



Revisión

Clinical undernutrition in 2014; pathogenesis, early diagnosis and consequences; undernutrition and trophopathy

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Abstract

The last ten years have allowed me to mature some concepts and criteria in relation to malnutrition in the clinical practice. A lot of us have devoted all our efforts in an attempt to take it under control. The results, however, have shown to be insufficient in the clinical practice, because Hospital Undernutrition still persists in our hospitals and in fact, its prevalence is growing due to an ageing population.

I think it is necessary to insist in renaming it as Clinical Undernutrition because it not only appears in hospital settings but it is present before and persists even after hospitalization; the latter reinforces the condition by forcing a change in the habits of the patient and the consequences of the treatments. I would also like to sustain that the risk is not caused by the undernutrition in itself but rather in the disruption of the nutritional balance which is a consequence of the aforementioned conditions and which is defined in a term: Trophopathy; that is, a disruption in the trophism or in the normal functioning of the nutritional status. This disruption constitutes the core risk that is associated with clinical undernutrition and the physical consequences of it. The disruption occurs internally and it will play havoc on cellular nutrition, tissues and further. It appears simultaneously in the blood, so it should be searched and detected there as it is the closest possible place to its origin.

The new therapeutic procedures make it possible to cure some cases that in the past were impossible to treat. However, this also means increased risks and so requires a strict control to achieve the best results. Both illness and its treatment put homeostasis at risk and they will definitely impact the nutritional balance, being the latter the key objective in order to achieve or restore the healing process and health.

Apart from the benefit obtained with the treatment, it is necessary to apply an appropriate nutritional support that will guarantee the least amount of risks which could derive from an imbalanced nutritional status.

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LA DESNUTRICIÓN CLÍNICA EN 2014; PATOGENIA, DETECCIÓN PRECOZ Y CONSECUENCIAS; DESNUTRICIÓN Y TROFOPATÍA

Resumen

Los últimos diez años me han permitido madurar conceptos y criterios en lo relacionado con la desnutrición en la práctica clínica. Muchos hemos luchado por controlarla, pero no es demasiado lo avanzado en realidad ya que persiste en nuestros hospitales y residencias, e incluso aumenta su prevalencia a causa del envejecimiento de la población.

Insisto en denominarla Desnutrición Clínica porque no solo es hospitalaria pues se presenta antes y persiste después de la hospitalización, reforzada por ésta y lo que implica en cambios de hábitos y el efecto de los tratamientos. Sugiero también que el riesgo no es, no está en la desnutrición, sino en la alteración del equilibrio nutricional provocado por los elementos citados y tiene un nombre que lo define: trofopatía, que es la alteración del trofismo o del normal funcionamiento del equilibrio nutricional. Esta alteración es el prolegómeno de la desnutrición clínica y sus repercusiones anatómicas. La alteración de este equilibrio se produce en el medio interno, repercutiendo en la nutrición celular y tisular. Y como se manifiesta simultáneamente en el plasma sanguíneo, es ahí donde debemos buscarla.

Nuevas técnicas terapéuticas facilitan tratamientos anteriormente impensables, pero suponen un incremento de riesgos que es necesario controlar frecuentemente para conseguir un balance positivo de resultados. Enfermedad y tratamiento atentan contra la homeostasis, repercutiendo sobre el deseable equilibrio nutricional, pilar básico para conseguir o recuperar la capacidad de restauración de la salud.

Amén de la acción directa saludable del procedimiento terapéutico sobre la enfermedad, hemos de contar con el adecuado soporte nutricional para reducir riesgos derivados del desequilibrio nutricional.

La disponibilidad de sistemas automáticos para la predicción y el seguimiento del riesgo en el episodio clínico

The use of automated systems to predict and control the risk factors during the clinical phase makes it possible to have a more thorough control of the illness from its origins, allowing an early diagnosis and treatment of it.

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Key words: *Plasma albumin. Comorbidity. Nutritional Screening. Clinical Undernutrition. Hospital Undernutrition. Illness-related Undernutrition. Primary Undernutrition. Controlling nutritional status (CONUT) score. Prognostic Markers. Nutritional risk. Trophopathy. Exit/Clinical results/ Outcome.*

Introduction

Ten years have gone by since I wrote about Hospital Undernutrition¹. Therefore I think it is necessary to revise, modify and adapt some of the key aspects related to it since unfortunately not much has been attained till now to face this serious illness.

The first aspect to reconsider is the term itself. I have decided to change Hospital Undernutrition for Clinical Undernutrition (CU) and I would suggest the concept of Clinical Trophopathy as the most appropriate term to avoid confusion.

It is also necessary to make an update on the semantics normally used to refer to CU. For this, the word “trophopathy” (an alteration of the nutritional balance) is introduced in order to consider the physiopathology of the illness in a broader sense and to understand the complex amount of issues that are involved in it. Trophopathy should not be regarded as a synonym of undernutrition because during the illness there are constant changes in the metabolism (which are usually of short duration) or in the availability of nutrients (which cannot be used by the cell even if they are present in the system).

These metabolic changes are trophopathic and, if they persist, can lead to undernutrition. Having this picture in mind, it is evident that it is absolutely necessary to modify our concepts and goals, that is, what is to be expected from the nutritional screening that is carried out to guarantee an early detection as well as to control the nutritional risk (table I). We must also consider the new screening tools, which make it possible to get valuable prognostic data. In this regard we will now discuss the most appropriate parameters to face this illness with the best possible results.

Clinical Undernutrition in 2014

The term Clinical Undernutrition was described in *Libro Blanco sobre Desnutrición Clínica en España*, edited (in Spanish) by SENPE in 2005. In the chapter “A project to prevent, detect promptly and control undernutrition” (Proyecto para la prevención, detec-

facilita su control, desde la detección precoz a su solución, con mayor dominio de la evolución.

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Palabras clave: *Albúmina plasmática. Comorbilidad. Control nutricional (CONUT). Cribado Nutricional. Screening. Desnutrición Clínica. Desnutrición hospitalaria. Desnutrición ligada a la enfermedad. Desnutrición primaria. Índices pronósticos. Pronóstico nutricional. Riesgo nutricional. Trofopatía. Resultados clínicos.*

ción precoz y control de la desnutrición) (CONUT® Project), was defined as “Clinical undernutrition (CU): a condition characterized by a lack of nutrients (a calorie-protein lack), being it either the cause or consequence of the illness, the treatments or the hospitalization and/ or the complications related to it, and which can occur during the hospital stay or Primary Assistance”.

I am particularly interested in making the term CU updated and available to all professionals, but I would also like to make particular emphasis on the complexity of this clinical condition as well as the metabolic and functional alterations related to it. I am also interested in replacing the term Hospital Undernutrition (or Undernutrition related to the illness) and distinguishing this from Primary Undernutrition (PU), in order to demonstrate how relevant, varied and serious all the concepts involved are. In this way we will be able to prevent CU by means of the new screening systems and we will improve the control by achieving the following three objectives: 1. Being able to guarantee an early diagnosis of nutritional risk, 2. Doing a more precise prognosis of the risk by ranking it according to the degree of seriousness and 3. Carry out the frequent follow-ups to monitor its evolution and keep a record of the changes occurred during the process. These changes could be a consequence of an illness, a therapy or a particularly vulnerable case (as frequently happens in elderly or chronic patients).

Clinical Undernutrition / Primary Undernutrition

To begin with, Clinical Undernutrition must be distinguished from Primary Undernutrition.

Primary Undernutrition refers only to a lack of nutrients, no matter what the cause of that lack has been. Following the words of Grande Covian, it is “a pathological condition derived from a deficiency in the caloric, plastic or regulatory nutrients, which fail to cover the needs of a living organism”.

As a consequence of this situation, an array of metabolic changes occurs in an attempt to maintain the vital equilibrium and to obtain maximum energy from the

reserves, and, at the same time, to save protein as well as other nutritional substrates. If depletion and its consequences do not reach risky limits, the equilibrium can be restored by an appropriate nutritional oral support that is administered until deficiency has been solved.

On the other hand, although the causes of CU and PU can be the same, the former is basically caused by the metabolic changes occurred both by the illness and the therapeutic procedures (such as surgery, radio, chemotherapy, transplant, etc) as well as other by other aspects related to hospital care. However, CU does not necessarily imply nutrient deficiency; it can also be present in a situation where a decreased concentration or availability of a nutrient can be enough to alter the whole system. All these aspects determine the metabolic changes that will eventually alter the trophism of the cells, tissues and systems, hence the concept of trophopathy (an altered nutritional balance). The patients who suffer it were, at the beginning, suffering from an illness and, later on, they may also suffer the consequences derived from the treatments as well as from hospitalization.

As this can also be a consequence of PU, I suggest that undernutrition should be used to refer to the clinical condition and it should be considered as a synonym of clinical trophopathy. With the latter we are then taking into account the original causes of the illness, including those stages in which some kind of alteration is already present, yet without any physical signs.

The consequences of each are also different, as well as their complications and solutions, so they cannot be measured with the same tools. In the case of PU the objective should be aimed at getting a balanced nutrition (usually orally) that will cover the needs, while in

the case of CU the focus is placed on the frequent changes of the nutritional status. This is because normally in CU the physiological mechanism (eating) is impaired and so it is necessary to apply artificial feeding, hence supplying nutritional formulas by enteral or parenteral means.

The ways in which they appear and evolve are different as well: PU normally evolves slowly and it generally depends on the difference between a deficient income and the demands, which will signal a saving state. On the other hand, CU implies not only a certain kind of shortage but an impaired ability to ingest, absorb and/or metabolize, an increase of the demands, as well as internal changes derived from illness, comorbidity or treatment, as is the case of inflammation, over-hydration, medication, etc.

As regards the term “Hospital Undernutrition” or “Undernutrition Related to an Illness”, we think that these concepts are definitely not sufficient to refer to the condition in a broad sense, neither chronologically nor conceptually.

The concept of Hospital Undernutrition goes beyond the chronological limits of hospitalization; it usually starts before hospital admission with a high prevalence and it generally persists even after hospital discharge, being even higher at that moment. CU normally extends during treatment and recovery, reason why we insist that the concept of hospital undernutrition is not appropriate as it lasts as long as the clinical stage.

It is estimated that around 30% of patients are already undernourished at the moment of hospital admission and that this condition increases by 30% among hospitalized patients, which determines a higher risk of complications, mortality (fig. 1), duration of stay and hospital expenses²⁻⁵. It is very important

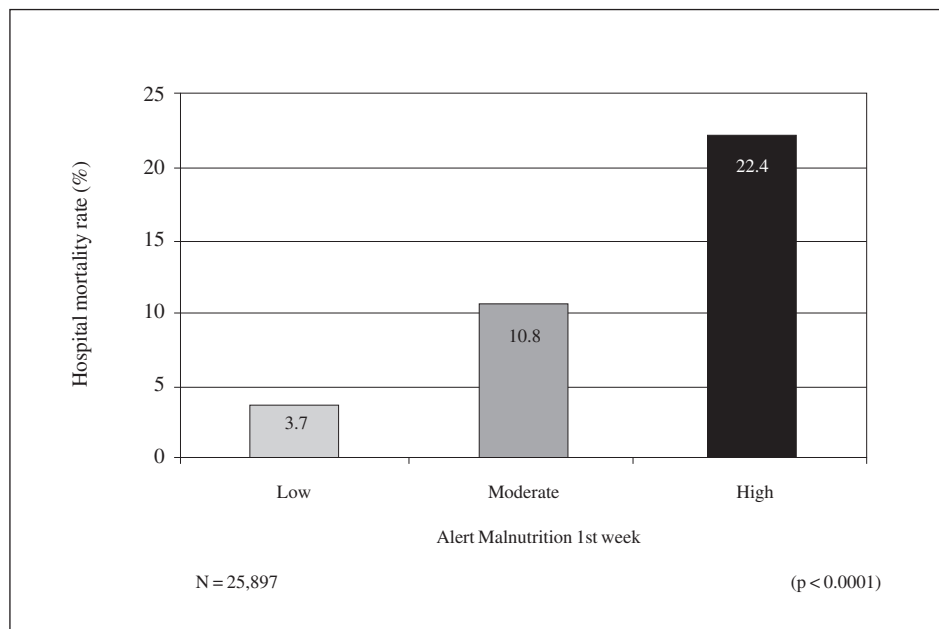


Fig. 1.—Specific mortality rate alert malnutrition presented in the first week of hospitalization.

to remember that almost all of these undernourished patients have developed the condition as a consequence of CU (not as a consequence of PU) because they were already ill by the time of admission and probably during previous treatments, being these events the cause of their altered trophopathy. There is a further increased incidence of patients who become undernourished due to the clinical condition that they are going through such as illness, hospitalization, fasting, increased demands, further treatments and complications, all of which are a cause of trophopathy that will increase both duration and seriousness of the condition,

and that can be diagnosed as undernutrition by means of anthropometrical parameters.

After this period and hospital discharge, patients with persistent CU will be likely to need a longer period of sick leave as well as a more intensive therapy and home care by the Primary Assistance. They will also be prone to be readmitted due to further complications derived from undernutrition. All this will definitely impact the patient and his carers (ulcerations by pressure⁶ are a common example), hence the need of a continued nutritional control (figs. 2 and 3). As a consequence cessation of the CU control should not be at the moment of

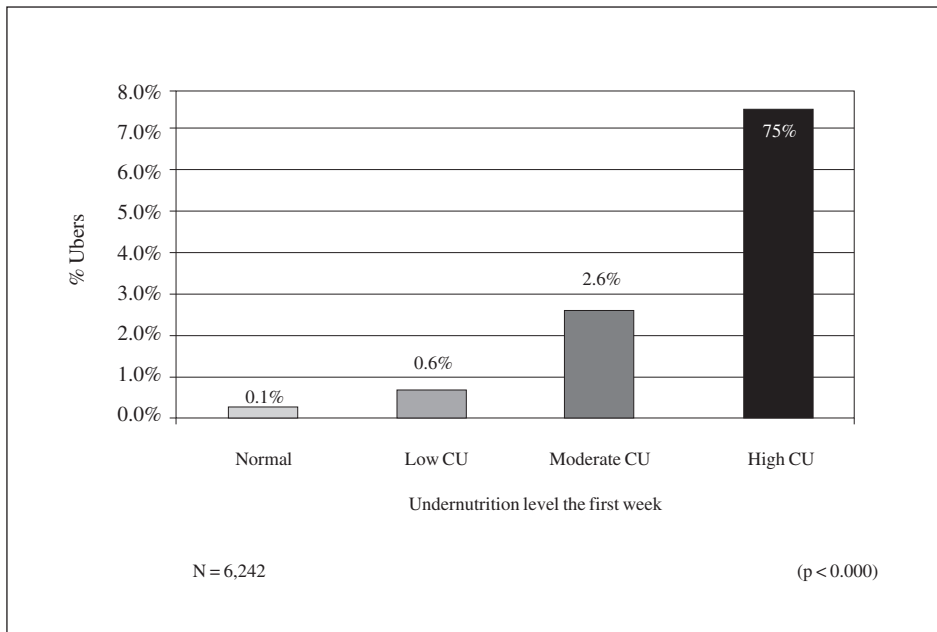


Fig. 2.—Decubitus ulcer prevalence according to the degree of under nutrition during the first week of hospitalization.

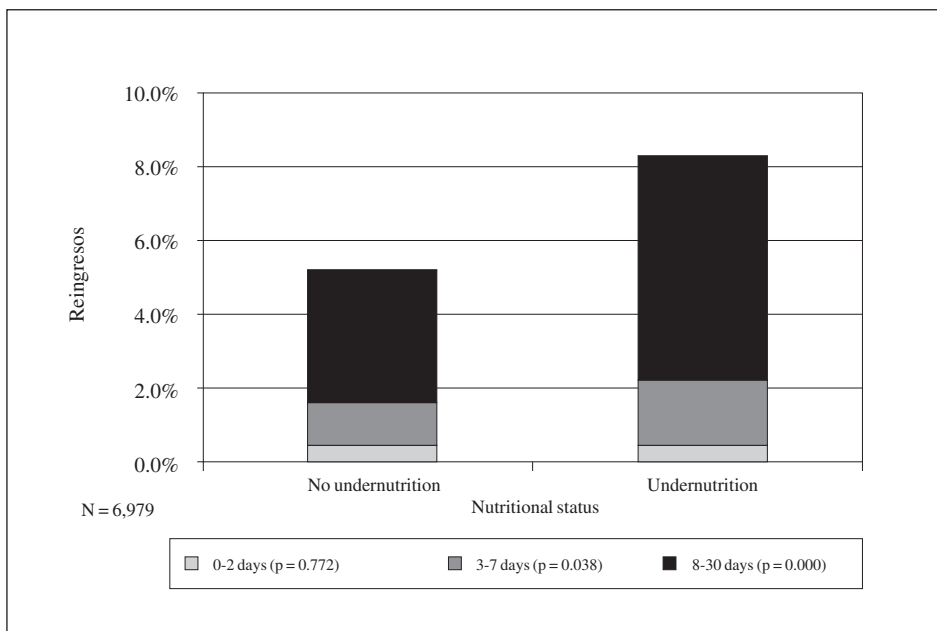


Fig. 3.—Percentage of readmissions urgent as the degree of malnutrition sometime previous hospitalization.

hospital discharge but, rather, after the recovery period and with the final discharge. Exception of this would be in the case of very vulnerable patients (such as chronically ill or the elderly), in which case it is necessary to keep some kind of control either at home or at the hospital where they have been admitted.

To sum up, and regarding the concept of Hospital Undernutrition: There is an evident need to control it before the moment of admission and diagnose it as an illness from the beginning. Undernutrition tends to increase during the treatment and hospitalization, but also persists after the hospital discharge. This is why nutritional control should continue even outside the hospital², especially in the case of chronic or elderly patients.

Finally, it is clear that the classical concept of Undernutrition Related to Illness is too limited because it does not consider the therapeutical procedures which are so detrimental and aggravate undernutrition. It does not either contemplate the eventual consequences of hospitalization and undernutrition, as well as other circumstances that may coexist (such as other illnesses, its complications and the treatments received).

When referring to CU we believe that nutritional status control should be carried out from the moment the illness appears until the end of it and of the recovery period. CU must be traced back as close as possible to its origin, that is, in the internal environment. It must be detected as soon as possible, preferably at the moment when it originates. It is extremely important to act promptly in order to prevent the serious consequences of it. The more serious a condition and the more aggressive the treatments to reverse it, the higher the risk of complications.

Trophopathy: “Altered nutritional status”

Undernutrition, when already established, is considered a trophopathy. However, many other metabolic conditions due to different causes can also lead to a trophopathic condition which can occur before undernutrition or play a role in the aggravation of it. In order for CU to develop, a lack of or diminished input of nutrients is not always needed. In many cases a metabolic imbalance of any kind can be sufficient to play havoc on the cell trophism. Either a change in nutrient concentration or a cell’s failure to assimilate them (such as an altered osmotic or oncotic pressure, pH, etc.) as well as the presence of certain substances such as medicine, can all have a trophopathic effect. Even when the body is able to receive and put away the essential nutrients, the cell will develop undernutrition if it fails to assimilate them.

It is not always easy to state whether undernutrition is the cause or the consequence of the patient’s clinical development. The same applies when introducing changes in the therapeutical procedures to control the illness; these generally involve an increased demand of

nutrients while at the same time, there is a necessary restricted intake as well as an alteration in the physiology of certain organs and systems that metabolize them. Hence, clinical undernutrition can be a consequence of many therapeutical procedures.

It is also important to bear in mind that undernutrition (or an altered nutritional equilibrium, that is trophopathy) reduces the efficiency of many therapeutical procedures, which is demonstrated by means of the clinical data that we use to control it, as these are essential to closely monitor any changes that occur internally in the patient.

Finally, in those cases where trophopathy has already been established or there is a high risk of developing (or worsening of) undernutrition, we think that it would be a serious mistake to wait until any anatomic changes caused by undernutrition appear and eventually then diagnose and treat the condition. By this time undernutrition will have already been well established since long and metabolic evidence of it can be easily detected by the clinical data. By then the body will have suffered the consequences and be in a more complex condition. In the clinical practice, in order to treat, control and diagnose these alterations as soon as possible, it is necessary to apply specific type of methods. These methods have been specially designed for this purpose and therefore they have been based on analytical parameters which are the only way to study the condition from within (fig. 4). Pretending to do with anamnestic and anthropometric methods is like watching late, from outside, the ravages of what has been happening.

Inflammation

Inflammation is another common clinical issue that can alter the body’s function and metabolism: “It is the immunological system’s reaction to the damage caused to the cells and tissues by bacterial pathogens or by any biological, chemical, physical or mechanical aggressor”, as defined by García Barreno⁷.

Heilmeyer and Kähler⁸ had already stated that: “Inflammation is to be regarded by the medical profession as of utmost importance due to the biological impact of it. Whatever the chosen approach to treat inflammation, it will eventually influence his attitude”

Systemic inflammation is a complex reaction that is unfortunately of a high frequency and we consider it as a serious trophopathic cause⁹. The reason for this is that systemic inflammation can be triggered by multiple aggressions, illnesses and treatments of these. As a consequence we strongly believe that it must be taken into consideration at the moment of the diagnosis as well as during the follow up of the metabolic changes that occur. All these must be considered when choosing the appropriate nutritional support, which must go in hand with the treatment for inflammation (its origin and consequences).

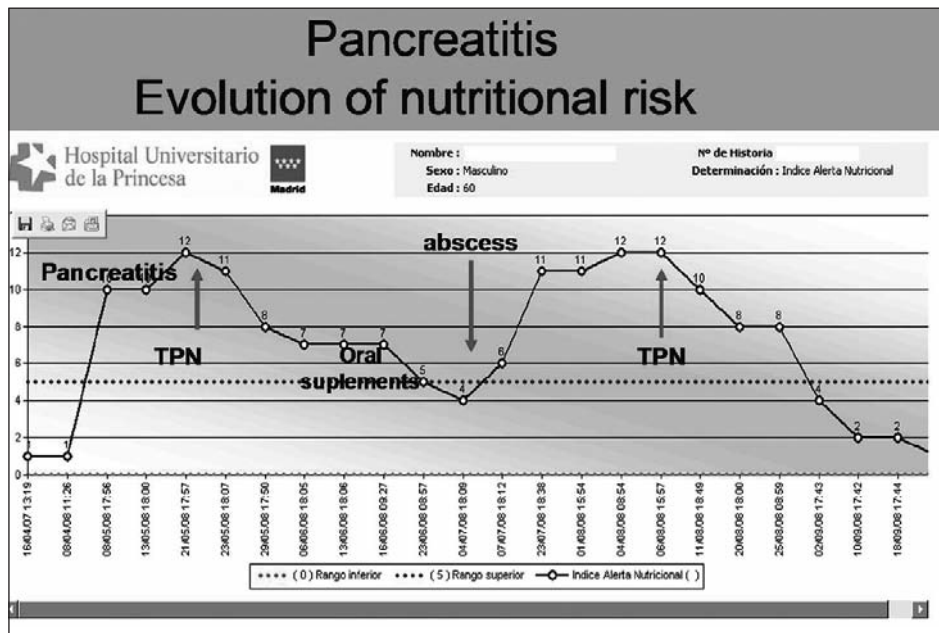


Fig. 4.—Pancreatitis.

Clinical Undernutrition, therefore, should not be approached in the same way as primary undernutrition which is merely indicative of a lack. On the contrary, Clinical Undernutrition must be regarded as a trophopathy, that is, a pathological condition characterized by an alteration in the homeostasis and in the functional capacity of the tissues, hence a failure to achieve nutrients as a consequence of a reduced availability of these in the internal environment. This will eventually generate cellular undernutrition which, if the trophopathic conditions remain present, will aggravate the whole condition and extend it to death. This process will be marked by an inevitable increase of the nutritional risk accompanied by a rise in morbidity, hospital stay and therapeutical cost.

CU outside the hospital

All that has been explained shows why this situation must be seriously considered by all the members of the hospital team. The Family Physician and the Primary Assistance professionals are the first ones to become in contact with undernutrition since this has already been developing as a consequence of the illness and probably even from the beginning of the treatment at Primary Assistance. Therefore these professionals should be the ones to set off the controls and be able to diagnose CU as soon as possible, even before hospitalization. They should also continue to monitor eventually adjust the treatment after hospital discharge.

It is very important to train these professionals and make them aware of the relevant role they play in the prophylaxis and control of CU, as well as their key role in the prevention of it. The number of undernourished patients that will require more special treatments will

be diminished and this will benefit the results achieved with surgery, radio and chemotherapy. An essential role to be performed by this team of professionals is to keep good control of the facts that lead to undernutrition, such as a low intake (due to anorexia or difficulty to swallow), or an increase in the demands (high temperature, seizure disorder), or loss of fluids (diarrhoea, fistulas). It is also important to pay attention to those therapeutic procedures which could have a trophopathic effect. They must control these conditions in order to prevent an eventual CU from developing, so they will apply the screening tools before hospitalization and will eventually consider nutritional support to be carried out at home. The same will apply after hospital discharge, a period in which the doctor in charge should carry on the screening to control the clinical development of the patient.

Specialists play a decisive role in detecting any possible risk of developing the illness or, at least, a high NUTRITIONAL RISK that is usually related to particularly trophopathic conditions and treatments. They should be aware of the trophopathic impact that their illness of specialization usually involves, as well as the treatments applied. By administering a proper nutritional support to a patient with a high risk of undernutrition it is possible to guarantee a better evolution of the process as well as better results of the therapies and a decrease in the duration, costs and risks associated¹⁰⁻¹².

At the moment of carrying out the pre-surgical tests, Anaesthetists should evaluate the nutritional status of the patient in case the surgeon has not done it. Both professionals are well prepared to detect a case of undernutrition or the risk of developing it during the stay of the patient in hospital. Nutritional risk should be considered right from the first consultation with the patient, especially if the patient is to go under surgery.

Early detection of CU and nutritional risk

The ideal tools to guarantee an early detection and follow-up of CU are based on the diagnosis and control of the changes in plasma of the body functions, since any alteration of these can be detected much earlier and with more precision than anthropometrical measures.

We have previously selected the appropriate parameters for clinical diagnosis, albumin, total cholesterol and total lymphocyte count, all of which are included in routine tests. A reduction in blood concentration of any of these can be used to detect an altered trophopathy at an early state. They are evidence of a possible CU and nutritional risk, hence they constitute an effective tool to act immediately by applying nutritional support, even before hospitalization.

The advantages of these parameters as screening tools have already been discussed thoroughly in previous papers.

The fact that nutritional screening is based on these parameters does not mean that other parameters are excluded for assessment of nutritional status. Parameters such as anamnesis, clinical and anthropometric should always be present when analysing the nutritional state and risk of a patient. Any protocol must involve a thorough assessment of the nutritional status to be followed after the screening process.

After hospital discharge nutrition control continues and is to be carried out by the Family Physician until the causes of undernutrition have been reverted. Later on, it will be sufficient to check the patient's appetite, general aspect and weight, and in case of doubts, the necessary blood tests should be carried out to guarantee that the nutritional indicators are within the normal range¹³.

The ageing process

When considering the risk of a clinical intervention it is also necessary to bare in mind the inevitable trophopathic impact caused by ageing. It must be taken into consideration at the moment of assessing diagnosis, prognosis and treatment.

The close relationship between age and undernutrition have already been studied extensively by analysing the parameters measures by CONUT[®]. That has been done in order to effectively adapt the screening tools to age as precisely as possible. Our CONUT[®] system has shown to be such an effective tool that can predict nutritional risk regardless of age¹⁴ (fig. 5).

We should bare in mind the complexity of the trophopathic condition which appears in the clinical setting as a consequence of the illness and its treatment, but also determined by the complications of these. The alterations in nutritional status are extremely difficult to detect and measure by means of the methods normally used for that purpose. However, they can easily be detected with the same parameters that are already being applied for the control of the clinical process.

Another potential benefit of the system is the prognostic effectiveness of the automatic screening filters. These filters will allow us to improve the quality of the assistance that the patient receives, by means of better nutritional support as well as by applying those predictive qualities in such a way that we will be able to select the most appropriate treatments that combine the highest efficiency and the least aggressiveness to the integrity of the patient¹⁵⁻¹⁷.

At this point we would like to conclude with a brief analysis of this trophopathic process by stating the

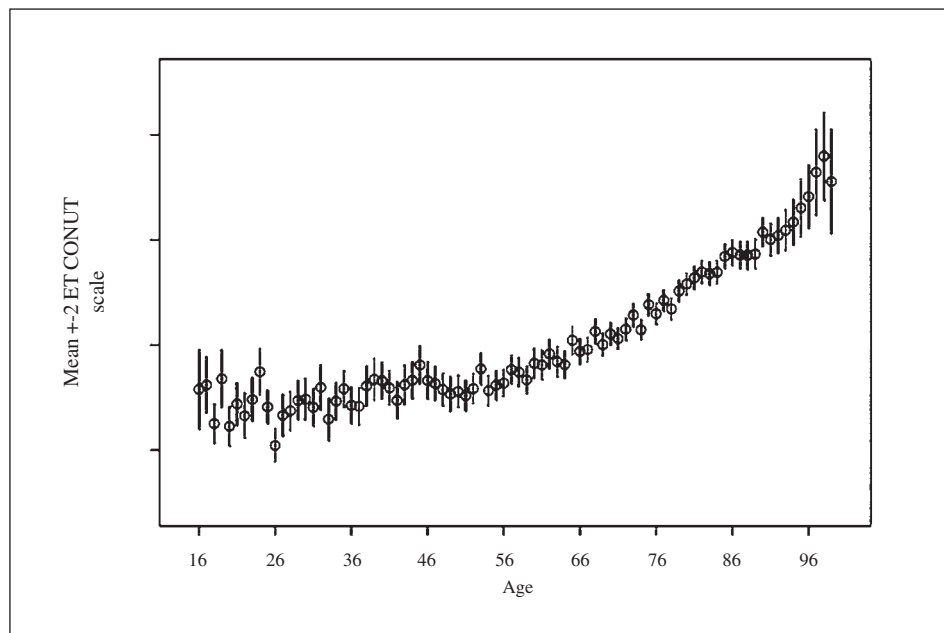


Fig. 5.—Correlation between CONUT scale and age. (ESPEN 2012 Congress “Association between age and an automatic nutritional screening tool” PP211-SUN. Barcelona, Spain).

serious conditions which are usually present at the moment of discharge or end of the clinical period. These conditions can be taken under control with the frequent follow-ups to monitor the chances of risk.

The following are the most frequent consequences of a nutritional alteration that can appear during the clinical-assistential event:

- Increased morbidity with multiple complications:
 - re-opening of surgical stitches
 - Infections, sepsis
 - Decubitus ulcer
- Poor response to medical and surgical therapies,
- Longer hospitalization,
- Higher hospital costs¹⁸⁻²⁰,
- Higher mortality²¹,
- Higher readmissions,
- Longer off work time²²

The latest automate and computer systems for nutritional screening make it possible to keep a record of the events, to predict their incidence and impact, and so allow us to prevent them from occurring^{23,24}.

With the aim getting maximum profit of the sensibility, promptness and predictive capacity that the control of CU offer, we have considered the impact posed by illnesses and their treatments that have been the most common in our experience during hospital discharge or development, considering hundreds of thousands of cases recorded. In order to do this we analysed the diagnosed groups of CIE-9 according to *ITIL* in the hospitals that normally use our nutritional control system, and we have ranked them according to

their potential risk to some aspects such as mortality, survival, hospital stay and even relapses or readmission.

This information involves the aspects and trophopathic situations included in those diagnosis and treatments that imply nutritional risk and that are responsible for Clinical Undernutrition and its eventual consequences. With that we will have a valuable data for assessing the degree of risk related to each condition, clinical control and treatment. This way it will be possible to previously reflect on the most appropriate approach to each particular patient, thanks to the predictive value of the CONUT system.

CONUT[®] is an innovative system for nutritional control that includes the latest tools capable of keeping track of the patient's prognosis from the beginning of hospitalization or even at any moment of his stay or at considering the treatment applied. It is an extremely useful tool for both the Specialist and the Family Physician^{4,17}.

Once we had the clinical information systems had been settled up it will be possible to have easy access to the original causes of hospitalization. This will allow us to calculate the risk that corresponds to each patient in a more precise way, and hence automatically state a real risk or even predict the possible results or outcomes, such as length of treatment, mortality risk, costs, etc.²⁵ (fig. 6).

Finally, after so many years of experience in the use of these parameters for the study of CLINICAL UNDERNUTRITION, I would like to be among the first ones to update the terminology, which could be reformulated as: "An altered nutritional or trophopathic state caused by an illness or its treatment, including hospitalization and the complications derived of it".

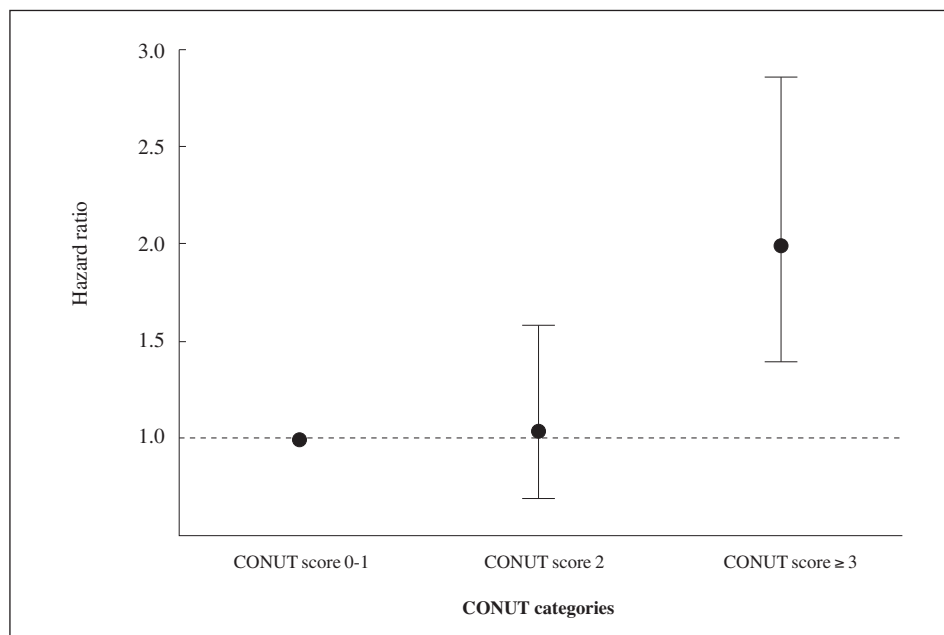


Fig. 6.—Relationship between the controlling nutritional status (CONUT) category and hazard ratios for the all-cause death in fully adjusted Cox regression analyses. Vertical bars represent 95% confidence intervals. (Taken from: Prognostic Impact of Nutritional Status in Asymptomatic Patients With Cardiac Diseases A Report From the CHART-2 Study – Kotaro Nochioka, MD, PhD; Yasuhiko Sakata. *Circulation Journal* Vol. 77, September 2013).

Table I
Comparisson of the main aspects of CONUT with the requirements of Resolution ResAP (2003) 3 and the Praga criteria regarding screening systems

<i>CE suggestions for nutritional screening: resolution ResAP (2003)3</i>	<i>Compliance with manual methods</i>	<i>Compliance with analytical methods</i>
1. Nutritional risk assessment must consider the nutritional state and the degree of illness.	They can diagnose an already present undernutrition, not the risk at the moment of assessment	Is satisfies both aspects at the moment of assesment and at its original place: internally
2. The method for nutritional risk control must be based on evidence in oder to guarantee that it can efficiently identify those patients that might need nutritional spport.	They do not detect any recent damaged caused by the treatment or fasting period until many days after.	Validated by VEN and SGA, but validation according to the results is highly recommended
3. The method for the control of nutritional risk must be an easy to apply and interpret kind of method	They require specific training, experience and time. They are liable to errors dependent on the observer and among different observers	It is automatic, no room for mistakes.
4. The influence played by age, height and sex must be considered in order to determine the nutritional risk of the patient.	Age is a very influential aspect on the surveys and measurements.	Valid for adult and elderly patients.
5. Nutritional risk of all the patients should be check routinely before hospitalization or when this takes place. This evaluation is to be repeated at frequent intervals during hospitalization (the frequency will be dependant on the degree of nutritional risk).	They are valid at the moment of assessment. Repetition of them within less than three weeks does not detect any variations and demand too much effort.	It is carried out at each analytical evaluation, hence it facilitates any necessary modifications of the treatment or nutritional support.
6. It is necessary to carry out studies for the design and validation of easy to apply screening, which will be applied in hospitals as well as in primary care units.	Specially trained staff and time are required, hence it is not easy to apply.	It is compatible with the computing systems already in use in the hospital.
7. Once a patient has been diagnosed with nutritional risk, a full nutritional assessment is to be carried out in order to determinine the adequate nutritional plan, dietetic objectives, intake and body weight control, as well as the necessary modifications of the treatment.	They require constant control of the evolution in order to repeat the surveys and meassurements.	The alert is automatic, which allows for early modifications of the nutrition and treatment as required.
8. It is necessary to establish standards for diagnosis and control of nutritional risk/state, to be applied at a national and international levels.	Its subjective nature prevents standardize the results with sufficient security.	It is a valid system to be applied locally, regionally and internationally.

This new approach considers undernutrition as a condition that can develop during clinical stay and so implies regarding it a trophopathy. This way we should bare in mind that the most appropriate treatment to control this condition will be one that will allow the necessary changes at the right moment: these should take place internally and at the moment that they are occurring inside the cells which provide nutrition to the tissues. It is then insufficient to focus the attention on the anatomical changes; the development of these is too slow, rather vague and of late appearance in the process, hence not useful parameters for clinical use, especially during hospitalization.

Update

Unfortunately, after looking back on these ten years it is evident that not much has been improved regarding undernutrition and the interest shown by the Administration on this issue. It is also evident that there is a "Lack of knowledge and awareness among health professionals of the aspects related to undernutrition", as well as an insufficient training of these professionals and a poor application, in our hospitals, of the nutritional screening tools designed for early detection of undernutrition. In most cases, this situation has remained the same, with the added risk of an ageing

population and a growing number of elderly people. As a consequence of this, undernutrition within both hospital and outpatient settings (especially at nursing homes) has increased dramatically in the last years.

Conclusions

1. A metabolic or trophopathic alteration caused by an illness or its treatment is not necessarily a synonym of undernutrition, although it can eventually cause it, depending on the duration and intensity of the alteration.
2. An early detection of these trophopathic alterations through screening is a highly effective tool to anticipate the possible anatomical and clinical changes that may be caused by undernutrition, and this enables us to carry out an early intervention to prevent the appearance of undernutrition.
3. It consists of an easy and efficient tool to keep a close control of the situation with the analytical parameters in the clinical setting. It is also very effective in the case of chronic, vulnerable and elderly patients, without inflicting any discomfort to them.
4. Directly introducing the analytical data in the lab systems will make this information readily available to other systems and so it will be possible to apply them with clinical and epidemiological purposes.

5. The introduction of this data in systems such as *ITIL* will determine that it will be possible to benefit from the prognostic potential of this tool and use it for the prevention of new cases.
6. The efficiency of this tool has proven to be very valuable to predict risks, which make it of inestimable value for making decisions in the clinical practice.

In the next issues I will discuss the automation of the nutritional screening tools based on analytical data as very effective parameters for the screening. They are also very valuable to carry out the follow-ups and predictions; in fact they have proved to be much more practical, economical, reliable, objective and precise than the ones based on antropometric data and subjective observations.

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Annex I

Glossary of terms

<i>Comorbidity</i>	A condition that involves more than one illness and its possible consequences.
<i>Nutritional Control</i>	A system for the control of nutritional status and risk of undernutrition. It is carried out initially by screening procedures that have sufficient sensitivity and can effectively be applied for the control in the clinical practice. This initial screening, as appropriate, will be followed by a more thorough evaluation, which will be performed by other specific methods such as anamnesis, physical exploration, clinical tests, etc, according to the each particular situation.
<i>Undernutrition</i>	<ul style="list-style-type: none"> – From the Latin Dis, separation or lack, Trophis or Thophs, Nutrition. f. Degeneration and vulnerability due to insufficient or inadequate nutrition (Espasa Calpe). – “A pathological condition caused by a deficiency in energetic, plastic or regulatory substrates that is below the needs of a living system” (Grande Covian).
<i>Clinical Undernutrition</i>	“A situation in which there is an altered of trophopathic nutrition due to an illness or its treatment, including hospitalization and the complications derived from it”. (Ulíbarri, 2012).
<i>Discharge</i>	An exit that leads out of a place or situation.
<i>Disease-related undernutrition</i>	A state of insufficient intake, utilisation or absorption of energy and nutrients due to individual or systemic factors, which results in recent or rapid weight loss and change in organ function, and is likely to be associated with a worse outcome from the disease or the treatment. Undernourished patients can be overweight or obese according to their body mass index (BMI). (Council Of Europe Committee Of Ministers. Resolution ResAP(2003)3 on food and nutritional care in hospitals).

Annex I (cont.)
Glossary of terms

<i>Early detection</i>	To diagnose or identify an illness by means of an examination of the symptoms. Diccionario Manual de la Lengua Española Vox. © 2007 Larousse Editorial, S.L.
<i>Ergonomics</i>	Scientific study of human ability and psychology in relation to his work and machinery or equipment used for work, and that aims at improving the conditions of these.
<i>Inflammation</i>	<ul style="list-style-type: none"> – “A pathological alteration in any place of the body, characterized by an altered blood circulation, being excessive heat, rash, swollen and pain the most frequent symptoms. Real Academia Española®. – “It is the body’s immunological response to the damage caused to its cells and vascularised tissues by pathologic bacteria or any other biological, chemical, physical or mechanical aggressors” (Pedro García Barreno).
<i>Outcome</i>	Results. Final results of a clinical process or event.
<i>Nutritional risk</i>	The risk for nutrition-related complications due to the disease or the treatment. (Council Of Europe Committee Of Ministers. Resolution ResAP(2003)3 on food and nutritional care in hospitals)
<i>Nutritional risk screening</i>	The process of identifying characteristics known to be associated with nutrition-related complications. Its purpose is to detect patients at risk who may experience an improved clinical outcome when given nutritional support. (Council Of Europe Committee Of Ministers. Resolution ResAP(2003)3 on food and nutritional care in hospitals).
<i>Nutritional Screening</i>	It is the process of detecting any individual who is undernourished or who is in risk of developing this condition. It consists of fast, easy and reliable techniques carried out on a specific group with the aim of being able to treat the undernourished members as early as possible.
<i>Trophic</i>	– Adjective. Related to the nutrition of tissues. (From Greek troph , eating).
<i>Trophology</i>	<ul style="list-style-type: none"> – Science or study of nutrition® 2001, Espasa Calpe – The study of nutrition in the body.
<i>Trophopathic</i>	– It refers to all those situations, events or circumstances that alter the nutritional equilibrium® 2001, Espasa Calpe
<i>Trophopathy</i>	<ul style="list-style-type: none"> – Alteration of the nutrition or nutritional status (τροφος or troph(o): ‘that provides nutrition’ and πάθος or pathos: damage, harm). – Alteration of the nutritional equilibrium (Ulbarri) – Any illness that is related to nutrition. Medical Dictionary. 2011 – A generic term to refer to nutritional illnesses. Medical Dictionary – Any nutritional disorder. Illustrated Medical Dictionary by Melloni.
<i>Trophopathy, trophopathia, trophonosis, trophonosus</i>	Disease arising out of nutritional defect (Greek: trophe (nutrition), nosos (disease))

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