by the patient's **attending physician**. The physician attending the patient or supervising the patient's care when the patient's attending physician is not present should be explicitly specified. In the absence of the patient's attending physician, the physician on duty will assume this responsibility. ✓ The information provided should be recorded in the clinical history.
Population	All patients admitted to the ICU during the period reviewed • Exclusion criteria: ✓ Patients without family or designated persons ✓ Patients who express their desire that families not be informed
Type	Process
Source of data	Clinical history
Standard	100%
Comments	Referencia: • Ley 41 /2002 Básica reguladora de la autonomía del paciente y de derechos y obligaciones en materia de información y documentación clínica (noviembre 2002). BOE 15 noviembre 2002 • Davidson JE, Powers K, Hedayat KM, Tieszen M, Kon AA, Shepard E, Spuhler V, Todres ID, Levy M, Barr J, Ghandi R, Hirsch G, Armstrong D; American College of Critical Care Medicine Task Force 2004-2005, Society of Critical Care Medicine. Clinical practice guidelines for support of the family in the patient-centered intensive care unit: American College of Critical Care Medicine Task Force 2004-2005. Crit Care Med. 2007 Feb;35(2):605-22. • Halpern NA, Raoof ND, Voigt LP, Pastores SM.Challenging family dialogues within the intensive care unit: an intensivist's perspective.J Hosp Med. 2008 Jul;3(4):354-6. • Abizanda Campos R, Bernat Adell A, Ballester Arnal R, Bisbal Andrés E, Vidal Tegedor B, Cubedo Bort M, Reig Valero R.[Information strategies in a polyvalent Intensive Care Unit]. Med Intensiva. 2008 Jun-Jul;32(5):216-21.

INDICATOR NUMBER 98

Name of the indicator	INCORPORATION OF ADVANCE DIRECTIVES IN THE DECISION-MAKING PROCESS
Dimension	Appropriateness and satisfaction
Justification	Advance health directives (AHD) facilitate respect for the incapacitated patient's wishes. Current legislation establishes and regulates the obligation to incorporate AHD into the decision-making process. It is the physicians' responsibility to explore the existence of AHD in the decision-making process for those patients that cannot express their preferences.
Formula	Nº. of incapacitated patients for whom the existence of AHD was investigated ---------- X 100 Nº. of incapacitated patients
Explanation of terms	• Incapacitated patient: patient unable to make decisions because of his/her condition • Advance health directives: involves the exploration of AHD that meet the legal requirements for validity • Other instructions that are not legally regulated should also be taken into consideration (oral instructions, written documents, etc.)
Population	All incapacitated patients in the critical care department during the period reviewed
Type	Process
Source of data	Clinical records: should include an explicit statement by the attending physician about whether the existence of AHD has been explored before making decisions regarding incapacitated patients.
Standard	100%
Comments	References: • Ley 41 /2002 Básica reguladora de la autonomía del paciente y de derechos y obligaciones en materia de información y documentación clínica (noviembre 2002). BOE 15 noviembre 2002 • Saralegui Reta I, Monzón Marín JL, Martín MC. Instrucciones previas en Medicina Intensiva. Med Intensiva 2004;28:256-261 • Whetstine LM. Advanced directives and treatment decisions in the intensive care unit. Crit Care. 2007;11(4):150. • Tillyard AR. Ethics review: 'Living wills' and intensive care--an overview of the American experience. Crit Care. 2007;11(4):219. • Lautrette A, Peigne V, Watts J, Souweine B, Azoulay E. Surrogate decision makers for incompetent ICU patients: a European perspective. Curr Opin Crit Care. 2008 Dec;14(6):714-9 • Silveira MJ, Kim SY, Langa KM Advance directives and outcomes of surrogate decision making before death. N Engl J Med. 2010 Apr 1;362(13):1211-8

INDICATOR NUMBER 99

Name of the indicator	INFORMED WRITTEN CONSENT
Dimension	Satisfaction
Justification	In general, every act in a healthcare environment requires the patient's prior consent or, in the case of incapacitated patients, that of their legal representative. Failure to obtain consent violates the patient's right to autonomy. Although, as a general rule, consent will be verbal, the legislation requires written consent in certain circumstances (surgery, invasive procedures and procedures that suppose significant risks or drawbacks).
Formula	Nº. of informed written consent forms correctly filled out ---------- x 100 Nº. of procedures requiring informed written consent
Explanation of terms	• Informed written consent forms correctly filled out: Document including the identification and signature of the physician and the patient/authorized legal representative, together with a brief description of the procedure and the possible risks involved, as well as alternatives if they exist. • Procedures requiring informed written consent. The SEMICYUC Bioethics work group recommends the following: ✓ Tracheostomy, ✓ Non-urgent transfusion of blood products ✓ Urgent surgical intervention ✓ Renal replacement techniques ✓ Non-urgent pacemaker implantation ✓ Plasmapheresis ✓ Angiography • Exclusion criteria: Incapacitated patients whose family or legal representatives cannot be contacted
Population	All of the procedures listed above during the period reviewed
Type	Process
Source of data	Clinical records
Standard	100%.
Comments	Solo se considerara correcto este indicador sí se cumplen todos los requisitos mencionados en "Explanation of terms". References: • Ley 41 /2002 Básica reguladora de la autonomía del paciente y de derechos y obligaciones en materia de información y documentación clínica (noviembre 2002). BOE 15 noviembre 2002 • Solsona JF, Cabré L, Abizanda R, Campos JM, Sainz A, Martín MC, Sánchez JM, Bouza C, Quintana M, Saralegui I, Monzón JL y grupo de bioética de la SEMICYUC. Recomendaciones del grupo de bioética de la SEMICYUC sobre el Consentimiento Informado en UCI. Med. Intensiva 2002; 26 (5):254-255 • Davis N, Pohlman A, Gehlbach B, Kress JP, McAtee J, Herlitz J, Hall J. Improving the process of informed consent in the critically ill. JAMA. 2003 Apr 16;289(15):1963-8 • Clark PA. Intensive care patients' evaluations of the informed consent process.Dimens Crit Care Nurs. 2007 Sep-Oct;26(5):207-26. • Fan E, Shahid S, Kondreddi VP, Bienvenu OJ, Mendez-Tellez PA, Pronovost PJ, Needham DM.Informed consent in the critically ill: a two-step approach incorporating delirium screening.Crit Care Med. 2008 Jan;36(1):94-9.

INDICATOR NUMBER 100 (FUNDAMENTAL INDICATOR)

Name of the indicator	LIMITING LIFE SUPPORT
Dimension	Appropriateness and satisfaction
Justification	The aim of limiting life support is to avoid suffering caused by futile treatment. Life support is limited in a significant percentage of critical care patients. The decision to forego life support should never be taken individually, rather certain essential criteria, both scientific and consensual, must be met.
Formula	Nº. of indications to limit life support that fulfill the criteria ----------x 100 Nº. of indications for total limitation of life support
Explanation of terms	Both withdrawing and withholding therapeutic measures are considered limitation of life support. • <u>The following are considered essential for the indication:</u> ✓ Based on the best scientific evidence available ✓ Taking the patient's wishes into consideration as well as advance health directives ✓ Consensus among the healthcare team ✓ Informing and consulting with the family All of the above must be stated in the clinical records (the decision to limit life support, its clinical basis, whether reached by consensus, whether the family was informed, and whether the patient's previous instructions were taken into consideration).
Population	All patients admitted to the ICU in whom life support is limited during the period reviewed • <u>Exclusion criteria:</u> ✓ Decision not to admit the patient to the ICU, because this does not generally allow the team to deliberate the decision ✓ In exceptional cases, the decision to limit life support can be taken individually
Type	Process
Source of data	Clinical records
Standard	100%
Comments	When the healthcare team's decision is not supported by the family, it is advisable to consult the institution's Ethics Committee. References: • Esteban A, Gordo F, Solsona JF, Alía I, Caballero J, Bouza C, Alcalá-Zamora J, Cook DJ, Sanchez JM, Abizanda R, Miró G, Fernández Del Cabo MJ, de Miguel E, Santos JA, Balerdi B.Withdrawing and withholding life support in the intensive care unit: a Spanish prospective multi-centre observational study.Intensive Care Med. 2001 Nov;27(11):1744-9 • Cabré L, Solsona JF y grupo de trabajo de bioética de la SEMICYUC. Limitación del esfuerzo terapéutico en Medicina Intensiva. Med Intensiva. 2002;26: 304-311. • Cabré L, Mancebo J, Solsona J, Saura P, Gich I, Blanch L, et al. Multicenter study of the multiple organ dysfunction syndrome in intensive care units: the usefulness of Sequential Organ Failure Assessment scores in decision making. Intensive Care Med. 2005 Jul;31(7):927-33. Intensive Care Med. 2005;31:927-33.

INDICATOR NUMBER 101

Name of the indicator	USE OF RESTRAINTS
Dimension	Safety and appropriateness.
Justification	Restraints (physical and/or medications) are often used in the ICU; sometimes they are deemed necessary for the patient's own safety and sometimes they are deemed necessary to protect the staff. Given the ethical issues involved (use in incapacitated patients, impossibility of obtaining family approval, potential for abuse, etc.) and the potential undesirable consequences from the clinical point of view, the use of restraints should be regulated by protocol.
Formula	Nº. of restraint applications in accordance with the protocol ---------- x 100 Nº. of restraint applications
Explanation of terms	Restraints can be physical or pharmacological. The use of restraints must be prescribed by a physician; however, nursing staff may initiate the process. The protocol must include at least: ✓ Definition of restraint and types of restraint ✓ Indication of situations in which restraints should be applied ✓ Follow-up of restrained patients: what and when ✓ Documentation in the clinical history
Population	All applications of restraints in the period reviewed. • Exclusion criteria: therapeutic immobilization (traction) and restraints imposed by court order
Type	Process
Source of data	Clinical records. (Orders to apply restraints should be recorded in both the clinical history and the nursing register)
Standard	100%
Comments	The measurement of this indicator implies the existence of a specific protocol for the indication and management of restraints.References: • Maccioli GA, Dorman T, Brown BR, Mazuski JE, McLean BA, Kuszaj JM, Rosenbaum SH, Frankel LR, Devlin JW, Govert JA, Smith B, Peruzzi WT; American College of Critical Care Medicine, Society of Critical Care Medicine. Clinical practice guidelines for the maintenance of patient physical safety in the intensive care unit: use of restraining therapies--American College of Critical Care Medicine Task Force 2001-2002. Crit Care Med. 2003 Nov;31(11):2665-76 • Martin B, Mathisen L.Use of physical restraints in adult critical care: a bicultural study. Am J Crit Care. 2005 Mar;14(2):133-42. • Hofsø K, Coyer FM. Part 1. Chemical and physical restraints in the management of mechanically ventilated patients in the ICU: contributing factors. Intensive Crit Care Nurs. 2007 Oct;23(5):249-55 • Hofsø K, Coyer FM. Part 2. Chemical and physical restraints in the management of mechanically ventilated patients in the ICU: a patient perspective. Intensive Crit Care Nurs. 2007 Dec;23(6):316-22

PLANNING, ORGANIZATION, AND MANAGEMENT

INDICATOR NUMBER 102

Name of the indicator	DAILY ROUNDS FOR MULTIDISCIPLINARY TEAMS
Dimension	Safety
Justification	Teamwork is essential for patient safety. Daily multidisciplinary clinical rounds reduce the risk of adverse events, facilitate teamwork, and improve communication among professionals.
Formula	Nº. of days in which multidisciplinary clinical rounds are carried out ---------- x 100 365
Explanation of terms	• Multidisciplinary rounds: presence of physicians and nursing staff (incorporating other professionals, e.g. clinical pharmacologists, is recommendable) • Clinical rounds: review of patients' clinical situations and decision making
Population	All days of the year
Type	Process
Source of data	The critical care department's Functional Plan
Standard	80%
Comments	• Puntillo KA, McAdam JL. Communication between physicians and nurses as a target for improving end-of-life care in the intensive care unit: challenges and opportunities for moving forward. Crit Care Med. 2006 Nov;34(11 Suppl):S332-40. • Curtis JR, Cook DJ, Wall RJ, Angus DC, Bion J, Kacmarek R, Kane-Gill SL, Kirchhoff KT, Levy M, Mitchell PH, Moreno R, Pronovost P, Puntillo K. Intensive care unit quality improvement: a "how-to" guide for the interdisciplinary team. Crit Care Med. 2006 Jan;34(1):211-8 • Miller A, Scheinkestel C, Limpus A, Joseph M, Karnik A, Venkatesh B.Uni- and interdisciplinary effects on round and handover content in intensive care units. Hum Factors. 2009 Jun;51(3):339-53. • Kim MM, Barnato AE, Angus DC, Fleisher LA, Kahn JM. The effect of multidisciplinary care teams on intensive care unit mortality. Arch Intern Med. 2010 Feb 22;170(4):369-76.

SEMICYUC

INDICADOR Nº 103

Name of the indicator	REGULATED EXCHANGE OF INFORMATION
Dimension	Safety
Justification	The interdisciplinary exchange of information about the patient is an essential component of patient safety; it helps to improve the effectiveness of the measures applied and to ensure patient-centered care. The high frequency of information exchange, the severity of critical patients, and the large quantity of information to exchange pose a challenge in the ICU. Verbal communications can suffer from interruptions and time limitations; thus, there is a risk of losing information that is very important for the continuity of care.
Formula	Nº. of regulated exchanges of information ---------- x 100 Nº. of routine exchanges of information among professionals
Explanation of terms	Regulated exchange of information: exchange of information between professionals (physician-physician; nurse-nurse) as a matter of routine (change of shifts) and includes: • Identification of the professional responsible for the care of the patient • Pre-established time and place for the transfer of information • Fundamental clinical information, including the patient's current condition • Information about decision making • Procedures and complementary tests pending performance/evaluation • Information provided to patients/families • The most fundamental points should be recorded in the clinical history.
Population	All routine exchanges of information during the period reviewed Exclusion criteria: Transfer of information to other professionals involved in the care of the patient
Type	Process
Source of data	The critical care department's Functional Plan
Standard	90%
Comments	References: • Solet DJ, Norvell JM, Rutan GH, Frankel RM. Lost in translation: challenges and opportunities in physician-to-physician communication during patient handoffs. Acad Med. 2005 Dec;80(12):1094-9. • Arora VM, Manjarrez E, Dressler DD, Basaviah P, Halasyamani L, Kripalani S. Hospitalist handoffs: a systematic review and task force recommendations. J Hosp Med. 2009 Sep;4(7):433-40 • Benham-Hutchins MM, Effken JA. Multi-professional patterns and methods of communication during patient handoffs. Int J Med Inform. 2010 Apr;79(4):252-67 • Riesenberg LA, Leisch J, Cunningham JM. Nursing handoffs: a systematic review of the literature. Am J Nurs. 2010 Apr;110(4):24-34

INDICATOR NUMBER 104

Name of the indicator	SUSPENSION OF SCHEDULED SURGERY
Dimension	Safety and efficiency
Justification	The suspension of scheduled surgical interventions (SI) due to unavailability of ICU beds can involve a risk to the patient, diminish satisfaction, and increase stays and costs.
Formula	Nº. of scheduled SI suspended due to unavailability of previously reserved ICU beds ---------- x 100 Nº. of scheduled SI with previously reserved ICU beds
Explanation of terms	• Scheduled SI suspended due to unavailability of ICU bed: SI not performed on the day scheduled because the bed reserved in the ICU was not available
Population	All scheduled SI with previously reserved ICU bed during the period reviewed • Exclusion criteria: Scheduled SI after which admission to the ICU is considered unnecessary (because of risk reassessment or death)
Type	Outcome
Source of data	ICU management register Surgical registers
Standard	10%
Comments	References: • Pronovost PJ, Berenholtz SM, Ngo K, McDowell M, Holzmueller C, Haraden C, Resar R, Rainey T, Nolan T, Dorman T. Developing and pilot testing quality indicators in the intensive care unit. Journal of Critical Care 2003; 18:145-155 • Williams T, Leslie G. Delayed discharges from an adult intensive care unit. Aust Health Rev. 2004 Sep 30;28(1):87-96. • Galván MA, Flores NG. La suspensión de cirugía programada como un indicador de calidad en la atención hospitalaria. Rev Hosp M Gea Glz 2006; 7 (2) :59-62 • Van Houdenhoven M, Nguyen DT, Eijkemans MJ, Steyerberg EW, Tilanus HW, Gommers D, Wullink G, Bakker J, Kazemier G. Optimizing intensive care capacity using individual length-of-stay prediction models. Crit Care. 2007;11(2):R42.

INDICATOR NUMBER 105

Name of the indicator	INAPPROPRIATE OR PRECIPITATED DISCHARGE FROM THE ICU
Dimension	Safety and appropriateness
Justification	The limited number of beds in the ICU and the increase in the number of critical patients favor the tendency of some patients being discharged in inappropriate or precipitated circumstances. Precipitated or inappropriate discharge is associated with increased adverse events, readmission, stays, costs, and hospital mortality.
Formula	Nº. of patients with precipitated or inappropriate discharge from the critical care department ---------- x 100 Nº. of patients discharged from the critical care department
Explanation of terms	• Precipitated or inappropriate discharge: ✓ Patients with unscheduled discharge: not based on a consensus reached in a clinical session or forced discharge to allow another patient to be admitted (during the night, weekends, or holidays) ✓ Patients discharged without fulfilling standardized criteria (1)
Population	All patients discharged from the critical care department during the period reviewed • Exclusion criteria: patients with orders to withhold life support
Type	Process
Source of data	Clinical records
Standard	1%
Comments	Dedicated teams for ward medical emergencies or ward follow-up by critical care specialists can reduce the negative impact of precipitated discharge. References: (1) Guidelines for intensive care unit admission, discharge, and triage. Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine.Critical Care Medicine 1999; 27:633-638 • Daly K, Beale R, Chang RWS. Reduction in mortality after inappropriate early discharge from intensive care unit: logistic regression triage model.BMJ. 2001;322:1274-1276 • Priestap FA, Martin CM. Impact of intensive care unit discharge time on patient outcome. Crit Care Med. 2006 Dec;34(12):2946-51. • Hanane T, Keegan MT, Seferian EG, Gajic O, Afessa B. The association between nighttime transfer from the intensive care unit and patient outcome. Crit Care Med. 2008 Aug;36(8):2232-7.

SEMICYUC

INDICATOR NUMBER 106

Name of the indicator	DELAYED DISCHARGE FROM CRITICAL CARE
Dimension	Efficiency, accessibility, and appropriateness
Justification	Delays in the discharge of critical patients are associated with inappropriate increases in cost and reduce the number of beds available for new admissions. Delays could increase morbidity and hamper relations with patients' families. Appropriate management of ICU beds and prior scheduling of discharges reduces delays at discharge.
Formula	Nº. of stays with delays at discharge from the critical care department ---------- x 100 Total Nº. of stays
Explanation of terms	• Delay at discharge: more than 12 h from indication for discharge to exit from the critical care department
Population	All stays of patients discharged from the critical care department during the period reviewed • Exclusion criteria: ✓ Stays of patients discharged to other centers ✓ Stays of patients in whom a previously planned discharge was delayed for medical reasons
Type	Outcome
Source of data	Clinical records
Standard	9 %
Comments	References: • Pronovost PJ, Berenholtz SM, Ngo K, McDowell M, Holzmueller C, Haraden C, Resar R, Rainey T, Nolan T, Dorman T. Developing and pilot testing quality indicators in the intensive care unit. Journal of Critical Care 2003; 18:145-155 • Lin F, Chaboyer W, Wallis M. A literature review of organisational, individual and teamwork factors contributing to the ICU discharge process. Aust Crit Care. 2009 Feb;22(1):29-43 • Williams TA, Leslie GD, Brearley L, Leen T, O'Brien K. Discharge delay, room for improvement? Aust Crit Care. 2010 Aug;23(3):141-9

INDICATOR NUMBER 107

Name of the indicator	DELAYED ADMISSION TO THE ICU
Dimension	Accessibility, efficiency, and safety
Justification	Delays in the admission of critical patients to the ICU increase morbidity and mortality as well as increased costs. Delays are usually related to the unavailability of beds in the ICU.
Formula	Nº. of critical patients admitted to the ICU after delays > 4 h ---------- X 100 Total Nº. patients discharged from the ICU
Explanation of terms	• Delay: Time interval from indication for admission by a critical care physician to actual admission to the ICU
Population	All patients discharged from the critical care department during the period reviewed • Exclusion criterion: patients transferred from another center
Type	Outcome
Source of data	Clinical records
Standard	5%
Comments	References: In cases of delayed admission, the critical care physician is still responsible for care of the critical patient (regardless of where the patient is located). • Restrepo MI, Mortensen EM, Rello J, Brody J, Anzueto A. Late admission to the ICU in patients with community-acquired pneumonia is associated with higher mortality. Chest. 2010 Mar;137(3):552-7 • Chalfin DB, Trzeciak S, Likourezos A, Baumann BM, Dellinger RP; DELAY-ED study group. Impact of delayed transfer of critically ill patients from the emergency department to the intensive care unit. Crit Care Med. 2007 Jun;35(6):1477-83. • Vidal Tejedor B, Micó Gómez M, Abizanda Campos R, Alvaro Sánchez R, Belenguer Muncharaz A, Mateu Campos L, Andrés EB. [Bias in time delay in ICU admission as a mortality risk factor or "lead time bias"]. Med Intensiva. 2008 Aug-Sep;32(6):272-6 • Carter AW, Pilcher D, Bailey M, Cameron P, Duke GJ, Cooper J. Is ED length of stay before ICU admission related to patient mortality? Emerg Med Australas. 2010 Apr;22(2):145-50. • Cardoso LT, Grion CM, Matsuo T, Anami EH, Kauss IA, Seko L, Bonametti AM. Impact of delayed admission to intensive care units on mortality of critically ill patients: a cohort study.Crit Care. 2011 Jan 18;15(1):R28

SEMICYUC

INDICATOR NUMBER 108 (FUNDAMENTAL INDICATOR)

Name of the indicator	SURVEY ABOUT PERCEIVED QUALITY AT DISCHARGE FROM THE ICU
Dimension	Satisfaction
Justification	Patient-centered care is one of the main goals of healthcare. Satisfaction surveys are one of the most frequently employed methods to determine patients' and families' perceived quality and to establish measures to improve results.
Formula	Nº. of surveys answered ---------- x 100 Nº. of patients discharged from the critical care department
Explanation of terms	Discharge includes: transfer to a hospital ward or to another center, discharge to home, or death. Readmissions should be counted. Surveys answered: survey returned with > 70% of the questions answered by the patients themselves or families
Population	All patients discharged from the critical care department during the period reviewed. Exclusion criteria: ICU stay < 24 h
Type	Process
Source of data	Nursing register
Standard	50%
Comments	The satisfaction survey should include items regarding: 1. Environmental conditions; 2. Relations with physicians; 3. Relations with nursing staff; 4. Aspects related to visits. 5. Information received. References: • Wasser T, Pasquale MA, Matchett SC, Bryan Y, Pasquale M. Establishing reliability and validity of the critical care family satisfaction survey..Crit Care Med 2001;29:192-6 • Heyland DK, Rocker GM, Dodek PM, Kutsogiannis DJ, Konopad E, Cook DJ, Peters S, Tranmer JE, O'Callaghan CJ. Family satisfaction with care in the intensive care unit: results of a multiple center study. Crit Care Med. 2002 Jul;30(7):1413-8. • Pérez MD, Rodríguez M, Fernández A; Calatán M, Montejo JC. Valoración de grado de satisfacción de los familiares de pacientes ingresados en una unidad de cuidados intensivos. Med Intensiva 2004;28(5):234-49 • Dodek PM, Heyland DK, Rocker GM, Cook DJ. Translating family satisfaction data into quality improvement.Crit Care med 2004;32:1922-1926 • Santana Cabrera L, Ramírez Rodríguez A, García Martul M, Sánchez Palacios M, Martín González JC, Hernández Medina E. [Satisfaction survey administered to the relatives of critical patients]. Med Intensiva. 2007 Mar;31(2):57-61

INDICATOR NUMBER 109

Name of the indicator	ICU DISCHARGE REPORT
Dimension	Effectiveness
Justification	Standardized classification of the main diagnosis, secondary diagnoses, and procedures at discharge from the ICU is an essential tool for the management of the department and improvement of quality. It also prevents the loss of information. Therefore, the discharge report needs to collect the appropriate information correctly.
Formula	Nº. of patients discharged from the critical care department with the information required for codification ---------- x 100 Nº. of patients discharged from the critical care department
Explanation of terms	Information required for codification: • Main diagnosis: diagnosis related with the admission to the hospital • Secondary diagnoses: new conditions that develop or complications. NOT comorbidities. Up to five. • Procedures: during the ICU stay, whether or not they are performed by critical care staff.
Population	All patients discharged from the critical care department during the period reviewed
Type	Process
Source of data	Clinical documentation department
Standard	100%
Comments	References: • A Raya Pugnaire et al. Clasificación y codificación de enfermedades y técnicas en medicina Intensiva. Med Intensiva 1987;11 (2):20-27 • Barrientos Vega R. Nuestra experiencia con los grupos relacionados por el diagnóstico en una unidad de cuidados intensivos. Med Intensiva 2003; 27:391-398 • Andersen JS, Drenck NE, Keiding H. Diagnosis Related Groups in intensive care units--cost model for critically ill patients. Ugeskr Laeger. 2007 19;169(8):727-30. • Abizanda Campos R, Ferrándiz Sellés A, Reig Valero R. [Patient data management systems or unit data management systems. Two clinical management perspectives in Intensive Medicine] Med Intensiva. 2008 Oct;32(7):354-60. • Conthe Gutiérrez P, García Alegría J, Pujol Farriols R, Alfageme Michavilla I, Artola Menéndez S, Barba Martín R, Cañones Garzón PJ, Casado Pérez P, de Alvaro Moreno F, Escosa Royo L, Jovell Fernández A, León Gil C, Lisbona Gil A, Márquez Vázquez R, Pastor Rodríguez-Moñino A, Pérez Martínez DA.[Consensus for hospital discharge reports in medical specialities].Med Clin (Barc). 2010 Apr 17;134(11):505-10.

INDICATOR NUMBER 110

Name of the indicator	STANDARDIZED MORTALITY RATE (SMR)
Dimension	Safety, effectiveness, and efficiency
Justification	Raw mortality is not a good indicator of quality as it does not take into consideration differences in case mix or severity of illness. The use of SMR enables comparative auditing.
Formula	Observed hospital mortality ---------- x 100 Expected hospital mortality (mean value +/- confidence interval)
Explanation of terms	• Observed hospital mortality: Nº. of patients admitted to the ICU who die in the hospital ÷ Nº. of patients admitted to the ICU per unit of time • Expected hospital mortality: arithmetic sum of the individual probabilities of death for each patient admitted to the ICU according to the severity score ÷ Nº. of patients admitted to the ICU • Standardized mortality: mortality adjusted for severity; different predictive models can be used (APACHE I-II-III, MPM I-II; SAPS I-II-III) • This indicator is based on the comparison of the patients' outcome with those predicted by the model. • All predictive indices of risk of death refer to hospital mortality.
Population	All patients admitted to the ICU during the period reviewed • Exclusion criteria: ✓ patients who die within 24 h of admission to the ICU ✓ patients who die after heart surgery (because no validated system is available for this type of patient)
Type	Outcome
Source of data	Clinical records; mortality commission
Standard	Rate = 1 (+/- 0.10)
Comments	References: • The main selection criteria should be the exactitude (validation and reliability) of the model and the goodness of fit (calibration and discrimination). • Gordo F, Núñez A, Calvo E, Algora A. Mortalidad intrahospitalaria tras el alta de una unidad de cuidados intensivos (UCI) en pacientes que han precisado ventilación mecánica. Med Clin (Barc) 2003; 121: 241-244 • Pitches DW, Mohammed MA, Lilford RJ. What is the empirical evidence that hospitals with higher-risk adjusted mortality rates provide poorer quality care? A systematic review of the literature. BMC Health Serv Res. 2007 Jun 20;7:91 • Cook DA, Duke G, Hart GK, Pilcher D, Mullany D. Review of the application of risk-adjusted charts to analyse mortality outcomes in critical care. Crit Care Resusc. 2008 Sep;10(3):239-51

INDICATOR NUMBER 111

Name of the indicator	AUTOPSY RATE
Dimension	Effectiveness and safety
Justification	Clinical-pathological correlation is important. Knowledge acquired from autopsies is useful for scientific training necessary in future situations similar to the death investigated. Autopsies are a tool for the analysis of adverse events.
Formula	Nº. of patients autopsied ---------- x 100 Nº. of patients who die in the ICU
Explanation of terms	
Population	All patients who die in the ICU during the period studied • Exclusion criteria: cases in which autopsy is performed to comply with a court order
Type	Process
Source of data	Clinical records Pathology department
Standard	10%
Comments	References: • El índice de necropsias realizadas en los SMI observado en los diferentes estudios es variable oscilando entre el 25-50% http://remi.uninet.edu/2004/01/REMIA011.htm • Esteban A, Alia I, Fernández P, Palomino R. Evolución del porcentaje de autopsias en una Unidad de Cuidados Intensivos. Med Intensiva 1991;15:127-130 • Para la acreditación docente de un SMI se considera deseable una tasa > 10% sobe los pacientes fallecidos. Acreditación docente de los Servicios de medicina Intensiva. Comisión nacional de la Especialidad de Medicina Intensiva. Med Intensiva 1997; 21:392-39 • Magret Iglesias M, Vidaur Tello L, Fernández Olsina S, García Fontgivell JF, Blázquez Vilàs S, Alonso Rubio S, Díaz Santos E, Sirvent Calvera JJ, Rello J. [Discrepancies between clinical and pathological diagnosis in a polyvalent intensive care service] Med Intensiva. 2006 Apr;30(3):95-100

SEMICYUC

INDICATOR NUMBER 112

Name of the indicator	ICU STAFF ORIENTATION PLAN
Dimension	Appropriateness and safety
Justification	New professionals integrated into the ICU, whether on a long-term or short-term basis, whether working for the center or merely at the center, will perform better if they are familiar with the organization of the ICU from their first day in the unit. Furthermore, safety can be improved by informing new staff about specific aspects of the department.
Formula	Nº. of professionals assigned to the ICU who have undergone orientation ---------- x 100 Nº. of professionals assigned to the ICU
Explanation of terms	• Professional assigned to the ICU: Any professional assigned to the ICU, whether working for the center or merely at the center (physician, nurse, nurse's aide, orderly, or administrative staff), whether on a temporary or permanent basis. • Orientation plan: Written plan explicitly explaining the organization of the department, its mission, its values and philosophy, its principal goals, and staff members together with their roles and responsibilities. The plan should also explicitly state who reports to whom. The plan should include specific aspects related to patient safety.
Population	All professionals assigned to the ICU in the last year during the period reviewed
Type	Process
Source of data	Hospital human resources department
Standard	100%
Comments	The plan will also cover the mission, values, and philosophy of the critical care department. • Morrison AL, Beckmann U, Durie M, Carless R, Gillies DM. The effects of nursing staff inexperience (NSI) on the occurrence of adverse patient experiences in ICUs. Aust Crit Care. 2001;14:116-21. • Alonso Ovies A, Alvarez Rodríguez J, García Gálvez MM, Velayos Amo C, Balugo Huertas S, Alvarez Morales A. [Perception of safety culture in Spanish intensive care units]. Med Clínica 2010 135(Supl1):45-53.

SEMICYC

INDICATOR NUMBER 113 (FUNDAMENTAL INDICATOR)

Name of the indicator	PRESENCE OF AN INTENSIVIST IN THE ICU 24 H PER DAY
Dimension	Appropriateness, safety, and efficiency
Justification	The presence of an intensivist in the ICU 24 hrs/day guarantees the quality of care, decreasing mortality and stay among critical patients.
Formula	Nº. of days without the physical presence of an intensivist 24 h/day ---------- x 100 365
Explanation of terms	• "Intensivist": physician who is a certified specialist in critical care, excluding specialists in training • Physical presence is considered necessary.
Population	All days of the year during the period reviewed
Type	Structure
Source of data	Human resources department and duty rosters
Standard	100%
Comments	References: • Pronovost P, Angus D,Dorman T, Robison K, Dremsizov T, Young T. Physician staffing patterns and clinical outcomes in critically ill patients: a systematic review. JAMA 2002; 288:2151-2162 • Angus DC, Shorr AF, White A, Dremsizov TT, Schmitz RJ, Kelley MA; Committee on Manpower for Pulmonary and Critical Care Societies (COMPACCS). Critical care delivery in the United States: distribution of services and compliance with Leapfrog recommendations. Crit Care Med. 2006 Apr;34(4):1016-24. • Arabi Y. Pro/Con debate: should 24/7 in-house intensivist coverage be implemented?. Crit Care. 2008;12(3):216. Epub 2008 Jun 5 • Gajic O, Afessa B, Hanson AC, Krpata T, Yilmaz M, Mohamed SF, Rabatin JT, Evenson LK, Aksamit TR, Peters SG, Hubmayr RD, Wylam ME. Effect of 24-hour mandatory versus on-demand critical care specialist presence on quality of care and family and provider satisfaction in the intensive care unit of a teaching hospital. Crit Care Med. 2008 Jan;36(1):36-44

SEMICYUC

INDICADOR 114 (FUNDAMENTAL INDICATOR)

Name of the indicator	SYSTEM FOR THE NOTIFICATION OF ADVERSE EVENTS
Dimension	Safety
Justification	Adverse events (AE) are common in the field of medicine and are related to significant mortality and morbidity, as well as increased stays and costs. Moreover, they diminish patients' and families' satisfaction. Systems for notifying AE enable the analysis of AE and actions to improve the quality of care. These systems also encourage the culture of safety.
Formula	The presence of a system for notifying and registering AE in the ICU
Explanation of terms	System for notifying and registering AE: • Must be voluntary and anonymous • Must make it possible for any professional to notify an AE • Must include sentinel events and the analysis of root causes • Must provide feedback / each semester: bulletins, warnings, etc • Can function simultaneously with other surveillance systems for specific AE: infections, falls, restraints, etc
Population	Hospital registers
Type	Structure
Source of data	ICU registers
Standard	100%
Comments	References: • Wu AW, Pronovost P, Morlock L. ICU incident reporting systems. J Crit Care. 2002 Jun;17(2):86-94. • Needham DM, Thompson DA, Holtzmullller CG, Dorman T, Luboms LH, Morlock LL, Pronovost PJ. A system factors analysis of airway events from the Intensive Care Unit Safety Reporting System (ICUSRS). Crit Care Med 2004;32(11):2227-33 • Pronovost PJ, Thompson DA, Holzmueller CG, Lubomski LH, Dorman T, Dickman F, Fahey M, Steinwachs DM, Engineer L, Sexton JB, Wu AW, Morlock LL. Toward learning from patient safety reporting systems. J Crit Care. 2006 Dec;21(4):305-15. • Winters BD, Berenholtz SM, Pronovost P.Improving patient safety reporting systems. Crit Care Med. 2007 Apr;35(4):1206-7

INDICATOR NUMBER 115

Name of the indicator	UNSCHEDULED READMISSION TO THE ICU
Dimension	Safety and efficiency
Justification	A high rate of readmission could reflect premature discharges, incorrect use of ward care, or a poor response to treatment despite appropriate care. Low rates could reflect excessively long ICU stays (inappropriate discharge criteria). Readmission is generally associated with increased hospital stays, increased consumption of resources, and greater morbidity and mortality.
Formula	Nº. of patients with unscheduled readmissions < 48 h ---------- x 100 Nº. of patients discharged from the critical care department
Explanation of terms	• Unscheduled readmission: Readmission due to unforeseen causes, whether or not related and regardless of where the patient spent the last 48 h
Population	All patients discharged from the critical care department during the period reviewed • Exclusion criteria: ✓ Death ✓ Patients discharged with orders to limit life support
Type	Outcome
Source of data	Admissions department ICU
Standard	4 %
Comments	The readmission rate reported in the different studies published ranges from 4% to 14% (mean 7%). References: • Elliott M. Readmission to intensive care: a review of the literature.Aust Crit Care. 2006 Aug;19(3):96-8, 100-4. • Campbell AJ, Cook JA, Adey G, Cuthbertson BH. Predicting death and readmission after intensive care discharge. J Anaesth. 2008 May;100(5):656-62 • MJ, Hillman KM. Severity of illness and risk of readmission to intensive care: a meta-analysis. Resuscitation. 2009 May;80(5):505-10 • Frost SA, Tam V, Alexandrou E, Hunt L, Salamonson Y, Davidson PM, Parr MJ, Hillman KM Readmission to intensive care: development of a nomogram for individualising risk. Care Resusc. 2010 Jun;12(2):83-9.

SEMICYUC

INTERNET

INDICATOR NUMBER 116

Name of the indicator	ACCESS TO FUNDAMENTAL MEDICAL SOURCES IN ELECTRONIC FORMAT
Dimension	Appropriateness
Justification	A large part of the fundamental medical information is concentrated in a relatively small number of databases. Online access to these electronic sources of information helps achieve more efficient use of the time dedicated to searching for scientific information and improves the quality of the data obtained, promoting decision making based on up-to-date scientific evidence. Likewise, this resource facilitates interaction with other colleagues and hospitals, giving access to important clinical information about patients.
Formula	Availability of online access
Explanation of terms	Continuous availability of online access (24 h) to electronic sources of scientific information, regardless of the route or ownership.
Population	Not applicable
Type	Structure
Source of data	ICU annual report
Standard	100% (YES)
Comments	The variability in clinical practice, the complexity of ICU decisions, and the availability of IT systems are enough to justify this indicator.

SEMICYUC

CONTINUING MEDICAL EDUCATION, TEACHING, AND RESEARCH

INDICATOR NUMBER 117

Name of the indicator	**EXISTENCE OF BASIC PROTOCOLS**
Dimension	Appropriateness
Justification	Good clinical practice is favored by the standardization of processes in agreement with current scientific evidence by means of periodically updated protocols. Protocols should adjust guidelines to the diagnostic and therapeutic possibilities of our working environments. Protocols should aim to homogenize the care provided in each center and serve as tool to facilitate and streamline decision making.
Formula	Existence of duly updated basic protocols
Explanation of terms	• Protocol: at the very least, should include assessment, diagnosis, treatment, and healthcare circuits used • Basic protocols: every ICU should have protocols for: ✓ Criteria for admission to and discharge from the ICU ✓ Acute coronary syndrome (ACS) ✓ Management of severe arrhythmias and heart block ✓ Traumatic brain injury ✓ Sedation and pain management ✓ Invasive and noninvasive mechanical ventilation and weaning ✓ Severe sepsis and treatment of infections in general ✓ Limiting life support ✓ Appropriate end-of-life care ✓ Use of restraints ✓ Enteral and parenteral nutrition ✓ Renal replacement techniques ✓ Brain death ✓ Acute respiratory distress syndrome (ARDS) ✓ Life support ✓ Prophylaxis against upper-gastrointestinal bleeding ✓ Prophylaxis against deep vein thrombosis ✓ Acute intoxications ✓ Intrahospital transport • Updating: referring to the period of time established for their revision. In general a period of 3 to 5 years in recommended.
Population	Census of up-to-date protocols in the ICU
Type	Structure
Source of data	Register of protocols
Standard	Yes or 100 %
Comments	The standard should be considered met only when all 19 protocols listed above are available and up to date. Protocols for diseases whose treatment is not among the services provided by the critical care department should be excluded from the list of basic protocols. The work group recommends that, in addition to these processes, protocols should be made available for all clinical situations in which normal clinical practice varies.

INDICATOR NUMBER 118

Name of the indicator	**PARTICIPATION IN RESEARCH PROJECTS**
Dimension	Appropriateness
Justification	Biomedical research should be considered an indispensable investment for the success of any strategy oriented toward improving the health of the population and the competitiveness of healthcare organizations. A department's participation in competitively funded research projects is a marker of consolidated research activity
Formula	Nº. of active research projects in the last 3 years
Explanation of terms	Research project: - Competitively funded research: projects funded through research programs from the European Union, National R+D plan, FIS, FISPSE, or regional governments - Clinical trial: approved by a clinical research committee and covered by law
Population	All research projects generated by the department during the period evaluated Exclusion criteria: post-authorization studies
Type	Outcome
Source of data	Accredited document from the organism responsible for the competitive funding of the project Record of research activity in the department or hospital
Standard	1 research project / 3 years
Comments	Note: This indicator is designed to evaluate the participation in research projects, not to identify units of excellence. The authors consider this indicator to be highly recommendable for teaching hospitals and fundamental for those accredited to train residents.

INDICATOR NUMBER 119

Name of the indicator	SCIENTIFIC PUBLICATIONS FROM THE CRITICAL CARE DEPARTMENT
Dimension	Training and research are essential components for quality and effective professional performance; without training and research, it would be difficult to set professional goals to resolve problems or needs. Presentations at congresses and publications in prestigious journals are indicators of the results of the department's research.
Justification	Appropriateness
Formula	Number of publications or presentations from the department in the last 3 years.
Explicación de términos	Publication: original article published in an indexed journal (national or international). Only publications in which a member of the department is one of the authors should be considered. Editorials and systematic reviews are included but letters to the editor are excluded. Communications at congresses: communications accepted at national or international congresses of scientific societies or those referenced in PubMed in which a member of the department is one of the authors
Population	Publications from the department during the period studied
Type	Outcome
Source of data	Department's annual report
Standard	1 publications or 4 communications / 3 years for level I and II hospitals (or non-teaching hospitals) 3 publications or 12 communications / 3 years for level III hospitals (or teaching hospitals)
Comments	Notes: As this is an indicator to measure research activity, publications considered secondary sources are excluded, with the exception of systematic reviews. The authors consider this indicator to be highly recommendable for teaching hospitals and fundamental for those accredited to train residents.

SEMICYUC

INDICATOR NUMBER 120

Name of the indicator	CONTINUING MEDICAL EDUCATION (CME)
Dimension	Continuing education is considered an essential element for quality and effective professional performance. Continuing medical education is especially important in areas in which scientific evidence is rapidly translated into clinical practice. Continuing education is a tool to improve professional satisfaction and contributes to the achievement of established career goals.
Justification	Appropriateness, professional satisfaction
Formula	Nº. of professionals on the staff who obtained continuing medical education credits in the last 36 months ----------x 100 Nº. of professionals on the staff
Explanation of terms	Professionals on the staff: physicians and nurses contracted Obtainment of credits: 5 credits / 3 years Training: Teaching content related to the specialty
Population	Healthcare professionals on the staff of the department during the period evaluated
Type	Outcome
Source of data	Annual report of teaching activities
Standard	>75%
Comments	Note: Credits must be obtained from accredited national or international organisms (Continuing Training Commission of the National Health, Regional governments, European Accreditation Council for CME or ACCME). Spanish healthcare professions law 44/2003, 21 November. BOE nº 280, 22 November 2003. 41442-41458.

	Number	Name of the indicator	Dimension	Type	Standard
CARDIAC CARE AND CPR	1.	**EARLY ADMINISTRATION OF ACETYLSALICYLIC ACID (ASA) IN ACUTE CORONARY SYNDROME (ACS)**	Effectiveness and safety	Process	100%
	2.	**ADMINISTRATION OF BETA-BLOCKERS IN ACUTE CORONARY SYNDROME (ACS)**	Effectiveness and safety	Process	90%
	3.	**RISK STRATIFICATION IN ACUTE CORONARY SYNDROME (ACS)**	Effectiveness and safety	Process	100%
	4.	**URGENT INVASIVE STRATEGY IN UNSTABLE NON-ST-SEGMENT ELEVATION ACUTE CORONARY SYNDROME (NSTE-ACS)**	Effectiveness and safety	Process	95%
	5.	**REPERFUSION TECHNIQUES IN ST-ELEVATION ACUTE CORONARY SYNDROME (STE-ACS)**	Effectiveness, safety, and appropriateness	Process	> 90%
	6.	**DOOR-NEEDLE TIME IN ST-ELEVATION ACUTE CORONARY SYNDROME (STE-ACS)**	Effectiveness, safety, and appropriateness	Process	100%
	7.	**DOOR-BALLOON TIME IN PRIMARY PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA)**	Effectiveness, safety, and appropriateness	Process	100%
	8.	**HOSPITAL MORTALITY IN ACUTE CORONARY SYNDROME (ACS)**	Safety	Outcome	< 10% (STE-ACS) and < 4% (NSTE-ACS)
	9.	**THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST (CA)**	Effectiveness and safety	Process	90%
	10.	**USE OF THE UTSTEIN TEMPLATE**	Appropriateness.	Process	100%
	11.	**REGISTRY OF QUALITY INDICATORS IN HEART SURGERY**	Safety and effectiveness	Structure	Yes (100%)
	12.	**INCIDENCE OF EARLY COMPLICATIONS IN THE IMPLANTATION OF PERMANENT PACEMAKERS (PP)**	Safety	Outcome	< 2 %

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	Number	Name of the indicator	Dimension	Type	Standard
ACUTE RESPIRATORY FAILURE	13.	**INCIDENCE OF BAROTRAUMA**	Safety	Outcome	< 3%
	14.	**VENTILATOR CIRCUIT CHANGE AT 7 DAYS**	Safety and efficiency	Process	< 100%
	15.	**REGISTERING COMPLICATIONS OCCURRING IN PATIENTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS) WHILE IN THE PRONE POSITION**	Safety	Process	100%
	16.	**SPONTANEOUS BREATHING TRIALS**	Safety and efficiency	Process	> 75%
	17.	**SELECTIVE DIGESTIVE TRACT DECONTAMINATION (DTD) IN PATIENTS AT RISK**	Safety and efficiency.	Process	80%
	18.	**SEMIRECUMBENT POSITION IN PATIENTS UNDERGOING INVASIVE MECHANICAL VENTILATION (MV)**	Safety and effectiveness	Process	97%
	19.	**CHANGING HEAT-AND-MOISTURE EXCHANGERS**	Safety and effectiveness	Process	100%
	20.	**PREVENTION OF THROMBOEMBOLISM**	Safety	Process	90%
	21.	**UNPLANNED EXTUBATION**	Safety	Outcome	15 episodes (per 1000 days MV)
	22.	**REINTUBACIÓN**	Seguridad y efectividad.	Resultado	< 12%-13%
	23.	**EARLY IMPLEMENTATION OF NONINVASIVE MECHANICAL VENTILATION ON EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)**	Effectiveness and efficiency.	Process	95%
	24.	**LUNG-PROTECTIVE VENTILATION IN ACUTE LUNG INJURY (ALI) / ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)**	Safety	Process	95%

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	Number	Name of the indicator	Dimension	Type	Standard
NEUROINTENSIVE CARE AND TRAUMATOLOGY	**25.**	**EXAMINATION OF POTENTIALLY SEVERE TRAUMA PATIENTS BY INTENSIVISTS**	Effectiveness and safety.	Process	95 %
	26.	**TRACHEAL INTUBATION IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY AND GLASGOW COMA SCORE < 9 DURING THE FIRST 24 HOURS**	Safety	Process	95%
	27.	**SURGICAL INTERVENTION IN TRAUMATIC BRAIN INJURY (TBI) WITH SUBDURAL HEMATOMA (SDH) AND/OR EPIDURAL HEMATOMA (EDH)**	Safety and effectiveness	Process	100%
	28.	**INCIDENCE OF ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS) IN SEVERE TRAUMA**	Effectiveness and safety	Outcome	10%
	29.	**MONITORING INTRACRANIAL PRESSURE (ICP) IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY WITH PATHOLOGIC CT FINDINGS**	Safety and effectiveness	Process	95%
	30.	**MORTALITY IN SEVERE TRAUMATIC BRAIN INJURY (TBI)**	Safety	Outcome	< 40%
	31.	**EARLY OSTEOSYNTHESIS IN FRACTURES OF THE FEMORAL DIAPHYSIS**	Safety, continuity of care, and effectiveness	Process	95%
	32.	**EARLY SURGICAL FIXATION OF OPEN FRACTURES**	Safety	Process	95%
	33.	**EARLY CEREBRAL ANGIOGRAPHY IN SUBARACHNOID HEMORRHAGE (SAH)**	Effectiveness and safety	Process	90%
	34.	**ADMINISTRATION OF NIMODIPINE IN SUBARACHNOID HEMORRHAGE (SAH)**	Effectiveness and safety	Process	100%
	35.	**CRITICAL ILLNESS POLYNEUROPATHY**	Safety	Outcome	< 50%
	36.	**IMMEDIATE CT EXAMINATION IN ISCHEMIC STROKE**	Effectiveness and appropriateness	Process	95%
	37.	**INTRAVENOUS FIBRINOLYSIS IN ACUTE ISCHEMIC STROKE**	Effectiveness	Process	100%
	38.	**USE OF SOMATOSENSORY EVOKED POTENTIALS (SEP) IN POST-ANOXIC ENCEPHALOPATHY**	Appropriateness	Process	90%

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	Number	Name of the indicator	Dimension	Type	Standard
INFECTIOUS DISEASES	**39.**	**BACTEREMIA RELATED TO CENTRAL VENOUS CATHETER**	Safety and effectiveness	Outcome	4 episodes per 1000 days with a CVC in place
	40.	**URINARY TRACT INFECTION (UTI)** **RELATED TO URETHRAL CATHETER**	Safety and effectiveness	Outcome	4.5 episodes per 1000 days of urethral catheter use
	41.	**VENTILATOR-ASSOCIATED PNEUMONIA (VAP)**	Safety and effectiveness	Outcome	12 episodes per 1000 days MV
	42.	**EARLY RESUSCITATION IN SEVERE SEPSIS / SEPTIC SHOCK**	Effectiveness	Process	95%
	43.	**INAPPROPRIATE EMPIRICAL ANTIBIOTIC TREATMENT FOR INFECTIONS TREATED IN THE ICU**	Safety and effectiveness	Outcome	10%
	44.	**METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* INFECTIONS (MRSA)**	Safety and effectiveness	Outcome	< 2.5 %
	45.	**INDICATIONS FOR ISOLATION**	Safety and appropriateness	Process	100 %
	46.	**EARLY ANTIBIOTIC TREATMENT IN SEVERE SEPSIS**	Effectiveness and safety	Process	100%

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	Number	Name of the indicator	Dimension	Type	Standard
METABOLISM AND NUTRITION	47.	**COMPLICATIONS OF TOTAL PARENTERAL NUTRITION (TPN): HYPERGLYCEMIA/ LIVER DYSFUNCTION**	Safety	Outcome	- Hyperglycemia: ≤ 10% - Liver dysfunction: < 25%
	48.	**MAINTAINING APPROPRIATE BLOOD GLUCOSE LEVELS**	Effectiveness and safety	Process	80%
	49.	**SEVERE HYPOGLYCEMIA**	Safety	Outcome	0.5%
	50.	**IDENTIFICATION OF PATIENTS WITH NUTRITIONAL RISK**	Effectiveness and safety	Process	100%
	51.	**ASSESSMENT OF NUTRITIONAL STATUS**	Effectiveness	Process	100%
	52.	**CALORIE AND PROTEIN REQUIREMENTS IN CRITICAL PATIENTS**	Appropriateness and safety	Process	85 %
	53.	**EARLY ENTERAL NUTRITION**	Effectiveness and safety	Process	100%
	54.	**MONITORING ENTERAL NUTRITION**	Effectiveness	Process	100%
	55.	**APPROPRIATE USE OF PARENTERAL NUTRITION**	Effectiveness	Process	25%
	56.	**PROPHYLAXIS AGAINST GASTROINTESTINAL BLEEDING IN PATIENTS UNDERGOING INVASIVE MECHANICAL VENTILATION (MV)**	Safety and effectiveness	Process	95%

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	Number	Name of the indicator	Dimension	Type	Standard
NEPHROLOGIC CARE	57.	**MONITORING CONTINUOUS RENAL REPLACEMENT THERAPY**	Effectiveness and safety	Process	80%-90%
	58.	**DOPAMINE USE IN ACUTE RENAL FAILURE (ARF)**	Safety and effectiveness	Process	0%
	59.	**INCIDENCE OF ACUTE RENAL FAILURE (ARF) IN NON-CORONARY CRITICAL PATIENTS**	Safety and efficiency	Outcome	8%
	60.	**INCIDENCE OF ACUTE RENAL FAILURE (ARF) IN PATIENTS WITH ACUTE CORONARY SYNDROME**	Safety and efficiency	Outcome	1.5%
	61.	**PREVENTION OF CONTRAST-INDUCED NEPHROPATHY IN CARDIAC CATHETERIZATION**	Safety	Process	90%
	62.	**STRATIFICATION OF ACUTE RENAL FAILURE (ARF) IN CRITICAL PATIENTS**	Appropriateness	Process	100%

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	Number	Name of the indicator	Dimension	Type	Standard
SEDATION AND ANALGESIA	**63.**	**MONITORING SEDATION**	Safety and effectiveness	Process	95%
	64.	**APPROPRIATE SEDATION**	Safety and effectiveness	Outcome	85%
	65.	**DAILY INTERRUPTION OF SEDATION**	Effectiveness and efficiency	Process	80%
	66.	**PAIN MANAGEMENT IN UNSEDATED PATIENTS**	Effectiveness and safety	Process	100%
	67.	**PAIN MANAGEMENT IN VENTILATED PATIENTS**	Effectiveness and safety	Process	100%
	68.	**INAPPROPRIATE USE OF MUSCLE RELAXANTS**	Safety	Process	2%
	69.	**MONITORING NEUROMUSCULAR BLOCKAGE (NMB)**	Effectiveness and safety	Process	100%
	70.	**IDENTIFICATION OF DELIRIUM**	Effectiveness	Process	90%

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	Number	Name of the indicator	Dimension	Type	Standard
BLOOD COMPONENTS	71.	**INFORMED CONSENT FOR THE TRANSFUSION OF BLOOD COMPONENTS**	Satisfaction and appropriateness	Process	95%
	72.	**INAPPROPRIATE TRANSFUSION OF FRESH-FROZEN PLASMA (FFP)**	Effectiveness and safety	Process	0%
	73.	**INAPPROPRIATE TRANSFUSION OF PLATELET-RICH PLASMA (PRP)**	Effectiveness and safety	Process	0%
	74.	**INAPPROPRIATE TRANSFUSION OF PACKED RED BLOOD CELLS (PRBC)**	Effectiveness and safety	Process	3%

	Number	Name of the indicator	Dimension	Type	Standard
TOXICOLOGY	75.	**CORRECT INDICATIONS AND METHODS OF DIGESTIVE DECONTAMINATION (DD)**	Effectiveness and appropriateness	Process	>90%
	76.	**MINIMUM STOCK OF ANTIDOTES IN THE CRITICAL CARE DEPARTMENT AND/OR HOSPITAL PHARMACY**	Safety	Structure	95%
	77.	**EARLY APPROPRIATE RENAL REPLACEMENT THERAPY IN ACUTE INTOXICATION**	Safety	Process	100%
	78.	**APPROPRIATE INDICATION OF FORCED DIURESIS**	Effectiveness, appropriateness, safety, and continuity	Process.	> 95%
	79.	**MORTALITY DUE TO ACUTE (MEDICAL) DRUG POISONING OR TO OTHER POISONS**	Effectiveness and appropriateness	Outcome.	ADP < 1%; OP < 3%

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	Number	Name of the indicator	Dimension	Type	Standard
TRANSPLANTS	80.	**ORGAN DONORS**	Effectiveness	Outcome	60%
	81.	**ASSESSMENT FOR LIVER TRANSPLANTATION IN ACUTE LIVER FAILURE**	Effectiveness	Process	95 %
	82.	**MONITORING POTENTIAL ORGAN DONORS**	Appropriateness	Process	100%
	83.	**DIAGNOSIS OF BRAIN DEATH**	Effectiveness	Outcome	5%-30%

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	Number	Name of the indicator	Dimension	Type	Standard
NURSING CARE	**84.**	**REMOVAL OF ENTERAL FEEDING TUBE (EFT) DUE TO OBSTRUCTION**	Safety	Outcome	4%
	85.	**APPROPRIATE BRONCHIAL ASPIRATION**	Safety	Process	100%
	86.	**INFORMATION FROM NURSING STAFF TO PATIENTS' FAMILIES**	Satisfaction and appropriateness	Process	95%
	87.	**INTRAHOSPITAL TRANSPORT**	Safety, appropriateness, and continuity of care	Structure	Yes or 100 %
	88.	**CUFF PRESSURE**	Safety	Process	95%
	89.	**MANAGEMENT OF MONITORING ALARMS**	Safety and appropriateness	Outcome	5%
	90.	**ACCIDENTAL FALLS**	Safety and satisfaction	Outcome	0%
	91.	**NURSING REGISTRIES IN THE ICU**	Continuity of care	Outcome	100%
	92.	**MEDICATION ERRORS IN THE ICU**	Safety	Outcome	5%
	93.	**COMPLIANCE WITH HAND-WASHING PROTOCOLS**	Safety and effectiveness	Process	90%
	94.	**ACCIDENTAL REMOVAL OF VASCULAR CATHETERS**	Safety and effectiveness	Outcome	✓ Arterial catheter: 15 catheters per 1000 days ✓ Central venous catheter: 6 catheters per 1000 days
	95.	**CRASH CART REVIEW**	Safety and appropriateness	Process	100%

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	Number	Name of the indicator	Dimension	Type	Standard
BIOETHICS	**96.**	**APPROPRIATE END-OF-LIFE CARE**	Effectiveness and satisfaction	Process	100%
	97.	**INFORMATION TO FAMILIES OF ICU PATIENTS**	Satisfaction	Process	100%
	98.	**INCORPORATION OF ADVANCE DIRECTIVES IN THE DECISION-MAKING PROCESS**	Appropriateness and satisfaction	Process	100%
	99.	**INFORMED WRITTEN CONSENT**	Satisfaction	Process	100%
	100.	**LIMITING LIFE SUPPORT**	Appropriateness and satisfaction	Process	100%
	101.	**USE OF RESTRAINTS**	Safety and appropriateness.	Process	100%

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	Number	Name of the indicator	Dimension	Type	Standard
PLANNING, ORGANIZATION, AND MANAGEMENT	102.	DAILY ROUNDS FOR MULTIDISCIPLINARY TEAMS	Safety	Process	80%
	103.	REGULATED EXCHANGE OF INFORMATION	Safety	Process	90%
	104.	SUSPENSION OF SCHEDULED SURGERY	Safety and efficiency	Outcome	10%
	105.	INAPPROPRIATE OR PRECIPITATED DISCHARGE FROM THE ICU	Safety and appropriateness	Process	1%
	106.	DELAYED DISCHARGE FROM CRITICAL CARE	Efficiency, accessibility, and appropriateness	Outcome	9 %
	107.	DELAYED ADMISSION TO THE ICU	Accessibility, efficiency, and safety	Outcome	5%
	108.	SURVEY ABOUT PERCEIVED QUALITY AT DISCHARGE FROM THE ICU	Satisfaction	Process	50%
	109.	ICU DISCHARGE REPORT	Effectiveness	Process	100%
	110.	STANDARDIZED MORTALITY RATE (SMR)	Safety, effectiveness, and efficiency	Outcome	Rate = 1 (+/- 0.10)
	111.	AUTOPSY RATE	Effectiveness and safety	Process	10%
	112.	ICU STAFF ORIENTATION PLAN	Appropriateness and safety	Process	100%
	113.	PRESENCE OF AN INTENSIVIST IN THE ICU 24 H PER DAY	Appropriateness, safety, and efficiency	Structure	100%
	114.	SYSTEM FOR THE NOTIFICATION OF ADVERSE EVENTS	Safety	Structure	100%
	115.	UNSCHEDULED READMISSION TO THE ICU	Safety and efficiency	Outcome	4%

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	Number	Name of the indicator	Dimension	Type	Standard
INTERNET	116.	**ACCESS TO FUNDAMENTAL MEDICAL SOURCES IN ELECTRONIC FORMAT**	Appropriateness	Structure	100% (yes)

	Number	Name of the indicator	Dimension	Type	Standard
CONTINUING MEDICAL EDUCATION, TEACHING, AND RESEARCH	117.	**EXISTENCE OF BASIC PROTOCOLS**	Appropriateness	Structure	Yes or 100 %
	118.	**PARTICIPATION IN RESEARCH PROJECTS**	Appropriateness	Outcome	1 research project / 3 years
	119.	**SCIENTIFIC PUBLICATIONS FROM THE CRITICAL CARE DEPARTMENT**	Appropriateness	Outcome	1 publications or 4 communications / 3 years for level I and II hospitals (or non-teaching hospitals) 3 publications or 12 communications / 3 years for level III hospitals (or teaching hospitals)
	120.	**CONTINUING MEDICAL EDUCATION (CME)**	Appropriateness	Outcome	>75%

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ANNEXES

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ANNEX I

2005 PRESENTATION QUALITY INDICATORS

The strategic plan of the Spanish Society of Intensive and Critical Care and Coronary Units (SEMICYUC) provides for the development of instruments to aid in the continual improvement of the quality of care.

The Board of Directors designated the elaboration of the Quality Indicators for the Treatment of Critically Ill Patients to the Society's Work Group for Planning, Organization, and Management and to the Avedis Donabedian Foundation (ADF). I am pleased to present the result of two year's labor in this endeavor.

It should come as no surprise that these quality indicators are for the treatment of the critical patient, as the logo of our Society indicates we are after all "the Professionals for the Critical Patient". For this reason, we consider it our duty to provide physicians specializing in critical care medicine and nursing staff with the means to measure the quality of care in their daily practice, not only in hospital intensive care units, but wherever critical care patients are found. Our mission to ensure optimal care for these patients is intrinsic to our training as specialists, and society at large holds us accountable for this task.

These indicators are not intended to be tools to control our daily practice, rather they provide a system of self-assessment that will enable us to quantify and analyze what we do and how we do it in order to help us determine those aspects that can be improved. Obviously, this first version is not definitive; like protocols, quality indicators need to be revised and updated periodically in function of new developments in healthcare and the growing body of scientific evidence.

A large number of intensivists that belong to the SEMICYUC and nurses belonging to the Spanish Society for Intensive Care and Coronary Unit Nursing (SEEIUC) have participated in this project, perhaps a greater number than in any other of the Society's undertakings, and I believe that this attests to the cohesion and good health of our professional societies.

I would like to thank the ADF and especially Dr. Rosa Maria Saura for instructing us in the methodology used for the elaboration of the indicators and for their patience in responding to our doubts and questions. Without their help and dedication, this project could never have been realized with the rigor that characterizes each and every one of the indicators.

I would also like to express my gratitude to the Society's Work Group for Planning, Organization, and Management, who undertook this project with great enthusiasm from the time it was first suggested by the Board of Directors. Dr. Mari Cruz Martín, the scientific director throughout the project, is undoubtedly the person who has done the most work and who has done the most to make the rest of us work, too. For this reason, I would like to take this opportunity to recognize Dr. Martín as the true architect of these Quality Indicators for the Treatment of Critically Ill Patients.

In recent years, the SEMICYUC's work groups have acquired an essential role not only in the Society's annual congress but also in many other affairs. The participation of all of the work groups, each and every one of which has developed the specific indicators for their area (corrected and adapted methodologically by the directors and authors of the indicators), has been extremely helpful. I would like to acknowledge the efforts and of these work groups, with a special mention for all of those designated by their groups to be in charge of the project, and thank them for a job well done.

I would also like to thank the individual members of the SEMICYUC and of the SEEIUC for their contributions and willingness to help the scientific direction and authors of the project in the elaboration of the indicators.

Various members of the SEMICYUC took part in the final correction of the indicators and I would also like to thank them for their efforts and collaboration.

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Last but not least, on behalf of the SEMICYUC, I would like to thank Boehringer Laboratories for their financial support, which has made this project possible.

Dr. Lluís Cabré
President of the SEMICYUC (2005)

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ANNEX II

PROFESSIONALS COLLABORATED 2005 QUALITY INDICATORS

BOARD OF DIRECTORS

- Lluís Cabré Pericas
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- Antonio Jesús Pérez de la Cruz

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- Ana Ochagavía Calvo

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- Juan García Pardo
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SOCIEDAD ESPAÑOLA DE MEDICINA INTENSIVA, CRÍTICA Y UNIDADES CORONARIAS

LOS PROFESIONALES DEL ENFERMO CRÍTICO

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