ICU MANAGEMENT

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TRIAGE

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Decision making is one of the most crucial and painstaking elements of our positions as healthcare providers. While choices made in the personal realm of our lives can influence our paths and those of our friends and families; those decisions made inside the doors of our institutions leave an indelible mark on the lives of our patients, their families, and to a greater extent, our colleagues and the culture of our workplace. Certainly, decisive diagnostic and treatment determinations are imperative to achieving positive outcomes of patients under our care, but more monumental is the decision that brings them into our care in the ICU in the first place: TRIAGE.

The questions surrounding which patients should be admitted and when they should be discharged have existed since the inception of intensive care units. A debate as to whether critically ill patients, who have little chance of survival should be admitted and further, as to whether the ICU is the place where patients should die, has raged on over the past decades and is still a matter of discussion amongst intensivists internationally.

In this current climate of fiscal responsibility, much of our focus is on the cost effectiveness of care, with regards to staffing ratios, technology-laden treatment options and the limited availability (and even scarcity, in some cases) of ICU beds. This environment places an increased stress on the proper allocation of resources and as a result, there exists a undeniable need to define an clear policy for determining the most expedient and befitting place for each patient upon arrival at, and throughout their duration of stay at hospital.

While there are numerous scores utilised to predict mortality in the ED / ER and the intensive care unit; a definitive scoring system to determine which patients are most likely to benefit from admittance to the ICU is still lacking in most institutions. Empirical data from ICUs in seven countries is being compiled from the ELDICUS Study – (Triage decision making for the elderly in European intensive care units) and the forthcoming analysis and valorisation process should yield a Europe-wide ICU triage system for one of the largest patient populations.

In this edition of ICU Management, Prof. Khorram-Manesh and his colleagues from the Prehospital and Disaster Medicine Centre in Gothenburg, Sweden offer an expert overview on disaster triage while Dr. Rehn and team from Norway focus on the importance of effective and efficient triage of trauma patients-both in the pre-hospital environment and upon arrival at hospital. From her post-H1N1 stance in Canada, Dr. Hawryluck expands the discussion to include the ethical considerations of triage, within the realm of a disaster or pandemic as well as within a routine critical care scenario.

Matrix features in this issue include the second of Prof. Pelosi's two-part review of conventional and non conventional interfaces for non invasive respiratory support, and Prof. Povoa and his expert colleagues from Portugal and Brazil revisit the always intriguing topic of the usefulness of biomarkers within the clinical decision making process in sepsis.

In our Country Focus, we look at the history of healthcare in Turkey, current reforms and the unique challenges of administering intensive care within the country. In part two of the interview with Prof. Julian Bion in the Viewpoints section of the journal, he chronicles the trials and tribulations and ultimately, the advantages of working in one of the largest ICUs in the world.

Finally, the updated 2010 ERC Guidelines on Resuscitation were recently released, and we have included a short excerpt featuring the most important changes to the guidelines on Adult Advanced Life Support.

As we await an objective, standardised triage admission and discharge instrument developed from the ELDICUS Study data (or another harmonisation of standards to be utilised in our triaging of our patient populations), we must, meanwhile, continue to deeply consider the ramifications of each decision we make – both with one stern eye on the costs involved in admitting each patient, and the other equally focused on the ethical quandary that will inevitably follow each decision.

Jean-Louis Vincent

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MANAGEMENT NEWS

Reducing Blood Transfusions Improves Patient Safety and Cuts Costs, Study Finds

A Loyola University Hospital study has demonstrated how the hospital has improved patient safety and cut costs by reducing the number of blood transfusions.

In 2009, the average amount of blood products transfused per patient at Loyola was 10 percent lower than it was in 2008, saving 453,355 US dollars. The average amount of blood products transfused dropped from 2.03 units per patient in 2008 to 1.82 units per patient in 2009.

"We are giving the right blood component, in the right amounts, to the right patient at the right time, with the goal of improving patient care," said Phillip J. DeChristopher, MD, PhD, medical director of Transfusion Medicine, Blood Bank and Apheresis and senior author of the study. First author is Omar Habeeb, MD, a fourth-year pathology resident at Loyola.

Blood transfusions save lives, but they also carry risks. Studies during the last 10 years have found that transfusions make patients more susceptible to infections and increase the risk of poor outcomes such as longer hospital stays, cancer recurrences and multi-organ system failures. "The more you transfuse, the higher you put patients at risk for unintended consequences," DeChristopher said.

Transfusions of red blood cells, platelets, plasma and other blood products were approved decades ago without randomised controlled clinical trials to establish optimal uses. Consequently, doctors sometimes order more transfusions than necessary, DeChristopher said. He noted, for example that the amount of plasma transfused per patient in the United States is two to three times higher than the amounts transfused in Canada and Europe.

Loyola launched a new initiative for blood utilisation as part of its Blood Management Program. The programme implemented blood-use protocols that included evidence-based indications, educational programmes for doctors and nurses and oversight of the Blood Utilisation Review Committee.

The initiative resulted in some patients receiving less blood or no blood at all -- without compromising patient care. For example, instead of successively administering two units of blood, a doctor might now instead order one unit and then reassess later to see if a second unit is needed.

"We don't want to expose patients to blood products unless we have to," DeChristopher said.

While patient safety is the primary goal, blood management also can result in significant cost savings. The study documented only the amount saved in purchasing blood. It did not include the larger savings involved in storing, compatibility testing, transfusing blood and treating adverse effects. "The savings we documented are just the tip of the iceberg," DeChristopher said. Blood management also can help relieve chronic shortages in the blood supply, especially during summers and holiday seasons when donations drop.

"Blood products are a vital community resource, and we need to be good stewards," DeChristopher said. "The less blood we use, the more patients benefit, and the less strain we put on the blood supply."

DeChristopher is a professor in the Department of Pathology at Loyola University Chicago Stritch School of Medicine.

The above story is reprinted from materials provided by Loyola University Health System.

www.sciencedaily.com

WHO Urges All Countries to Strengthen Health Financing so More People can Use Services

Governments worldwide are struggling to pay for healthcare. As populations get older, as more people suffer chronic diseases, and as new and more expensive treatments appear, health costs soar.

Even in countries where health services have traditionally been accessible and affordable, financing mechanisms are increasingly stretched. In countries that depend heavily on people paying directly for services at the point of delivery, health bills push 100 million people into poverty each year.

This year's World health report gives governments practical guidance on ways to finance healthcare. Taking evidence from all over the world, it shows how all countries, rich and poor, can adjust their health financing mechanisms so more people get the healthcare they need. It encourages the international community to support low and middle-income countries' efforts to increase health coverage.

WHO highlights the following three key areas where change can happen:

Raise More Funds for Health

In many cases, there is scope for governments to allocate more money for health. In 2000, African heads of state committed to spend 15 percent of government funds on health. So far three countries (Liberia, Rwanda and the United Republic of Tanzania) have achieved this. If the governments of the world's 49 poorest countries each allocated 15 percent of state spending to health, they could raise an additional 15 billion US dollars per year - almost doubling the funds available.

Raise Money More Fairly

This means removing the key financial barriers to obtaining care. Countries like Japan that manage to ensure health services are available to the entire population have done so by reducing dependence on direct, out of pocket payments and increasing prepayment - generally through insurance or taxes or a mix of the two. The funds raised are then pooled, so that it is not just those who are unlucky enough to get sick that bear the financial burden.

Spend Money More Effectively

Smarter spending could increase global health coverage by anything between 20-40 percent. The report identifies ten areas where greater efficiencies are possible. One of these is the purchasing of medicines. France has adopted a strategy of using generic drugs wherever possible - this saved the equivalent of almost 2 billion US dollars in 2008. Hospitals are another. Hospital care often absorbs from half to two thirds of total government spending on health: almost 300 billion US dollars is lost annually to hospital-related inefficiency. More efficient spending on hospitals could boost productivity by 15 percent.

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TRIAGE: AN IMPORTANT PART OF THE RESPONSE TO MAJOR INCIDENTS

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The response given to a major incident/disaster depends on many factors such as coordination and command, communication, management and performance on scene, at hospital and at the time of evacuation and transport. To have a successful response all these links must work together. Although the most common weak links in this chain of reaction varies among different countries, the major short-comings are reported to be the lack of communication and training. Thus, to optimise the response, a common language to communicate and to describe the patients' status must be defined and the order by which patients should be transported and treated must be trained.

Triage as the Mutual Language

Derived from the French word "TRIER", triage means to sort into priority and was originally used to describe the sorting of agricultural products (Winslow 1982). However, its practice is historically linked to the military and closely associated to military medicine. Baron Dominique-Jean Larrey (chief surgeon of Napoleon Bonaparte, 18th century), John Wilson (British naval surgeon, 1846) and Jonathan Letterman (US Army, Civil war, 1862-1864) are some of the people who have used triage. Triage was also used during the First and Second World War by different protocols to sort out different categories of injured soldiers. However, today in modern military conflicts triaging is a matter of deciding who should be evacuated to definitive care first, with the dead being evacuated last. It should be performed by a triage officer who assesses each patient's medical needs and based on an established system or plan (usually an algorithm or a set of criteria to determine a specific treatment or treatment priority for each patient) (Iserson and Maskop 2007). During the sixties the military triage system was adapted for civilian use and in 1964 the first systemic description of civilian ED's use of triage was published by Weinerman (Weinerman et al. 1966). Nowadays triage is used in different places both in and out of hospitals e.g. ED triage, Inpatient triage, Incident (multi-casualty) triage, Military (battlefield) triage and at last Disaster (mass casualty) triage (Iserson and Maskop 2007).

Triage Methodology and Systems

Basically, triage can be performed either based on anatomical or physiological data or a combination of these. Decisions made anatomically is influenced by observed injuries and has the disadvantages of requiring fully exposed patients, considerable experience (inter-operator variability) and it fails to detect cavity haemorrhages in >40 percent of cases if used alone, which per se results is over- or under-triaging and an increased overall mortality. Physiological triage (primary or secondary) uses physiological parameters and is said to be more reliable (not validated). Primary triage is used in the field for evacuation and transport to definitive care by using physiological parameters such as motor response, respiratory and circulatory parameters (e.g. START, Triage Sieve, Care Flight, Sacco triage). The secondary physiological triage is used in conjunction with the primary triage and establishes the

Figure 2. Patient card showing both anatomical and physiological information of a patient injured in a major incident.

Figure 1. This figure shows the scene of a major incident during a MRMI course with injured patients (patient cards). They are first triaged and treated and then transported by ambulances in real time (white boards).

order in which patients receive care at the hospital or in the setting of delayed transportation, at the scene (e.g. SAVE-triage and Triage Sort). A two-part physiological triage system has gained popularity (Ryan 2008; Jenkins et al. 2008). Historically two different systems were used by NATO; P or Priority and T or Treatment/Triage (Ryan 2008). Today, there are different systems for prehospital triage and triage on arrival at ED (Jenkins et al. 2008; Robertson-Steel 2006).

Problems

Patient's status can change rapidly over time. Casualties are also triaged at different times following the incident. A number of different triage systems to capture this dynamic process have evolved. However, this has created some difficulties in communication within the healthcare services. Another problem is the fact that many systems used are validated only for trauma patients and it has been questioned whether these can be used also for other patient categories (Robertson-Steel 2006).

Future Challenges

The challenge for the future is to develop and validate a system that can cover all the phases of prehospital and hospital care. Such a system must be easily accessible and user-friendly to all parties who take care of patients. This will benefit the patients, but also result in a more cost effective use of available resources (Robertson-Steel 2006). Triage protocols must be analysed regarding patient outcome following major incidents. Actual incidents are not easily studied in real time but can be simulated. A simulation model has to fulfil certain criteria to be an instrument for testing methodology and skills. The input data have to be correct and complete and the consumption of time for every measure has to be accurate. The consumption of resources for every measure has to be accurate and the outcome with regard to mortality and complications has to be accurately predicted. Simulation models fulfilling these criteria are also very suitable for training and validation of educational methods. A recently introduced course in disaster medicine, "MRMI (Medical Response to Major Incidents)", which has been developed in collaboration between the Section for Disaster & Military Surgery in ESTES (European Society for Trauma & Emergency Surgery), the Croatian Society for Emergency Medicine & Surgery and the Prehospital and Disaster Medicine Centre, Gothenburg, Sweden, can be used for both scientific validation of different triage methods and teaching the best way to manage a major incident (MacSim; Lennquist et al. 2009; Lennquist et al. 2010). In this course patient cards originated from actual major incidents (MacSim) with accurate input and output data are used to test both clinical and organisational ability of units involved in management of a major incident (Figure 1-2). ■

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ACCURACY OF FIELD TRIAGE OF TRAUMA PATIENTS

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Field triage is important in regionalised trauma systems. We found triage imprecision resulting in over-utilisation of hospital resources and adverse outcomes from deprived immediate access to the trauma team.

Introduction

Globally, every year, approximately five million people die from injuries and many more become permanently or temporarily disabled. Trauma constitutes a major global public health problem that places a significant human and financial burden on individuals, families and societies (Sasser et al. 2005). The most advantageous way to reduce the impact of injuries is through primary prevention initiatives that avoid injuries from happening or reduce their severity. When primary prevention is unsuccessful, harm from injury may be minimised through effective pre-hospital and hospital-based trauma care (Sasser et al. 2005).

Regionalised trauma care with specialised trauma centres reduce in-hospital trauma mortality, and this tendency increases with injury severity (MacKenzie et al. 2006). Major trauma victims may therefore benefit from bypassing the local hospital and instead being transported directly to the closest trauma centre. However, if transportation time to the trauma centre is long, it may be more advantageous to transport to a local healthcare facility so a patient's condition can be stabilised prior to inter-hospital transfer for definitive treatment (Sasser et al. 2005). Early detection of major trauma may therefore enable emergency medical service (EMS) providers to appropriately match the needs of each victim to the resources available.

Field Triage

The process of classifying patients according to injury severity in order to determine the suitable level of care is called "field triage" and triage protocols for EMS providers are recommended (Sasser et al. 2005). Civilian, day-to-day field triage protocols for diagnosing major trauma have been refined over the past three decades. The American College of Surgeons, Committee on Trauma (ACS-COT) have pioneered this progress through periodical revision of the "Field triage decision scheme" (Mackersie 2006). Field triage protocols traditionally focus on physiological derangement ("vital signs"), obvious anatomical injury, pre-injury health status ("comorbidity") and mechanism of injury.

However, the detection of major trauma remains a challenge due to volatile evolution of symptoms, occult injuries, and the complexities of evaluating patients in the field. If patients only suffering minor injuries bypass the local hospital or activate the trauma team at the trauma centre (overtriage; false-positives), the regional hospital will be overwhelmed and its scarce human and financial resources consumed. However, if major trauma victims are denied access to the potential benefits of immediate expert assessment and resuscitation provided by a trauma team (undertriage; false-negatives), avoidable deaths may occur (Sasser et al. 2005).

Sensitivity and specificity are often negatively correlated making optimal field triage a balance between patient safety and optimal resource utilisation. ACS-COT therefore describes 5 percent undertriage as acceptable and associated with an overtriage rate of 25 - 50 percent (ACS-COT 2006).

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Challenges

Scandinavia is sparsely populated with time-consuming and weather-dependent patient transport. More than 200 Scandinavian hospitals receive major trauma victims, most with low trauma admission rates. In an attempt to optimise patient outcome, immediate trauma care is increasingly delivered via multidisciplinary trauma teams. Several Scandinavian papers confirm a tendency of imprecise activations of these trauma teams (Kristiansen et al. 2009).

In a recent analysis of 7 years (2001-07) of trauma registry data from Oslo University Hospital, Ullevål, a major Norwegian trauma centre, we documented imprecise activation of the trauma team (Rehn et al. 2009). Overall undertriage was 10 percent. Paramedic-manned prehospital services provided 66 percent overtriage and 17 percent undertriage, anaesthesiologists-manned services 35 percent overtriage and 2 percent undertriage. Falls, high age and admittance by paramedics were significantly associated with undertriage. Patients subject to undertriage had an ISS-adjusted Odds Ratio for 30-day mortality of 2.34 (95 percent CI 1.6-3.4, $p < 0.001$) compared to those correctly triaged to trauma team activation. We concluded that anaesthesiologists perform precise field triage, whereas paramedics have potential for improvement. Skewed mission profiles make comparison of differences in triage precision counterproductive, but criteria or the use of them may contribute. However, the massive undertriage among paramedics is of grave concern as patients exposed to undertriage had increased risk of dying.

Since triage decisions may be influenced by multiple factors, including prehospital transportation distances, resources locally available as well as legal considerations there are no unanimous guidelines for field triage (Cone et al. 2004). A recent combined expert consensus and literature review resulted in an extensive report on the ACS-COT "Field triage decision scheme" (Sasser et al. 2009; Lerner 2006). This report recommended the systematic evaluation of trauma victims for physiological derangement, obvious anatomical injury, mechanism of injury, and pre-injury health status in order to identify those patients with highest probability of having sustained major trauma. In general, "vital signs" criteria are considered highly specific (i.e., when positive, the patient is a major trauma victim), but not very sensitive (i.e., if negative, the patient may still be a major trauma victim). Therefore, vital signs can never be utilised as the only field triage criterion. In the Oslo-study (Rehn et al. 2009), a Triage-Revised Trauma Score (RTS) < 12 in the emergency department reduced the risk for undertriage compared to RTS = 12 (normal value). However, the general tendency of failure to document physiological variables was confirmed as RTS was documented by anaesthesiologists in 64 percent of the patients compared to 33 percent among paramedics.

> *"…the detection of major trauma remains a challenge due to volatile evolution of symptoms, occult injuries, and the complexities of evaluating patients in the field."*

The Oslo-study also confirmed the link between utilising mechanism of injury as the single criteria for trauma team activation and excessive overtriage. Mechanism of injury was triage criterion in 34 percent of the cases, of which only 26 percent were major trauma victims. This resulted in overtriage of 74 percent.

Conclusion

Some under- and overtriage is inescapable, and trauma managers should prepare for handling mistriage most effectively. One promising contribution to efficiently identify patients subject to undertriage is to establish ED triage protocols as a safety measure. Further, by establishing a reduced trauma team that analytically evaluates patients with undecided injury panorama, the hospital recognises the complexity of evaluating patient in field by lowering the threshold for trauma team activation. This two-tiered system may contribute to reducing the undertriage rate while minimising the impact of overtriage. In our opinion, this is a beneficial combination. ■

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ETHICS OF TRIAGE

WHAT HAVE WE LEARNED FROM RECENT CRITICAL CARE PANDEMIC PREPAREDNESS PLANNING?

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In the past few years, the field of critical care has increasingly explored its role in disaster preparedness and its ability to respond to the needs of patients caught in a pandemic or those of mass casualties from natural disasters or acts of terrorism. Such considerations have required the field to discuss different models of ethical triage, their usefulness and implications for critical care. As such triage models have been developed they, in turn, invited deeper reflection of ethical and legal values and how they are used in clinical practice. Indeed pandemic planning has stimulated some of the most fascinating discussions of values, beliefs, liberty, professionalism, worth and the role of individualism in multicultural societies. Most of us have been fortunate that a full-blown pandemic and the mass disaster that comes with it has not hit us.... yet. Therefore it has not been possible to rigorously validate such models. Are we ready? What have we learned from all these discussions, debates and the near overwhelming of our ICU systems? What questions remain? Where are the new frontiers?

Triage Models

Critical Care triage models for pandemics have been developed over time, in stages, as various threats, either actual or perceived, have arisen. Most have turned initially to the ethical concept of utilitarianism, the survival of the greatest number, as their fundamental guiding principle (Christian et al. 2006; Powell et al. 2008; Hick et al. 2007; Devereaux 2008; Frolic et al. 2009). While the concept seems reasonable even in multicultural societies where beliefs regarding the use of life support, quality of life and death may differ, questions have arisen over whether utilitarianism is sufficient ground in and of itself upon which to base such high-stakes decisions. Furthermore how this maximal survival can and should best be achieved still remains controversial. Initial triage models combined utilitarianism with accountability for reasonableness and military triage schemes in their quest for a robust yet practical model (Christian et al. 2006).

These models sought to incorporate justice and fairness in the allocation of scarce resources by considering scientific criteria that reasonable minded people could agree with, by making such plans public, making them clear and easy to use in practice and by building in enforcement, accountability, and reassessments as the situation evolved. It is important to note that the scientific criteria were harshly based on medical criteria (Christian et al. 2006; Ministry of Health and Long-Term Care 2008; Utah Pandemic Influenza Hospital and ICU Triage Guidelines 2009). Exclusion criteria incorporated patients with Do Not Resuscitate orders, those with permanent irreversible cognitive impairment, incurable metastatic malignancy, severe burns, severe trauma, cardiac arrest, and presence of advanced disease with expected less than six month survival, end-stage organ failure. Triage was based on current medical population survival models e.g. SOFA scores and did not consider individual beliefs, values or patients' perception of quality of life.

In contrast, in current daily practice, how much consideration to give to "medical criteria" as compared to patients' wishes is often hotly contested. However critical care is a resource that should be used wisely all the time: it is expensive and its use has broad implications for the healthcare system as a whole and for the development and access to other important social programmes to help the most vulnerable in any given society. The creation of these triage models begs the question of why we cannot balance patients' wishes for life support with some arguably much less ruthless, yet still medical considerations of the likelihood of life support improving or slowing the deterioration

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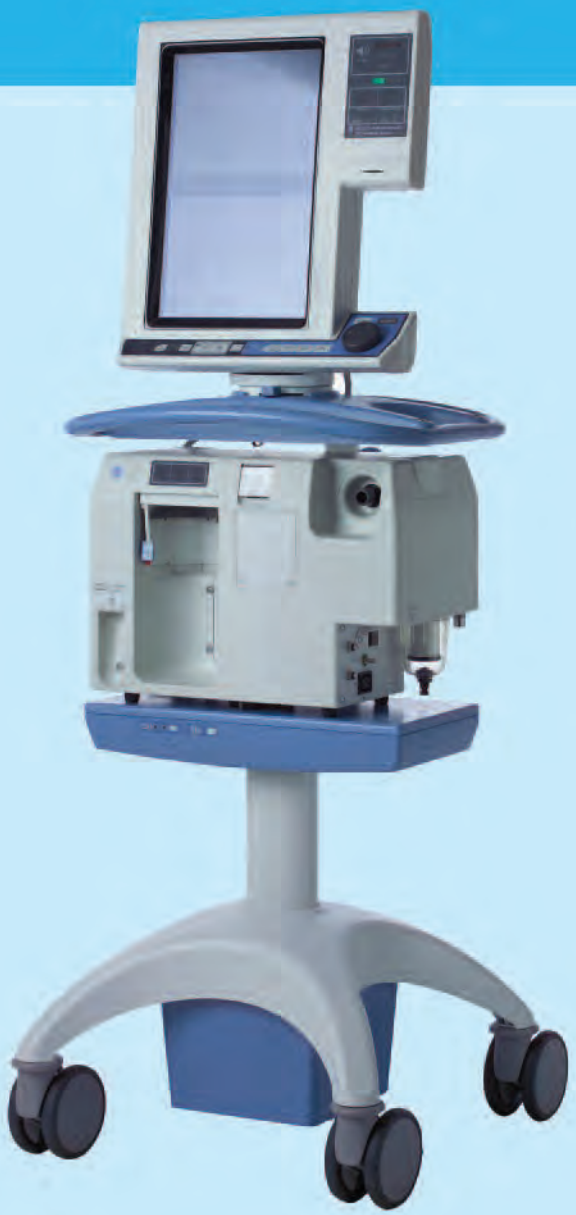

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in a patient's condition and/or well-being, whether the benefit the patient is expected to achieve will outweigh the harms and whether a less intrusive treatment may achieve the same result, in all decisions to initiate or continue life support. Are such considerations not crucial to good decision-making and to high quality patient-centered care?

Complex Decisions

As the threat of H1N1 influenza arose, many different groups rightly pointed out that existing triage schemes were still pretty "primitive" and that in practice further details would be required. For example what would happen if an ICU had five patients with the same level of priority for mechanical ventilation and only two ventilators? Secondary ethical criteria such as:

- Individual worth (e.g. importance to society, caregiver status, heroism, healthcare worker; workplace exposure; the concept of reciprocity; the existence of a multiplier effect - i.e. if you save the life of one person, he/she could save many others);
- Lottery (e.g. asking patients to choose a number from a hat);
- Fair innings (priority given to those who have not yet had opportunity for full lifespan);
- Rule of rescue (priority to those most in need);
- Conservation of resources; and
- First come, first served (priority based on arrival times) were then debated (NYS Workgroup on Ventilator Allocation in an Influenza Pandemic. 2007; The Pandemic Influenza Ethics Initiative Workgroup 2008; Frolic et al. 2009; Tabery et al. 2008; Vawter et al. 2009).

Interestingly, different groups have proposed different answers with some emphasising that importance to society in particular to maintaining government, law and order, healthcare, caregiver status, workplace exposure, fair innings, and multiplier effect must be taken into account somehow (Frolic et al. 2009; Vawter et al. 2009). The "how" remains elusive. How many in each group would need to be saved and who decides also remains generally obscure. Others have repudiated such claims and have said that the only secondary criteria that are justifiable, fair and amenable to use in the clinical setting is a lottery approach (e.g. flipping a coin). Still others have suggested a "first come first serve" response. Government and healthcare workers could be divided into shifts, similar to current military models, with a group of reserves that could be brought to active duty when needed. Yet is this thinking naïve? Can society really survive and overcome such a disaster if it doesn't maintain a number of key people in critical areas? Or would this create a new society with different values than we had before? Perhaps, the new society, if we are lucky and learn from the experiences, would ultimately be a more peaceful, compassionate and caring one.

> *"One of the most important, yet unresolved questions is: Can frontline ICU teams truly accomplish such a shift in their habitual mindset?"*

From Paper to Practice

While a change to a utilitarianism foundation may not seem, in principle, to be difficult to describe on paper, the decisions it would mandate in actual practice would be drastically different. This is a crucial point to grasp as such a philosophy asks that a detail-driven, intensely individual and patient-specific field, in which substantial human and technological resources are invested to save the life of one patient (especially when odds of survival are slim) – to shift its goals to societal or group survival. In other words, instead of directing the most energy to those in greatest need, such a focus would direct energy and resources to those who need our help the least. Such triage asks ICU teams to appreciate their own values and culture, and then to radically alter who they are at their core as professionals, as well as adjust their roles and responsibilities to their critically ill patients. One of the most important, yet unresolved questions is: Can frontline ICU teams truly accomplish such a shift in their habitual mindset? (Rottman et al. 2010) Can they perform mass triage effectively over potentially long periods of time? Decisions will result in life or death — literally and more acutely than in normal daily practice. Triage schemes have also asked us to confront who we are as individual healthcare professionals (Ruderman et al. 2006; Sokol 2006; Barr et al. 2008; Balicer et al. 2006), by reflecting on the extent of our duty to care and whether such a duty changes if we are married or single, a caregiver for relatives, pregnant or ill ourselves (Ruderman et al. 2006; Sokol 2006), etc… While the questions have not been easy to answer, it is to be hoped that the journey has helped us to learn about ourselves—the good and the bad— and to accept that limits exist, and it is necessary to define standards of professionalism in modern times.

Triage Teams?

To try to ensure such a shift to utilitarianism is achievable and decision-making consistent, some triage plans invoke the use of triage officers or teams who would be specially trained to make decisions to initiate, continue or withhold/withdraw life support. Yet little attention has been focused on who such people would be, whether they would need to have a healthcare background, what training, emotional and psychological supports they would need. How would such officers be held accountable for their decisions and how would consistency in decision-making be ensured? (Christian et al. 2006; The Pandemic Influenza Ethics Initiative Workgroup 2008) How would their personal safety be protected in an era

of increasing violence towards healthcare workers? Another issue that hasn't been extensively discussed is how would such officers gain and maintain the trust of individual ICU teams and the public especially as the basis of decision making is expected to evolve as more is learned regarding the nature of the illness, its course and response to treatments. Finally, how appeals regarding decisions could be made in a timely manner and to who have not been addressed. If in fact it is not possible to have an appeal or review of individual patients' care until after the pandemic has resolved, this would be poor consolation if the decision resulted in the loss of a loved one.

Communication and Role of the Media

Consistency, transparency and open communication regarding decisions are key to triage yet no attention has been paid to how these can be accomplished. Certainly, the worldwide media is very attuned to stories about potential and real pandemics. The degree of sensationalism we have seen in such reporting does not lead to faith in the media as means of accurate communication in times of greatest need. The role of ICU teams, hospital public relations and public health systems in messaging the public has become a little clearer over the past few years. Their integration regionally and worldwide is extraordinarily challenging and it is clear that the release of consistent messages will be crucial. The development of triage plans has highlighted the need to involve the media before any such situations arise. In this way, channels of communication can be formed and challenges anticipated and resolved. Both fields can provide valuable guidance on how they can help, and reflect on what standards of professionalism are required for its members in order not to engender fear or panic among the public.

Conclusion

Perhaps the most important thing triage planning has taught us is the need for integration like no other. In clinical practice we see the inter-relationships of human physiology and organ systems and what happens when one falls apart. Triage planning brings this imagery home for the healthcare system as a whole. From exploring surge capacity and needs through to actual triage, meeting the needs of patients cannot be done well unless the system functions with cooperation, goodwill and without silos. During the H1N1 pandemic, examples of unprecedented sharing and cooperation were plentiful. However work is still needed to ensure triage plans (from critical care through to public healthcare systems and palliative care) exist, that they make inherent sense, and that they all align (i.e. reflect same considerations of principles and values) on a hospital basis, regionally and globally. Triage planning has shown us what we can achieve with initiative, leadership and global cooperation—setting egos aside. Whether a pandemic hits or not, the challenge for everyone in healthcare is to never forget these broader principles and capabilities. ■

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CONVENTIONAL AND NON CONVENTIONAL INTERFACES FOR NON INVASIVE ESPIRATORY SUPPORT IN ADULTS AND CHILDREN

PART TWO: DESCRIPTIONS, ADVANTAGES AND CONTRAINDICATIONS

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Success or failure of non invasive respiratory support (NRS) treatment for acute respiratory failure (ARF) is often determined by the choice of the interface. This is mainly due to the strong effect of the interface on a patient's comfort. Furthermore, the interface choice can strongly influence the development of NRS drawbacks, such as air leak, claustrophobia, facial skin erythema, acneiform rash, skin damage, and eye irritation (Nava et al. 2009).

In the first part of this review, we discussed the role of conventional and non conventional interfaces in acute and chronic settings. In Part Two, we will describe interface currently being used in NRS and list the advantages and contraindictations of each.

Mouthpiece

Several types and sizes of mouthpiece are commercially available, to improve patient comfort and patient adherence to NRS. Standard narrow mouthpieces are available with various degrees of flexion, which are held by the patient's teeth and lips; and custom-moulded bite-plates. Oral interfaces are used, especially in North America, for long-term ventilation of patients with severe chronic respiratory failure due to neuromuscular disease, quadriplegia or cystic fibrosis. A recent study suggested that a mouthpiece, in spite of a higher number of asynchronies, was as effective as a full-face mask in reducing inspiratory effort in patients receiving NRS for ARF (Girault et al 2009).

Potentially, mouthpieces may elicit gag reflex, salivation, or vomiting. Long-term continuous use can also cause orthodontic deformities. Vomit aspiration is another potential complication, though so far that risk has only been theoretical. Mouth air leaks may be controlled with a tight-fitting lip seal while nasal pledges or nose clips can be used to avoid leaks through the nares.

Nasal Masks and Pillows

Although nasal masks are often the first choice for long-term ventilation they have also been used for acute hypercapnic and hypoxemic respiratory failure.

Nasal mask interfaces may be divided into the following:

- Full nasal masks (cover the whole nose);
- External nostril masks/nasal slings (applied externally to the nares);
- Nasal pillows or plugs.

Nasal pillows, like nasal slings, have less dead space than facial masks, are less likely to produce claustrophobia, and allow the patient to wear glasses. Nasal pillows offer advantages similar to those of nasal masks: allow expectoration, food intake, speech and reading without removing the mask.

The following lists the potential advantages and contraindications to nasal interfaces:

Advantages

- Less interference with speech and eating;
- Allows cough;
- Less danger with vomiting;
- Claustrophobia uncommon;
- No risk of asphyxia in case of ventilator malfunction;
- Less likely to cause gastric distension; and
- Less likelihood of causing skin breakdown (nasal pillows and nasal slings).

Relative Contraindications

- Leaks from the mouth during sleep;
- Edentulism;
- Nasal resistance > 5 cmH2O.

Absolute Contraindications

- Respiration from the mouth or inability to breath through the nose;
- Oronasal breathing in severe acute respiratory failure;
- Surgery of the soft palate.

Oronasal Masks

Oronasal masks (full-face masks) are the most commonly used for acute respiratory failure (ARF) both of hypoxaemic or hypercapnic origin, followed by nasal masks, total full-face masks, and helmets. Oronasal masks are preferred for patients with ARF because those patients generally breathe through the mouth to bypass nasal resistance. Recent engineering advances remarkably improved mask-face seal comfort and added quick-release straps and anti-asphyxia valves to prevent rebreathing in the event of ventilator malfunction. However the reasons for that preference were the nurses' and/or respiratory therapists' confidence, patient comfort, and minimisation of leaks and com-

plications. It has been found, in the acute setting of hypercapnic respiratory failure, that both nasal and ore-nasal masks performed similarly with regard to improving vital signs and gas exchange and avoiding intubation. However, the nasal mask was less tolerated than the oronasal mask in patients with acute respiratory failure (Kwok et al. 2003). Conversely, in another study in patients with acute on chronic hypercapnic respiratory failure treated with NRS, patient discomfort secondary to the interface was higher in the facial group although nasal group had a significant increase of mask failures.

However studies comparing two different interfaces cannot be blinded and it is impossible to eliminate bias. The decision to change masks was based on subjective opinion by the attending physician and not on objective criteria, and the use of different ventilators to deliver NRS could cause variations in outcome. A cephalic mask (total full-face mask or integral mask) has a soft cuff that seals around the perimeter of the face, so that there is no pressure on areas that an oronasal masks contacts. Compared to conventional full-face mask, a cephalic mask has a larger inner volume because it covers the entire anterior surface of the face. Its main advantage is that it limits the risk of deleterious cutaneous side effects during NRS. This mask also is of potential interest as an alternative to conventional masks for patients with skin breakdown or morphologic characteristics hindering adaptation to other interfaces. It has been found that nose comfort was better with the mouthpiece and the cephalic mask and that the cephalic mask has he same clinical efficacy and requires the same ventilatory settings as the oronasal mask during ARF. It also does not affect carbon dioxide clearance (Fraticelli et al. 2009).

Potential advantages and contraindications of oronasal and/or full-face mask for NRS compared to nasal masks are enlisted below:

Advantages

- Fewer air leaks with more stable mean airway pressure, especially during sleep;
- Less patient cooperation required.

Potential relative contraindications :

- Tetraparetic patients with severe impairment in arm movement in the home care setting.

Absolute contraindications (common to all interfaces during NRS):

- Vomiting;
- Claustrophobia.

The Helmet

The helmet has a transparent hood and soft (polyvinyl chloride or silicon) collar that contacts the body at the neck and/or shoulders. A helmet has at least two ports: One through which gas enters, and another from which gas exits. The helmet is secured to the patient by armpit straps. All the helmets on the market are latex- free and available in multiple sizes.

Recent engineering improvements gave helmets more comfortable seals, better seal against leak, and anti-asphyxia valves to limit rebreathing in the event of ventilator malfunction.

Helmets were originally used to deliver an accurate oxygen concentration during hyperbaric oxygen therapy. The United States Food and Drug Administration has not approved any of the available helmets, but helmets have been approved in many European countries.

Potential advantages and contraindications of helmets for NRS compared to oronasal and/or full-face masks are:

Advantages

- Less resistance to flow coming from CPAP flow generator or from the ventilator;
- Can be applied regardless of the facial contour, facial trauma, or edentulism;
- Allows coughing;
- Less need for patient cooperation;
- Better comfort;
- Less interference with speech;
- Securing system has lower risk of causing skin damage.

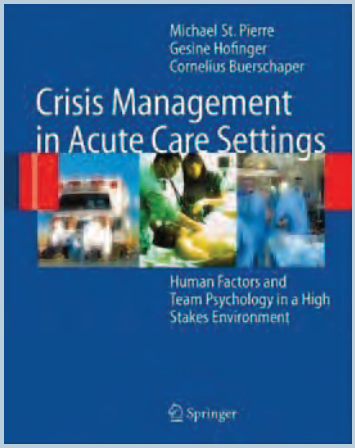
Relative contraindications

- Need for volume monitoring;
- Patient with high respiratory rate and short inspiratory time.

BOOKS IN REVIEW

Crisis Management in Acute Care Settings: Human Factors and Team Psychology in a High Stakes Environment

Authors: Michael St. Pierre, Gesine Hofinger and Cornelius Buerschaper



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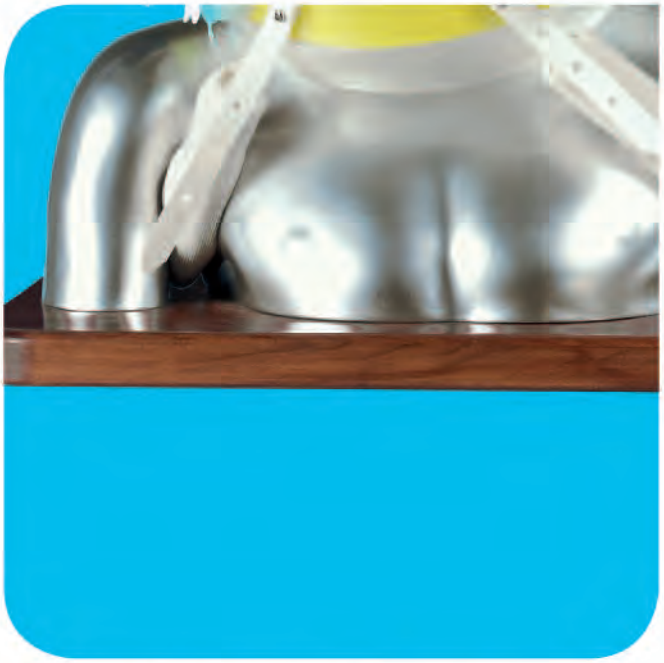

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Absolute contraindications

- Claustrophobia;
- Tetraplegia.

The helmet has been also proven to be effective and efficient when used outside the ICU (Cosentini et al. 2010; Squadrone et al. 2010).

NRS in Infants and Children

In children hypoxemic respiratory failure mainly occurs in disorders characterised by parenchimal pathologies, such as bacterial and viral pneumonia as well as by airway obstruction, such as bronchiolitis and status asthmaticus (Calderini et al. 2010). Actually there is a lack of well-designed, controlled experiments of nPPV in children with acute hypoxemic respiratory failure. However there are some indications suggesting that nPPV may reduce respiratory rate and heart rate within one hour and reduced tracheal intubation by 47 percent as compared to standard therapy (Yanez et al. 2008). It turns out that patient-ventilator asynchronies frequently occur when nPPV is used and nCPAP by helmet could represent a valid alternative in non-hypercapnic patients. nCPAP has been shown to be effective in the early treatment of acute severe bronchiolitis (Fauroux et al. 2005). Nasal CPAP with either gas mixture (air-oxygen or heliox) may be safe and effective in ameliorating gas exchange and respiratory pattern in this population. Furthermore, when heliox is used in place of an air-oxygen mixture the level of improvement of the clinical scores and transcutaneous PCO2 was almost doubled (Martinon-Torres et al. 2008).

Immunosuppressed children have been regarded as having a poor outcome, particularly when tracheal intubation and conventional mechanical ventilation for respiratory failure is required. Thus nPPV may play a relevant role in this setting (Piastra et al. 2009).

In children, the interfaces more frequently used are facial masks, moulded masks and modified nasal cannulae, and in some cases full-face masks, but nasal masks seem to be the preferred type, particularly in younger children. Nasal cannulas and nasal masks are easy to use and keep in place but are highly flow resistive and associated with mucosal bleeding, excess of nasal secretion with nares obstruction. Nasal mask is associated with large air leaks from mouth leading to airway depressurisation and interruption of respiratory treatment. Facial mask has the advantage to limit oral leak but can increase the number of failures due to patient discomfort from tight fitting masks, facial skin breakdown and difficult positioning. The transparent paediatric helmets, made of polyvinyl chloride, have been recently proposed as a possible alternative to masks with better tolerance and reduced need of sedation (Chidini et al. 2010a; Chidini et al. 2010b). However a monitoring of inspired oxygen fraction, pressure and temperature is mandatory even in PICU setting. New options have been recently tested to improve the efficiency of helmets to unload the respiratory system muscles, avoiding the use of a ventilator, thus likely minimising CO_2 rebreathing and patient ventilator asynchronies (Moerer et al. 2009; Isgrò et al. 2010).

Conclusion

A wide "armamentarium" of conventional and non conventional interfaces may lead to NRS success both in acute and chronic settings. Oronasal and total full-face masks should be considered the first option in patients with ARF, especially if nPPV is required. Practically, a full face mask or a total full face mask should be the first-line strategy in the initial management of hypercapnic acute respiratory failure with NRS. Differently, in mild ARF we recommend trying a nasal mask first which is better tolerated, or nasal pillows, which is less likely to cause skin damage. In the long term setting nasal mask ventilation and mouthpiece play a major role. Oronasal interfaces as well as tailored made to measure mask may be used in selected case as in chronic mouth breather and children with anatomical difficult profile.

However, the helmets should be considered in special cases, and especially in infants and children with ARF needing CPAP. Helmet CPAP with continuous flow devices may be an appealing approach taking into account the related problems with CO_2 clearance.

Physicians must bear in mind that, when switching from CPAP to nPPV, helmet mechanical property must be considered to obtain effective patient muscle downloading. ■

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USEFULNESS OF BIOMARKERS IN THE CLINICAL DECISION MAKING PROCESS IN SEPSIS

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Why are Clinicians using Biomarkers more Frequently?

The criteria to define the presence of sepsis (Levy et al. 2003) as well as to evaluate its clinical severity are not satisfactory since the signs and symptoms of sepsis are poorly specific and highly sensitive. Even more difficult than the diagnosis, is the monitoring of infection response to antibiotics (Povoa 2008). Currently the assessment of response relies on the resolution of the same criteria used in the diagnosis, however it may not be completely reliable as some clinical and radiologic variables can be influenced by non-infectious factors. Besides, the observation that a prompt and structured approach of severe sepsis and septic shock has a marked impact on prognosis urged the research on new tools of sepsis diagnosis even further (Marshall et al. 2009).

Since the inflammatory cascade plays a central role in the host-pathogen interaction and in the infection control mechanisms, these mediators have been successively assessed as potential biomarkers of infection. By definition, an ideal biomarker of infection should be absent if the patient is not infected, appear concomitantly and ideally precede the infection and disappear with successful therapy or remain elevated if infection is refractory to treatment (Povoa 2008). Whereas in myocardial infarction, 14 biomarkers are suitable for its diagnosis and prognostic assessment, in the complex field of sepsis more than 170 potential biomarkers have been studied and unfortunately the ultimate biomarker has not yet been identified (Pierrakos et al. 2010).

What are the Questions we want to ask a Biomarker of Sepsis?

Biomarkers are measures of molecular, biochemical or cellular levels that represent changes in the normal physiologic status. Biomarkers of sepsis indicate that the host has been exposed to an infectious pathogen, bacterial, fungal, viral or parasite, as well as the magnitude of the response to that infection.

At the bedside, clinicians are faced daily with the two frequent dilemmas: (1) Whether a patient is infected or not and (2) If the response to antimicrobial therapy is adequate.

In the presence of a patient with systemic inflammatory response syndrome (SIRS), particularly if associated with organ dysfunction, clinicians must consider the severity and site of the infection as well as the most probable agent and likely sensitivity patterns.

In addition, clinicians need to monitor infection response to antibiotics as well as to ascertain the duration of antibiotic therapy, thus raising two additional questions:

1. Is the infection refractory to therapy? Should I change the antimicrobials?

2. Is the infection cured? Can I safely stop antimicrobials?

Despite their importance, these questions are currently those most frequently cited by clinicians as 'impossible to answer with absolute confidence'. Biomarkers can be useful in some of these questions but the evaluation of their clinical performance is further complicated by the absence of a "gold standard" for the diagnosis of sepsis (Pierrakos et al. 2010).

What are the Questions Biomarkers Can Answer?

In the last 20 years, the research of biomarkers of sepsis has increased markedly. However, the great majority of studies evaluated their utility just in the assessment of prognosis. Biomarkers have a limited value

if they are employed just to see if a patient has a high risk of dying when the attending physician is unable to change that prognosis. In opposition, we consider a biomarker useful if they provide additional information to a detailed clinical evaluation. In the context of infection and sepsis, biomarkers can potentially provide the following additional information:

1. Screening;
2. Diagnosis;
3. Risk stratification;
4. Monitoring response to therapy; and
5. Antibiotic stewardship.

In this article we discuss recent data on the role of biomarkers of sepsis, in particular procalcitonin (PCT) and C-reactive protein (CRP), in the Diagnosis and Antibiotic stewardship.

Diagnosis

Both single as well as serial measurements of biomarkers have been evaluated in diagnosis, in a variety of infections as well as in clinical settings, namely emergency departments, medical and surgical wards and intensive care units (ICUs). However, the results are, at times, contradictory. This is a consequence of the choice of different methodologies, namely in inclusion and exclusion criteria, used for the selection of patients to be evaluated and analysed (Simon et al. 2004; Tang et al. 2007).

In most studies, patients were included if they presented with SIRS and were subsequently stratified according to the American College of Chest Physicians/Society of Critical Care Medicine (ACCP/SCCM) Consensus Conference criteria into sepsis, severe sepsis and septic shock (Levy et al. 2003). Such methodology could result in an assessment of clinical severity rather than the evaluation of the diagnostic accuracy of the biomarker in infection itself. The "gold standard", which should be presence of documented infection, that is patients with a defined source of infection with positive cultures, as opposed to patients with no infection and no antibiotic therapy is frequently ignored (Cohen et al. 2001).

Several studies have assessed the diagnostic performance of infection of a single measurement of a biomarker in different clinical settings and different infections (Table 1). In clinical practice, a markedly elevated serum level of a biomarker, e.g. CRP levels >5-10 mg/dL, may help to confirm the diagnosis of sepsis. Concerning PCT, the major limitation in diagnosis is the frequent finding of patients with documented infections with very low or even undetectable levels. This is particularly true in infections considered by the manufacturer to be "localised", like empyema or abscesses (Christ-Crain et al. 2010).

At the bedside, clinicians should always consider the possibility of a false-positive test because inflammatory stimuli other than bacterial infection can occur in critically ill patients, particularly during the first 72 hrs of postoperative course and major trauma. Notwithstanding, usually these later conditions are usually easily diagnosed and identified as causes of biomarker elevations whereas changes in biomarker concentrations without an obvious reason can usually be caused by the emergence of infection and sepsis that are frequently silent in the beginning (Povoa 2008).

Since biomarkers are not static but on the opposite dynamic, with marked changes in serum concentrations over time, serial measurements could be more informative. Our group demonstrated that daily CRP determinations are useful as a marker of infection prediction in ICU patients admitted for longer than 72 hrs. During the five days before the day of infection diagnosis CRP showed a steady and significant increase in infected patients, whereas in noninfected patients CRP remained almost unchanged (Povoa et al. 2006) (Figure 1). Patients, who presented a combination of a maximum daily CRP change higher than 4.1 mg/dL plus a concentration above 8.7 mg/dL, had an 88% risk of ICU-acquired infection.

In a cohort of mechanically ventilated patients (Luyt et al. 2008), absolute PCT values

	CRP				PCT			
	AUC	cut-off	sensitivity	specificity	AUC	cut-off	sensitivity	specificity
Ugarte (1999)	0.78	7.9	71.8	66.6	0.66	0.6	67.6	61.3
Chan (2004)	0.88	6.0	67.2	93.9	0.67	0.6	69.5	64.6
Sierra (2004)	0.94	8.0	94.3	87.3				
Póvoa (2005)	0.93	8.7	93.4	86.1				
Gaïni (2006)	0.83	5.0	73.6	74.6	0.77	0.1	71.6	62.7
Kofoed (2007)	0.81		86	60	0.72		80	58
Jung (2010)					0.45	0.5	54	39
Ingram (2010)	0.97	20.0	100	87.5	0.88	0.8	100	62.5

Table 1. Diagnostic accuracy of infection of C-reactive protein (CRP) and procalcitonin (PCT)

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as well as its kinetics over five days before clinical suspicion of pneumonia has been shown to have poor diagnostic accuracy for ventilator associated pneumonia (VAP) (AUC 0.51 and 0.62, respectively). More recently, two studies found that the diagnostic value of PCT to assess early onset pneumonia is poor in post-cardiac arrest hypothermia patients. In one study (Schuetz et al. 2010), PCT showed a steady decrease until day seven without differences in patients with and without presumed infection whereas CRP was significantly more elevated in patients with pneumonia.

"Biomarkers have a limited value if they are employed just to see if a patient has a high risk of dying when the attending physician is unable to change that prognosis. In opposition, we consider a biomarker useful if they provide additional information to a detailed clinical evaluation..."

Antibiotic Stewardship

The decision to start and stop antibiotics is probably one of the most frequent and difficult decisions at the bedside. In addition, the recommended durations of antibiotic therapy of the majority of infections are not based on data from randomised trials.

Two studies have demonstrated in VAP, that the implementation of a discontinuation antibiotic policy (Micek et al. 2004) as well as a fixed antibiotic duration (Chastre et al. 2003) could significantly decrease the duration of antibiotic therapy to 6 and 8 days, respectively, in comparison to traditional and longer antibiotic durations of the control groups, 8 and 15 days, respectively, without any differences in outcome. It is important to emphasise that both studies were conducted without the use of biomarkers!

Several original trials showed that the use of PCT in different infections, lower respiratory tract infection, acute exacerbation of chronic bronchitis, community-acquired pneumonia (Christ-Crain et al. 2006) and VAP (Stolz et al. 2009), could safely decrease the rate of antibiotic prescription and the duration antibiotic therapy. However, these analyses were markedly biased by the very long antibiotic therapies of the controls. In ProCAP (Christ-Crain et al. 2006), ProHOSP (Schuetz et al. 2009) and ProVAP (Stolz et al. 2009) trials, the control groups were on antibiotics for 12, 10 and 15 days, respectively!

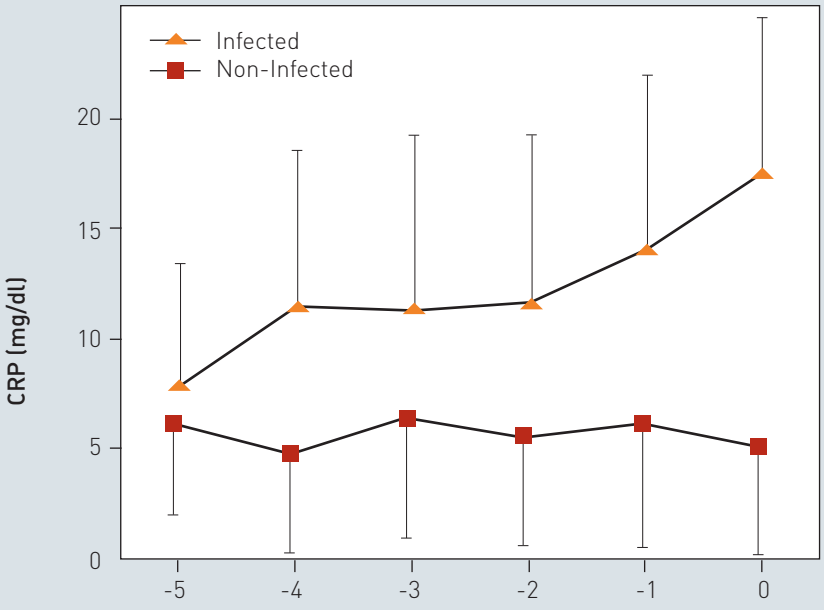
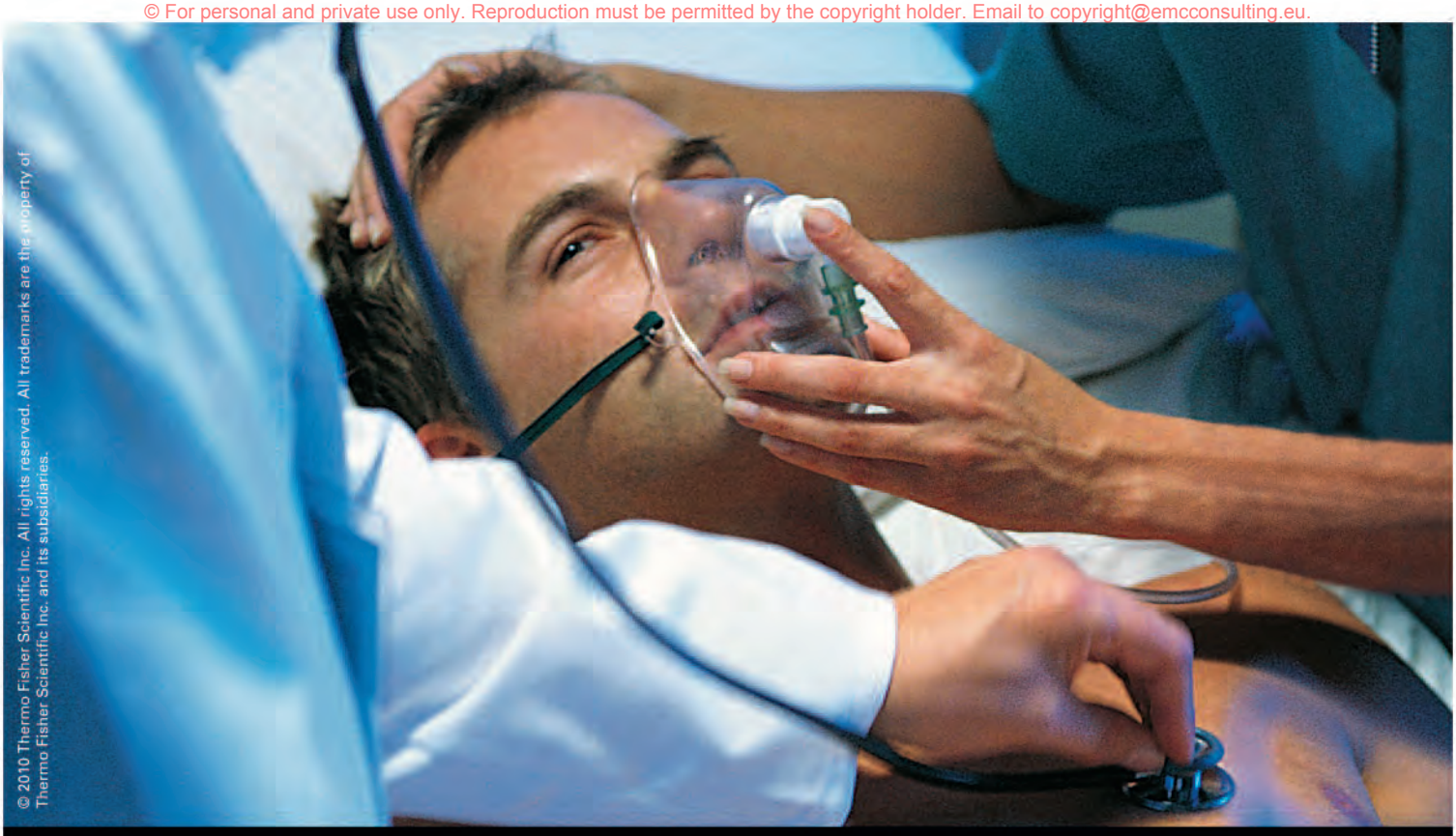


Figure 1. C-reactive protein (CRP) progression before infection diagnosis. The time-dependent analysis of CRP (mean ± standard deviation) from day -5 to day 0 of infected patients and noninfected patients is presented. The CRP course clearly differentiates infected patients from noninfected patients (P ← 0.001). Patients, who presented a combination of a maximum daily CRP change higher than 4.1 mg/dL plus a concentration above 8.7 mg/dL, had an 88% risk of ICU-acquired infection (Povoa et al. 2006).

In the ICU setting, several trials have been recently published assessing the role of PCT-guided antibiotic therapy (Bouadma et al. 2010; Hochreiter et al. 2009; Jensen 2009; Nobre et al. 2008). With one exception (Jensen 2009), PCT-guided group showed a significantly lower duration of antibiotic therapy and smaller antibiotic exposure. However, there are several caveats in these studies that need to be discussed. In two trials (Hochreiter et al. 2009; Nobre et al. 2008), more than 70 percent of the eligible patients were excluded for reasons that were difficult to accept since they are common in ICU setting, namely Pseudomonas aeruginosa infection. In the PRORATA trial, there were significant rates of protocol violations in the PCT-guided group (Bouadma et al. 2010). In 71.2 percent of the episodes of clinical decision, the attending physicians did not follow PCT-guided recommendations for several reasons. At inclusion, 69 infected patients had PCT<0.5µg/L, but in 94 percent the attending physician prescribed



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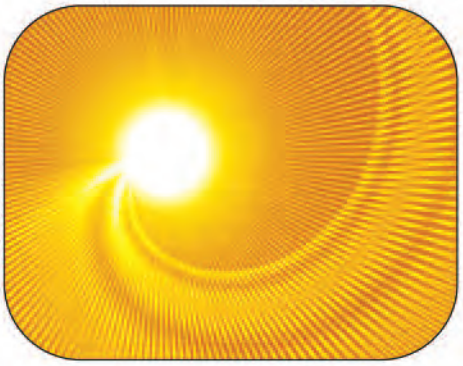

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antibiotics against the recommendations. In follow-up, antibiotics were stopped in 39 pts with PCT>0.5μg/L, since they were considered clinically cured also against the recommendations; in 111 patients, antibiotics were maintained even after discharge (N=32) and in 79 unstable patients despite a PCT<0.5μg/L (Bouadma et al. 2010). Finally, two trials (Bouadma et al. 2010; Jensen et al. 2009) demonstrated that patients from the PCT-guided groups presented more organ dysfunction and failure, in particular late failure.

In a pragmatic, 2x2 factorial, cluster randomised trial in which two interventions were tested, availability of a CRP test and/or training in communication skills, clearly showed that availability of a CRP test could significantly decrease antibiotic prescription (Cals et al. 2009). This result is noteworthy since this study was performed in The Netherlands, which is the European country with the lowest antibiotic prescription in the community.

Conclusions

The ideal biomarker has not yet been identified. Unfortunately, multiple biomarkers correlate only with mortality and few add additional valuable information that can be useful in the clinical decision making process at the bedside. Among all known biomarkers probably PCT and CRP are those with more solid data. Is it time yet to use biomarkers in sepsis? The answer is clearly yes but NEVER to be used solely, always in conjunction with a complete clinical evaluation and with a perfect knowledge of its biology, strengths and limitations. ■

'The real voyage of discovery is not in seeking new lands but in seeing with new eyes'
Marcel Proust

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IS HOSPITAL DOWNSIZING AN EFFECTIVE WAY TO CONTROL HEALTH EXPENDITURE?

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Hospital downsizing is a phenomenon characterising almost all western economies in the last decades, from US to Europe. As a matter of definition, downsizing policy is related to a reduction in the total number of acute care beds, generally pursued by Central or Regional governments imposing crude ratios of beds per population, which are not based on any empirical supporting evidence on real healthcare needs. This massive ongoing restructuring of the hospital industry has to be understood in the framework of changing population needs – an ageing population increases the demand for long-term care with respect to the past – and a search for a more efficient healthcare provision aiming at controlling health expenditure growth, as hospital costs represent the most relevant share of total spending.

As for the control of health expenditure growth, an important issue to be discussed concerns the reaction of hospital managers to the beds reduction imposed by the government, in particular in terms of workforce management. Indeed, while in the US bed downsizing has been typically accompanied with a medical staff reduction, in other countries - such as the European ones - the restructuring has been limited mainly to beds. In this article we try to understand whether this latter policy is effective in reducing hospital costs, or it generates potential inefficiencies that require paying more attention also to workforce management.

Hospital Downsizing Italian Style

To discuss the effectiveness of controlling health expenditure using hospital downsizing as a policy tool, here we concentrate on Italy, one of the countries where bed reductions was more severe. Italy is characterised by a National Health Service, which is a universalistic public scheme covering a wide array of health risks in place since 1978. Total public expenditure outstripped 100 billion euro in recent years, reaching about seven percent of GDP, a figure less than other comparable western countries, like Germany, France, and the UK. Given pressures on public finances coming from European constraints, particularly severe during the nineties (because of the Maastricht Treaty), Italian governments tried to establish a tight control on health expenditure with a number of different policy measures. Given the regional responsibility for the management of healthcare services, a naive form of fiscal decentralisation to Regions has been introduced, in order to curb regional expectations of bailouts. Bed downsizing needs to be understood in this framework, as a way to design a more effective and less costly NHS.

The way Central government pursued downsizing was by using beds to population ratios. In 1980, according to OECD data, the hospital network was characterised by eight bed per thousand inhabitants; the Law 595/85 defined the standard of six acute care beds per thousand population. The Laws 537/93 and 549/1995 further reduced this standard, by fixing the new one at 4.5 acute care beds per thousand, plus 1‰ bed for rehabilitation and long term care. After year 2000, the standard has been changed two more times. In 2001, the acute care beds should not exceed the number of four per thousand inhabitants, plus again 1‰ bed for rehabilitation and long-term care. In 2005, after an agreement between the Central government and the Regional governments, the standard is fixed to 4.5‰ beds without any distinction between different types of beds. Despite these centrally defined mandatory standards since 1985, regional differences were marked in 1996 (the first year we do have data on different types of beds in Italy), and still persist at least to some extent also in 2005 (Figure 1).

If the evolution of the number of beds is clear, the evolution of the workforce followed a completely different pattern. Indeed, despite turnover was blocked several times starting from the Nineties, the number of medical staff (physicians and nurses) out of the number of ordinary beds shows a steady increase, from 1.82 in 1996 to 2.85 in 2005 (Figure 2). How can we rationalise this sharp change? One first possibility is that the quality of care improved during this period. A

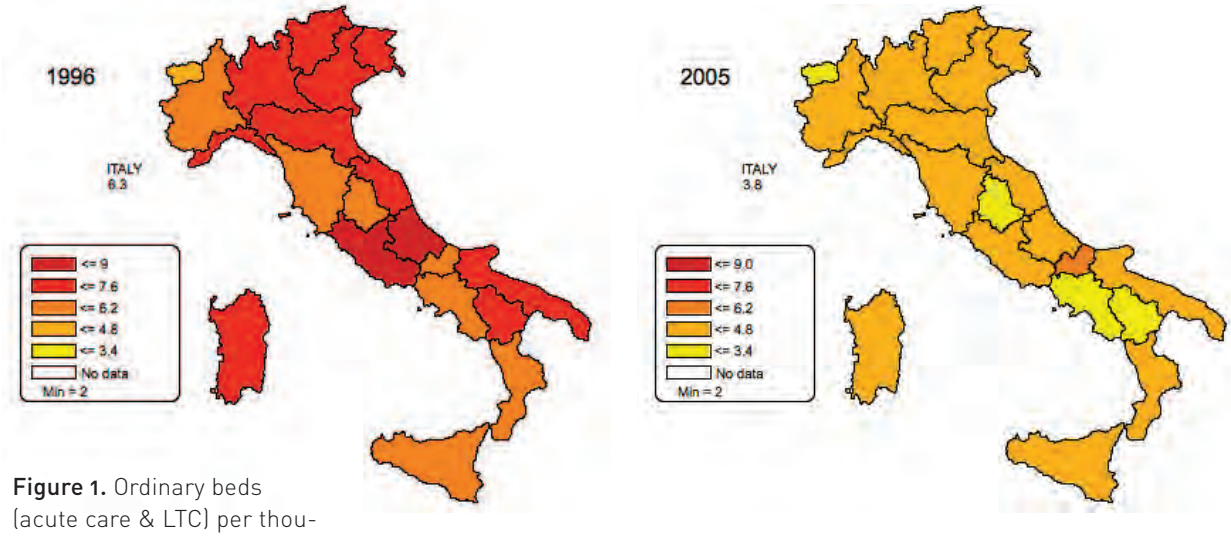

Figure 1. Ordinary beds (acute care & LTC) per thousand population (1996-2005)

Source: ISTAT – Health for All

second related explanation is the increase in the need of care: if hospitals are to be limited to cure acute patients, then the complexity (and the associated need of care) necessarily increases. Of course, there is a third possibility: namely, that workforce was not managed properly after downsizing, so that there are potential inefficiencies to be exploited in order to cut expenditure.

Simple Economics: the Elasticity of Substitution in Hospital Services

Definition of input elasticity of substitution

According to standard applied microeconomics, the usual way for assessing the flexibility in managing the different resources within a given production process and the efficiency of substantial changes in the input mix – e.g., in the ratio between medical staff and beds – relies on the statistical estimation of a cost function model for the firms included in the analysis and the computation of the related elasticities of substitution for the different input pairs. A cost function is a mathematical relationship between production costs – on one side – and output levels – on the other side, where the firm is assumed to minimise the cost needed to provide each amount of production, adopting a given technology and facing given prices for the production factors. Parameter estimates from this model can be exploited to derive important measures of technological characteristics, such as - among the others - input substitutability.

There are different concepts of elasticity of substitution available for the analysis of the flexibility in managing inputs, i.e., Allen, Morishima and Shadow elasticities. Generally, all these measures aim at assessing, for each couple of productive factors, how the input mix reacts to a change in the input price ratio, which modifies the relative convenience in using the two factors. For instance, considering the particular topic we are discussing here, these measures assess how the "medical staff-beds" mix responds to an increase (or a decrease) in the average wage of physicians and nurses compared to the average cost of beds. Estimated values for such elasticities very close to zero indicate a quite rigid technology, with difficulties for managers in substituting between inputs, and highlight potential cost inefficiencies in managing downsizing processes focusing only on the reduction of a particular factor (e.g., the number of beds), while maintaining unchanged the usage of other inputs (e.g., the number of physicians and nurses).

Evidence available for hospital industry

In the context of hospital industry, the strand of empirical studies investigating input substitutability is rather scant and mostly based on U.S. data, where the provision of healthcare services is prevalently managed by private hospitals and financed with private funds. Overall, the available evidence points to a very low degree of substitution between beds and medical staff, both for nurses and physicians, suggesting that bed downsizing should be accompanied by a proportional workforce reduction in order to avoid wastes of resources. However, it is important to test whether this result holds also in Europe, where – differently from U.S. – there is a prevalence of public producers and public funding in healthcare provision, and the process of restructuring of hospital industry has been limited mostly to bed downsizing, causing a large increase in medical staff per bed. The study by Piacenza, Turati and Vannoni (PTV) in 2010, provides the first evidence on input substitutability in the European context, relying on the estimation of a cost function model for a representative sample of public hospitals in Italy.

Main findings for hospitals in Piedmont

The data used in the analysis refer to all the public hospitals operating in the Local Health Units of Piedmont (Regione Piemonte), a highly industrialised area in North-Western Italy representing one of the 21 administrative entities that are responsible for the Regional Healthcare Systems. The full sample is a panel of 29 productive units observed over the period 2000-2004. The estimated cost function is based on a very general mathematical specification (the Generalised Composite1) and includes the total annual

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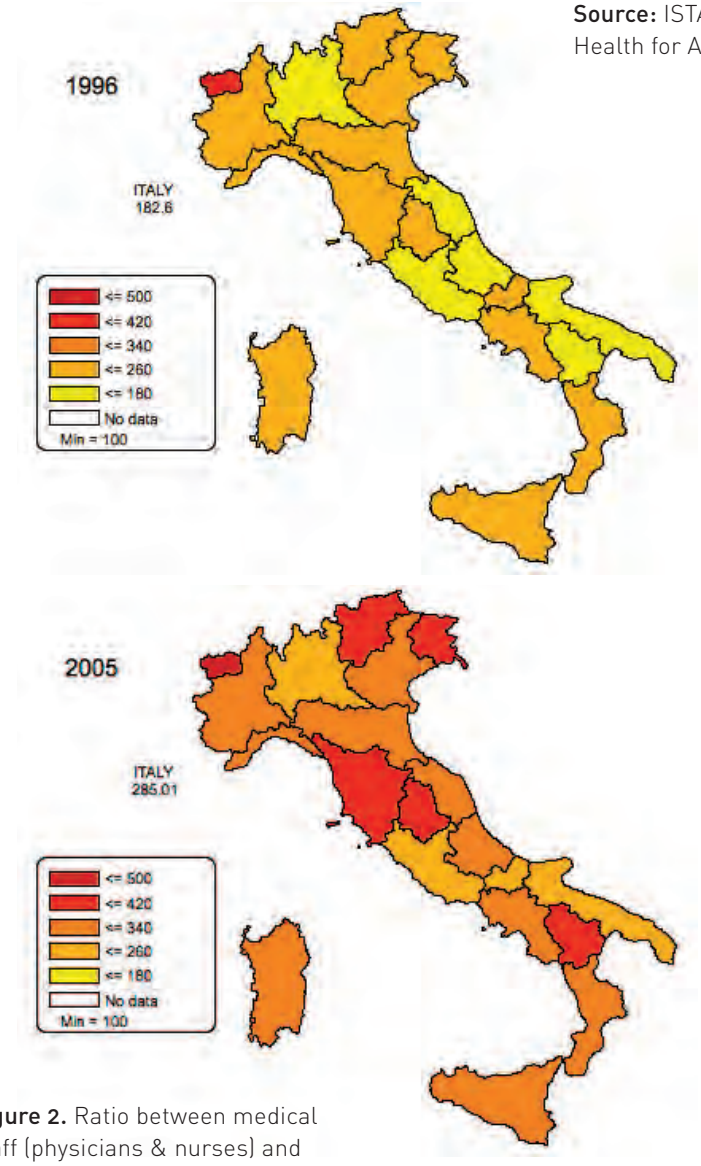

Source: ISTAT – Health for All

Figure 2. Ratio between medical staff (physicians & nurses) and ordinary beds (%, 1996-2005)

number of patients (both inpatients and outpatients) as output indicator and the sum of the operating costs associated to the inputs more closely related to the production of healthcare services as dependent variable: labour – distinct in medical staff (physicians and nurses) and other residual workers (technicians, professional and administrative staff), drugs, and beds – usually adopted as a proxy for the capital stock in the empirical studies on hospital efficiency. Moreover, a variable measuring the average DRG weight is introduced in the model, in order to control for the role played by the severity of illnesses and the composition of the production volume. The robustness of the results is also tested by extending the analysis in several directions, so as to consider some critical issues not tackled in the basic model (e.g., the potential reduction of operating costs following an increase in the number of outpatients beds).

Looking at the estimates of input substitutability – assessed using all the available concepts (i.e., Allen, Morishima and Shadow elasticities) – the evidence obtained highlights that substitution possibilities in the production of hospital services are in general very limited. This is especially true for the input pair "medical staff-beds", for which the measure of Shadow elasticity computed at mean values of the output (22,072 annual patients) and average DRG weight (1.12) is 0.14 (not statistically different from zero at 10 percent of significance level), meaning that a 10 percent increase in the price of capital relatively to the average wage of physicians and nurses implies the ratio of medical staff to beds to rise by 1.4 percent only. Notice also that considering output volumes higher than the sample mean - for instance a tripled production (66,216 annual patients) - it emerges a slight decrease of the substitutability between medical staff and beds, when increasing the complexity of treated patients from 0.56 up to 2.24 average DRG weight. The latter finding is consistent with a more marked rigidity of the production process starting from high levels of output.

Conclusions

Overall, the results from PTV (2010) on Italian hospitals confirm previous evidence on small input substitutability obtained in the literature on North-American countries, thus validating the difficulties for hospital managers to substitute between productive factors, in particular between medical staff and beds. This technology rigidity casts some doubts on bed downsizing policies as an effective tool for controlling hospital costs and public healthcare expenditure in countries, like the European ones, where the share of public providers and public funding is significantly higher than in the U.S.

A restructuring of the hospital industry limited to the cut of the number of beds, without properly managing also the workforce to avoid excess staffing – such as the downsizing carried out in Italy during the last decades – is likely both to limit the production possibilities and to preclude potential savings in operating costs. The latter could be effectively exploited, for instance, by re-allocating the medical staff in excess after beds reductions, from the hospitals towards the provision of other health services on the territory, such as home and community care. ■

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MANAGING CLINICAL COMMUNICATION FOR PATIENT SAFETY: THE PACT PROJECT

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The clinical handover process is an integral component of patient care. Communication between clinicians regarding a patient's condition, treatment plan and care is directly related to the quality of health outcomes and systems success. Poor communication has been implicated as the leading cause of medication errors, delays in treatment, perinatal deaths and injuries, patient falls and wrong site surgeries. A study by the Joint Commission on Accreditation of Healthcare Organisations in the United States found that communication errors were the root cause of almost 70 percent of all sentinel events, with 75 percent of patients involved dying (2008).

Effective communication is a complex concept requiring skill, insight, cognition and understanding. Although used frequently in day-to-day care, it remains a skill that must be learned, practiced and refined by all clinicians. Healthcare providers need to learn how to communicate in a clear, concise and appropriate manner within hurried, noisy and frantic healthcare environments.

Variations and inconsistencies in handover practices together with an apparent lack of best practice guidelines contribute to increased risk for patients and interruptions to the continuum of care. With this in mind, the PACT project was designed to develop, implement and evaluate for improvements in clinical communication.

The Setting

The project took place during 2008 in a regional, private hospital in south-eastern Australia. The 103 bed hospital provides acute inpatient and outpatient medical, surgical and mental health services to a predominantly rural catchment area within a radius of 150 km.

There were particular challenges in this setting:

- No resident medical officers on site;
- Nurses have to communicate directly with specialists;
- Poor mobile telephone coverage, and
- High proportion of part time, on call and junior nursing staff.

The PACT Project

The key objective of this project was to improve communication and increase patient safety by the development, implementation and evaluation of formalised tools and education processes for clinical handover. This initiative was entitled 'The PACT Project', to convey the essential elements of effective clinical handover.

P - Patient Assessment. Nurses must have the skills to conduct an effective patient assessment, particularly for patients whose condition is deteriorating.

A - Assertive Communication. Assessment findings must be communicated clearly and completely to other clinicians to ensure patient safety

C - Continuum of Care. Patient safety must be maintained by the timely, accurate and complete transfer of responsibility for patient care from nurse to nurse and shift to shift.

T - Teamwork with Trust. All healthcare providers regardless of their position and experience have the right to speak up and express their concerns or opinions about a patient in a trusting and respectful team environment.

A project team (the authors) was established to guide the development, implementation and evaluation phases of the initiative. A critical reference group (PACT champions) of seven experienced nurses from the wards met regularly with the project team. They promoted the project to ward staff and reported views and opinions of nurses on the floor back to the team.

The project team kept staff informed of progress through monthly PACT newsletters, posters and notice boards located in wards and the staff dining room. All project materials were coloured bright pink to provide a visual reminder of the PACT message.

Baseline Data

Questionnaires were designed by the project team to determine opinions of nurses and specialist doctors about the effectiveness of clinical handover and information exchange between nurses and other healthcare providers. In total, 49 nurses (response rate

54%) and 16 specialists (response rate 73%) responded. The results supported the belief that improvements in clinical handover were needed at the hospital. Key figures were:

- 94% identified that different nurses give handover in different ways;
- 82% stated that a standardised way of giving handover was needed;
- 85% believed that improvement was needed in the way nurses communicate with each other;
- 86% agreed that improvement was needed in the way that nurses communicate with specialists; and
- 60% wanted to deliver handover more effectively.

Implementation

All nursing staff attended one-hour workshops on assertive communication and patient assessment, primarily focused upon early recognition of the deteriorating patient. Workshops were mandatory and staff were paid to attend. Presentations were interactive and covered both theory and the lived experiences of staff, highlighting from their own practice examples of good and poor communications.

Two communication tools developed by the project team became the cornerstones of the project (Figure 1). The first was a handover prompt card, which provided a template for standardising shift to shift handover. The prompt card was designed to provide a structured, standardised format for handover by establishing a sequence for information transfer, making it easier for staff to identify if information was omitted. The bright pink handover prompt cards attached to staff identity badges, ensuring they were always available.

The second tool was a communication template or script, to be followed when nurses contacted specialists by telephone about deteriorating patients who required review. This template used a hybrid of the bullet point communication style favored by doctors and the descriptive narrative preferred by nurses. The format helped nurses to structure their

communication to facilitate listening and comprehension. It prompted staff to assess the patient, gather pertinent information and be prepared for questions the doctor may ask. There is space to record doctor's orders and any follow up required. Once completed, this form becomes part of the medical record.

Outcomes

For Staff

The tools were evaluated using action research (four competed cycles) and amended as a result of staff feedback and evaluation. Staff identified the value of the tools for ensuring accurate, consistent handovers and keeping staff on task when delivering handover, especially if they were tired at the end of a long shift.

A post implementation survey of nurses showed that:

- 68% stated that they now always get the information they need at handover;
- 72% agreed that handover is more structured now than before the project;
- 68% of nurses believed shift to shift handover has improved; and
- 80% felt more confident when communicating with doctors.

In a focus group conducted by the external project team members (EP & EC) PACT champions identified the following benefits:

- Handovers more comprehensive and omissions easily identified;
- Increased confidence among junior staff, recent graduates and students;
- Assessment workshops and communication tools led to earlier intervention for deteriorating patients;
- Improved written documentation;
- Less stress for staff in giving handover and when contacting doctors; and
- Nurses now able to identify and act on emerging clinical trends.

Anecdotal evidence supports these findings. Nursing Unit Managers and nurses identified improvements in the quality and structure of handovers given by staff. Handovers were generally more comprehensive and detailed, and structured to include information relevant to each patient. Nurses reported their confidence had increased when giving handover and they strongly supported the use of the template when telephoning doctors about deteriorating patients. Although the template could not remove all anxiety when calling a doctor at 3 am, staff felt more comfortable with a format to follow which kept them focused and prepared.

For Patient Safety

There have been a number of patient care benefits from the project. Analysis of the communication templates used by nurses when calling doctors allowed the identification of emerging clinical trends. To date the major reasons for calls include:

- Uncontrolled nausea and vomiting;
- Uncontrolled pain; and
- Observations outside normal limits.

One outcome has been the introduction of an antiemetic protocol. Since its implementation there have been no telephone calls to doctors regarding uncontrolled nausea and vomiting. Staff identify and respond to deteriorating patients much sooner than previously, leading to more timely care and interventions. Collection of statistical data including Medical Emergency Team (MET) calls and transfers to the high dependency unit is continuing, to evaluate the long term impact of the PACT project.

Conclusions

A key focus for managers today is to ensure optimal treatment, patient safety and early identification of issues that might lead to delays in discharge. Timely discharge and high patient satisfaction are especially important in the private (for profit) sector. The PACT project has shown one way to achieve these outcomes.

Another key issue is recruitment and retention of nurses, with stress cited as a major cause of staff morbidity, absenteeism and departure. The PACT project has shown one way to reduce stress among nurses by increasing their skills and confidence.

Future initiatives for this project include expanding and adapting the tools to the specialty areas of the hospital including Post Anesthetic Care Unit, Oncology and Mental Health Units. There are also plans to extend the use of the PACT project to other hospitals across Australia.

The ongoing challenge for the project is to maintain staff enthusiasm for and compliance with the structured programme. This can be achieved through embedding it in hospital policy, including it in orientation programmes for new staff and having mandatory annual updates for all staff. ■

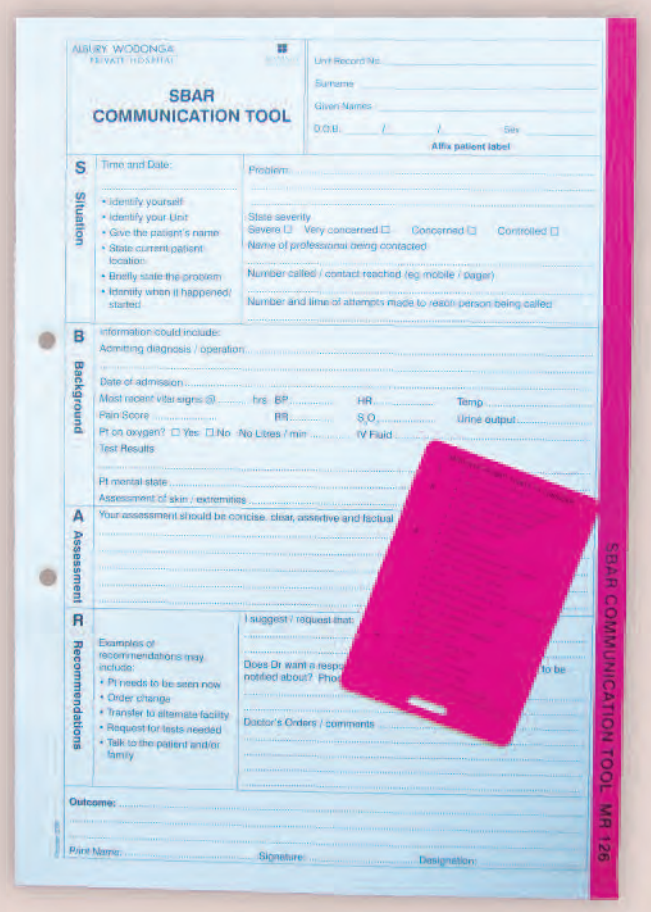

Figure 1. Standardised communication tools

TURKISH HEALTHCARE: OVERVIEW OF THE HEALTH SYSTEM

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The healthcare system in Turkey has a highly complex structure. The Ministry of Health (MOH), universities and the private sector are the health service providers in the Turkish health system.

History of Healthcare

The Turkish MOH was initially established in 1920, and the foundations of the current Turkish public health system were built in the period between 1923 and 1946. In 1946, the Social Insurance Organisation called "Sosyal Sigortalar Kurumu" or "SSK" was created to provide health insurance to private-sector and blue collar public-sector employees (OECD 2008).

In 1950 Government Employee's Retirement Fund (RF) called "Emekli Sandigi" was established to provide service to white-collar employees (government employees), military personnel with retirement and disability pension, local administration council members, parliamentary and military school students (Alkan et al. 2008).

The Universal Health Insurance (UHI) system was introduced by the government in the first five-year development plan in 1963 and then reintroduced in the National Health Policy (1990), however it could not be applied because of changes in government, economic crisis and lack of investment.

Between 1986 and 1989, the government adopted the Law on Launching Health Insurance through Bağ-Kur (the Social Insurance Agency for Merchants, Artisans and Self-employed). Then, in 1992 the Green Card programme was introduced as a temporary solution until the adoption of UHI. It aimed to provide free healthcare services to poor and uninsured people. However, as of the end of 2007 approximately 9 million citizens have utilised the Green Card system (Erus and Aktakke 2009).

By 2003, there were a number of different social security schemes used by Turkey; namely Social Insurance Organisation (SSK), Government Employees Retirement Fund (Emekli-Sandigi), Bağ-Kur and Green Card (Yesil Kart). Insured citizens were allowed to use different facilities and pharmacies according to their social security service. Payment mechanisms across the health insurance funds also varied.

Health Transformation Programme

In 2003, the Health Transformation Programme (HTP) covering the period 2003-13 was adopted by the MOH. The EU accession process has also provided additional momentum for the implementation of a more streamlined healthcare system (Varol and Saka 2008). By October 2008, the harmonisation of the benefit package was completed and finally UHI gathered all insured citizens (Bag-kur, SSK, Emekli Sandigi and Green Card holders) under a single insurance umbrella.

Under this new umbrella, the Health Insurance Certificate ("Saglik Karnesi"), which formally served as a document to prove health insurance plan coverage, was abolished and a new health information system was implemented making patients' records easily accessible by using their identity card numbers. There is also a plan to issue employees with credit card-like social security cards, which can be easily swiped to provide hospitals and pharmacies with their insurance details.

After the introduction of the HTP, family medicine was adopted in some cities, and the aim of the programme is to further generalise its' implementation across Turkey. Additionally, a Performance-Based supplementary Payment system was initiated. According to this system, revolving funds are distributed to healthcare personnel based on the comparative level of deprivation of their workplace. Preventive care practices are also emphasised as performance criteria. By the beginning of 2003, the share of full-time practitioners was 11 percent, and this has reached 75 percent as a result of these implementations (OECD/Organisation for Economic Co-operation and Development, 2008).

The other objectives of the HTP are to:

- Strengthen primary healthcare services;
- Improve the administrative and financial autonomy of health facilities;

Statistics:

Capital: Ankara
Area: 814,578 km²
Language: Turkish

Population-thousands:
72,971 (2006) / 74,767 (2008)
Life Expectancy at Birth:
73.2 (2006) / 73.6 (2008)
Health expenditures-% of GDP:
5.8 (2006) / - (2008)
GDP - Million Turkish Lira:
758,391 (2006) / 950,534 (2008)
Number of hospitals:
1204 (2006) / 1350 (2008)
Number of hospital beds
183,696 (2006) / 188,065 (2008)
Physician (per 1 000 population):
1.43 (2006) / 1.51 (2008)
Nurse (per 1 000 population):
1.13 (2006) / 1.34 (2008)
Midwife (per 1 000 population):
0.60 (2006) / 0.64 (2008)
Pharmacist (per 1 000 population):
0.32 (2006) / 0.33 (2008)
Infant mortality rate (per 100 000 population):
22.3 (2006) / 17.0 (2008)
Neonatal mortality rate (per 100 000 population):
14.3 (2006) / 13.0 (2008)
Under 5 age mortality rate (per 100 000 population):
28.7 (2006) / 24.0 (2008)
Maternal mortality rate (per 100 000 population):
28.5 (2006) / 19.4 (2008)

Sources: OECD Health Data 2009, TURKSTAT, Turkish General Directorate of Curative Services and GD-MCHFP

- Accelerate the accreditation for qualified and effective health services;
- Support the health system by education and science institutions;
- Improve the home care policy,
- Generalise Tele-Medicine and Tele-Health systems in order to provide remote health services in the field of screening;
- Improve the quality and increase the number of intensive care units;
- Decrease maternal and infant mortality rates; and
- Carry out the European Union harmonisation/accession process (SGK/Republic of Turkey Social Security Institution, 2008).

Financing of Healthcare System

The financing of healthcare system has three main sources, which are: Government budget funded by taxation revenue, contributions from employed citizens, and out-of-pocket payments (differing from 3 to 10 Turkish Lira according to the type of hospital), which are made by each individual who uses the health service (SGK/Republic of Turkey Social Security Institution, 2008). Citizens in vulnerable groups of society such as pregnant women, war veterans, diabetics and tuberculosis patients do not have to pay any charges. Expats, however, are obligated to pay for health services until they have lived and worked continuously in Turkey for two years.

Employers must register their employees with the health insurance fund and then income is automatically deducted from employees' salary. Dependant family members are covered by the contributions paid by employed family members. The unemployed, old age pensioners and people on long-term sickness benefit or maternity leave do not have to make payments. Self-employed people must make their own contributions to the health insurance fund (Orhaner 2006).

Hospitals

There are several types of hospitals throughout Turkey: State-funded hospitals, which suffer from overcapacity and lack of finances; University Hospitals, which have the highest standard of care out of all three of hospital types and boast highly skilled personal, and private hospitals. Although a limited percentage of Turkish citizens can afford to use private healthcare, it is affordable in comparison to Western expectations and on a par with western standards. Therefore, in recent years there has been a marked increased in the number of people travelling to Turkey as "medical tourists" to take advantage of this cost disparity.

Pharmacies

Only general practitioners (GPs) and consultants (senior doctors who have completed a higher level of specialised training) can prescribe medicine and prescription medicine is only available from registered chemists or hospital pharmacies. Employed people and dependent family members pay 10 percent of medicine price and it is 20 percent for the other citizens (SGK/Republic of Turkey Social Security Institution, 2008).

Emergency Care

Emergency care is available free for Turkish citizens including those without state health insurance. Emergency departments are open non-stop all year and can be reached by dialling 112. By 2008 all ambulances, which are used in 112 Emergency Health Services, were accredited to the European standards (Akdag 2008).

Dentists & Ophthalmologists

Dental care in Turkey is of a high standard. The dentists have facilities, which meet Western standard and they are mainly private with no fixed prices for treatments. Also Turkey has a reputation for expert laser surgery, to the point where some Turkish lasik surgeons now train ophthalmologists in other countries. Thus, many foreigners come to Turkey for ophthalmologic procedures.

Conclusion

The last few years have seen a rapid reformation of the healthcare system in Turkey. The health transformation programme and the European Union harmonisation / accession process have been the leading pressures on this reformation. In order to reach the expected quality levels and complete the transformation programme, future steps must be taken towards overcoming the deficiencies in Turkey's healthcare system and accelerating the accreditation process of healthcare organisations and their services. ■

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INTENSIVE CARE MEDICINE IN TURKEY

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Intensive Care Medicine (ICM) is a relatively new specialty in Turkey. In 1959, the first reanimation service was established in Istanbul University Hospital. For several years anaesthesiologists covered this area and special patient care in addition to their primary work in the OR. In 1978, they established the first national association – the Turkish Society of Intensive Care Medicine. The members of this society, (including the recent executive committee), are almost all anaesthesiologists.

Starting in the 1980s some institutions (mainly university hospitals), established medical Intensive Care Units (ICU) under their Departments of Internal Medicine and Pulmonary Medicine. In addition, several departments of General Surgery started to take care of their own critically ill patients in Surgical Intensive Care Units. And more recently, neuro-intensive care units are being established. As a result, a more multidisciplinary society – the Turkish Society of Medical and Surgical Intensive Care Medicine was established in 2005. The members of which are physicians from various backgrounds, nurses, and healthcare workers from other related disciplines. In addition to these societies, there are two more societies related with Intensive Care Medicine (ICM) that are active in the country: the Turkish Society of Paediatric Emergency and Intensive Care Medicine and the Turkish Society of Intensive Care Nurses. These four societies conduct several national meetings.

BACKGROUND: Healthcare System in Turkey

The Healthcare system is mainly regulated by the Turkish Ministry of Health (MoH). In addition, the MoH is the largest health service provider in Turkey, and employs about 200,000 staff itself.

In 2003, the MoH began a programme called "transformation of health", the main purpose of which was to organise and provide general health services to every citizen in a cost-effective and equal manner. Starting in 2004, family physicians started to provide primary care.

Secondary and tertiary healthcare is provided by the following:

- The MoH;
- Ministry of Defense (which has its own hospitals);
- Universities (which are mostly public, with a few private); and
- The private sector.

In theory, a patient should first apply to a primary care centre and referred to secondary and tertiary healthcare centres when needed. However, this referral chain is unfortunately not followed in practice, and therefore, even tertiary care hospitals are usually heavily overpopulated by outpatients.

There are three main types of hospitals: University, state hospitals (hospitals run by the MoH; some of which are tertiary centres), and private hospitals. In 2007, the total number of hospitals was 1276 (56 university, 849 state, 365 private) with 184,983 beds (29,700 university, 135,240 state, 17,995 private). Number of hospital beds per 10,000 people in Turkey was 26 beds in 2001. However, the distribution of hos-

Picture 1. Hacettepe University

pital beds across the country is not homogeneous, and the range of beds varies from 3 to 60 beds per 10,000 people. A MoH appointed head medical doctor and an assisting hospital administrator run each MoH hospital. Universities are not absolutely autonomous, as they are regulated by the Higher Education Council which is a government based institution.

In 2006, the total number of physicians was 114,583: 57,882 specialists and 56,701 practitioners (including family physicians) and there were 87,327 nurses. However, ratio of medical personnel to population varies greatly among regions. The MoH tries to recruit staff for those under-serviced areas. There is also obligatory public service for physicians both after graduation from the medical school and after becoming a specialist.

Many specialist doctors have dual employment; they work part time in public hospitals and have their own private practice. Recently the government is trying to put a law in place for full time employment. There is shortage of medical personnel, especially nurses, in addition to nationwide maldistribution.

Cost of Healthcare in Turkey

Social Security Institution, which is the main source of payment for hospitals, has adopted the policy of "payment for diagnosis". But, since the prices are very low, hospitals have difficulty in maintaining the resources especially in high cost areas such as ICM. Intensive care patients are divided into third levels according to their severity of disease, the 3rd level being the sickest patients who have multi-organ failure. Payment is done according to these levels but payments do not cover the whole expenses in especially high technology equipped university hospitals.

A majority of the hospitals are public hospitals and in 84 percent of healthcare costs are paid by the government. Only 3 percent of the population has private insurance. The remaining 13 percent of the population do not have a health insurance at all.

The MoH has recently established a "payment for performance" system, which has recently been adapted for costs of healthcare personnel and it has its own limitations.

FACTS: Medical Education

- There are 76 medical faculties in Turkey.
- Medical education in Turkey is six years.
- Less than 10 percent of the graduates can become specialists. The graduates have to pass a central exam to become a specialist.
- Residency training typically lasts for 4-5 years.
- Sub- or supra-specialty training usually last three years.
- Several medical specialty societies perform their own board exams.
- There are few national accreditation programmes only in very few specialties.
- Continuous medical and in-service education programmes are becoming more common.

Both patient care and medical education is not standardised and harmonised in the country.

Education and Training in Intensive Care Medicine

Education in ICM is also regulated by the MoH. ICM was first recognised as a separate supra-specialty in 2002. However, there are two main problems which have yet to be solved: 1) Which main specialties should ICM supra-specialty training follow? and 2) Which staff should be categorised as intensivists (physicians currently working in ICUs as directors, attending physicians or other staff and/or educators) and what criteria should be used?

The MoH and the four intensive care societies are currently working to resolve these issues. And so far in this country the main

Picture 2. Staff of the Medical Intensive Care Unit of Hacettepe University Faculty of Medicine, Ankara, Turkey. This Medical Intensive Care Unit being the only one in the country has been accredited by the European Board of Intensive Care Medicine in 2007.

Picture 3. Hacettepe University

intensivists are anaesthesiologists, internists, pulmonologists and general surgeons. However, cardiologists, cardiac surgeons, neurologists and neurosurgeons do run their own specialised ICUs.

The ICM education in graduate training is not well organised. This education is not structured and it is given during 3rd and 4th grade only as few theoretical lectures. For post-graduate supra-specialty training we have decided to accept the "Cobatrice" as our main curriculum and we have translated the syllabus so far. Post-graduate training has not been standardised yet. There are not national board exams, national accreditation programmes and certification. However, Division of Medicial Intensive Care of Hacettepe University Hospital in Ankara has been accredited by the European Board of Intensive Care Medicine in 2007 (Picture) and trainees are encouraged to obtain the European Diploma of Intensive Care though not obligatory.

There are several national meetings, continuous medical education programmes about ICM for physicians, nurses and other personnel in Turkey.

Organisation of ICUs in Turkey

Organisation of ICUs are also regulated by the MoH. Classically, ICUs are established either as general units or specialised units like medical, surgical, pulmonary, neuro-ICUs depending on the necessities. ICUs are in close contact with the emergency medical systems. A new system has started to be applied in each city of Turkey, where emergency medical systems coordination center tracks the available intensive care beds in public hospitals and carries the patients according to the availability of beds. This system has not been finalised yet and it needs improvement.

The ICUs are classified as first, second and third levels according to patient/nurse ratio, physical and patient properties. A team of intensivists authorised by the MoH has recently started hospital visits for accreditation which has not completed yet. This accreditation takes into account only the staffing and physical properties and it is used only for the purpose of health payments so far.

There are about 10,000 intensive care beds one third of which are 3rd level beds in Turkey. The MoH is planning to increase the bed numbers in their hospitals by about 8,000. There are only about 900 paediatric intensive care beds one third of which are 3rd level beds in Turkey and The MoH is planning to increase the bed numbers in their hospitals by about 1,200. In cities where the adult population is greater than 800,000, three intensive care beds per 10,000 adult population, for other cities two beds for 10,000 population and in general one bed for 20,000 paediatric population are planned.

There has to be at least 2000 certified intensivists in Turkey. The shortage of nurses is very marked. Even in 3rd level ICUs, there is one nurse for three patients. There are very few physiotherapists and clinical pharmacists.

Weaknesses and Threats in ICM

- There is shortage of intensivists, nurses and other personnel such as physiotherapists and clinical pharmacists.
- The number of ICUs in Turkey is very few (intensive care beds comprising < 5% of hospital beds). The MoH is planning to increase the number, since the population is high and there are very important problems in Turkey such as earthquake and traffic accidents.
- Societies and the MoH have not reached a definite consensus about establishing a new specialty, curriculum, etc., yet.
- Uncertainties about the specialty status, increased workload and relatively low income make the specialty unappealing.
- There is no national board exam, accreditation programme and certification yet.
- Nursing homes, home care, etc. are not wide spread through the country. In addition, "do not resuscitate" orders, "withholding or withdrawing of life support" are not legal nor adapted in Turkey. Therefore, patients stay in the ICU for prolonged periods.
- Due to insufficient payment of Social Security Institution to hospitals for intensive care service, hospitals can not and do not want to invest for ICUs for increased personnel, better physical properties and technology.

In conclusion, although there are uncertainties and insufficiencies in especially the specialty status of ICM, manpower and ICU beds, there are dedicated physicians, nurses and active national societies seeking to solve these problems in Turkey. ■

AUTHOR GUIDELINES

ICU MANAGEMENT

Content

Articles may focus on any management or practice issue in intensive care related to economics, quality of care or patient outcome. We only accept scientific papers with a clear connection to management and practise issues. We also invite opinions for publication in our Viewpoints section, which can be personal opinions of the author and/or reactions to articles published in prior issues. These are published at the discretion of the editors. Submissions may not have been published previously or be currently submitted for publication elsewhere. Articles must be written by independent authorities and any sponsors for research must be named. If manufacturers are named in an article, the text must present an unbiased view, not in support of any particular company.

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Authors are responsible for all statements made in their work, including changes made by the editor and authorised by the submitting author. The text should be provided as a word document via email to editorial@icu-management.org. Please provide a contact email address for correspondence. Following review, a revised version, which includes the editors' comments and recommendations, is returned to the author (at the contact email address) for authorisation.

Length

- Articles: maximum 1400 words (less if figures or tables are included)
- Viewpoints: maximum 700 words
- News/research/product updates: maximum 200 words

Please note that contributions longer than the specified number of words may not be accepted.

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Article texts must contain:

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- Summary of one or two sentences (no more than 30 words) describing the content
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- Website, if appropriate
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- Introduction, main text and summary/conclusion, with subheadings as appropriate
- Authors are encouraged to include checklists and/or guidelines, which summarise findings or recommendations
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Writing Style

Articles must be written in UK/British English (e.g. organisation, not organization), with short sentences, a clear structure (see above) and no bias. Full stops in numbers may only be used to indicate a decimal place; otherwise use commas as separators.

Images

Main authors are asked to supply a portrait photo for publication with their article. This and any other relevant images for publication with an article should be sent by email as separate files (only high resolution images with 300dpi) and their order of placement in the article must be clearly indicated. Only the electronic formats ".tif" or ".jpg" can be used for images, i.e. not Microsoft Word or PowerPoint. Images must be no smaller than 9cm x 9cm at 100% scale. Only images meeting these specifications can be published. If an image has been published before, permission to reproduce the material must be obtained by the author from the copyright holder and the original source acknowledged in the text, e.g. © 2010 Sherry Scharff.

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Any references that are deemed important to understanding of the article should be cited in concise form within the article. Please use the Harvard reference system. Citations within the text for a single author reference should include the author surname and year of publication; for a citation with two authors include both author surnames and year of publication; for more than two authors, include the first author surname followed by "et al." and the year of publication. Multiple citations should be separated by a semicolon, and listed in alphabetical order.

Example of within text citation: (Edwards 2004; Edwards and Miller 2002; Miller et al. 2003).

Reference lists should be alphabetised by lead author and included at the conclusion of the submission.

Example of standard journal reference: Sydow Campbell, K. (1999) "Collecting information; qualitative research methods for solving workplace problems", Technical communication, 46 (4) 532-544.

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Acceptance

It is always at the discretion of our editorial board to accept or refuse submissions. We will respond to submissions within 8 weeks of receipt. We reserve the right to revise the article or request the author to edit the contents, and to publish all texts in any EMC Consulting Group journal, on the Internet and to list them in online literature databases.

Thank you,
The ICU Management Editorial Team
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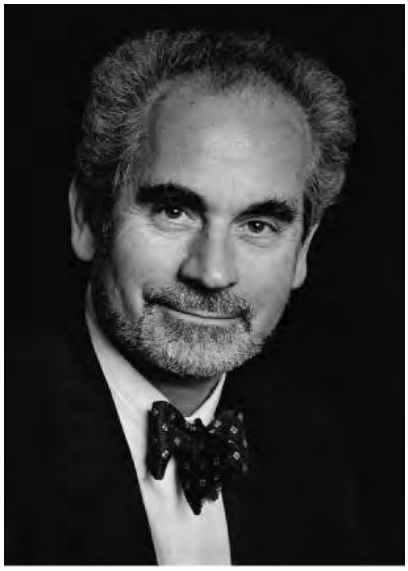
CHALLENGES OF WORKING IN A 100-BED INTENSIVE CARE UNIT

AN INTERVIEW WITH PROFESSOR JULIAN BION

— Part Two



Professor of Intensive Care Medicine at the University of Birmingham, Prof. Julian Bion also has an honorary consultant appointment with the University Hospital in Birmingham. He also has a number of high-profile national and international roles in the field of intensive care, including being an Editorial Board Member of ICU Management and is a former President of the European Society of Intensive Care Medicine (ESICM).

In the second of this two-part interview with Managing Editor Sherry Scharff, Prof. Bion describes the planning and implementation of combining hospitals, and highlights the importance of fostering a family culture in even the largest of units.

SS – Can you briefly describe your department?

JB – We are in the process of moving into one of the largest Intensive Care Units in the world. I was appointed as a consultant in Intensive Care Medicine and as a Senior Lecturer in Intensive Care Medicine at the hospital and the University in 1987. In 1987, the hospital had one ICU with six beds – for the entire hospital and as a consequence of expansion and co-location of services over the following years, we finally ended up with four Intensive Care Units across two hospitals and a total of somewhere in the region of 55-60 critical care beds. More recently, approaching 65-70 ICU beds. For the last ten or so years, we have been preparing for the move into a new hospital built contiguously with the Queen Elisabeth Hospital and we finally took possession of that hospital in June (2010), and began moving patients through into the new hospital. We have two hospitals: Queen Elisabeth Hospital and Selly Oak Hospital (2.5 miles apart), with four ICUs (one in Selly Oak and three in the QE). In June, we moved all the patients formally in the Selly Oak hospital into the new hospital, together with the critically ill patients from the ICU there. We also moved the cardiac Intensive Care Unit and the post-surgical ICU from the University Hospital into the new hospital. So we moved one entire hospital and two ICUs into a new building in a matter of four days. The two ICUs with about 40 critically ill patients took about three days…

> *"(Critical Care) is one of the few places in the hospital where you can be a holistic practitioner, providing real quality care to the most acutely ill and susceptible patients in the hospital system.*

SS – It sounds like a logistical nightmare…

JB – Oh it was a significant exercise, as you can imagine. But, as our Medical Director David Rosser, who is also one of our consultant intensivists said: "It's not a matter of moving 40 critically ill patients, it's more like moving one critically ill patient 40 times". We set about the patient transfers very methodically and calmly, with a lot of people around- the ambulance service was fully involved of course, but also the police helped with out-riders to clear the traffic for some of the more seriously ill patients and it went very well, without remarkable incident or complication of any sort. Of course, an additional element is that we had to continue providing high quality care to the patients remaining in the units being cleared, throughout this process, as well as in the new ICU where patients were being received, and during transfer. So it did require a certain amount of attention to detail.

The severity of illness of the patients in the UK is always very significant. Many of our patients are young soldiers with military-related injuries, some of them with appalling injuries, which I am sorry to say. Another large group of our patients, cardiac patients are very dependent- in fact one of the patients who was transferred was on extracorporeal membrane oxygenation (ECMO) and a balloon pump, so there was a lot of technical "kit" that had to accompany these patients as well. So that was the major activity during June, and later this year we will be moving the third ICU and then next year the final, fourth ICU, which is the Neuro-Intensive Care Unit and then we will all be co-located in one place. We will have about 73-75 ICU beds open in one place. We will also have another 25-

30 beds, which are not yet available, but we have established ourselves now as a 100-bed ICU, which as a single entity makes it one of the largest in the world.

SS – What is the nurse to patient ratio?

JB – Well we have as a general principle in the UK, a one nurse to one patient ratio; for mechanically ventilated or patients receiving extracorporeal circuits for example on continuous dialysis. We run the ratio of 5.5 nurses per ICU bed- so this gives us something in the region of 550 nurses plus additional staff, of course, because you have to have senior staff managing the individual areas within the unit. In total, there will be about 580 nurses, once the entire enterprise is running.

SS – With such large staff, there are most certainly some management challenges to face…?

JB – We have moved from a dispersed to a co-located model of critical care- a model including fairly large ICUs; by UK standards- these are ICUs with 15-20 critical care beds. Each had its own identity however, and staff which predominately spent much of their working lives in that location. We've now moved to this co-located model, which is much bigger and where the family mentality has to evolve to one much more based on a commune. This presents challenges in terms of scope and interpersonal relationships. As this is indeed a distinct cultural change, we are taking this rare opportunity to do some quality research. We have an integrated programme of quality improvement that we initiated before the move, and we are studying the impact of the move on various quality indicators. One of which, for example is the number of medical staff who are able to attend some of our professional development activities. Because when you have four ICUs across two hospitals, the one thing you can be sure of, is that you can never meet together as a group whereas, if you have everyone in one place, it's much easier to meet as a group. So we do have the opportunity now to work together, to get together and to support each other much more effectively than we had been able to before. On the other hand, there are so many of us that it is harder to learn everyone's names and to give the workplace a true family atmosphere. Creating that family atmosphere is quite important I think, it occurs not just through learning to work together but really, learning to live together as well and it incorporates such things as even having an annual staff party for example, which is relatively easy to do if you only have a hundred staff to organise, but when you have upwards of 600, 550 nurses, 40 consultants and roughly 40 trainees as well, it becomes quite a challenge to get that to work.

Picture 1. Queen Elizabeth Hospital Birmingham

Our quality improvement activities incorporate a range of other things as well. One of the most important of which is the family and patient satisfaction survey that we have been conducting for some time now, and which is providing us with some important feedback about ways in which we can improve. Clearly the great majority of responses reveal a very high level of satisfaction, but of course this is not merely dependent on the high staff to patient ratio- which really only signals that you have very little excuse for failure, it does not guarantee affection. Although most of the time we are well rated, as you might expect, there are always areas for improvement. We always highlight any noted areas of improvement and strive to work on them. Now, with the move to a co-located model, we can continue to measure performance, monitor our progress in these areas of improvement and study whether the move has made any difference in our delivery of care.

"We've now moved to this co-located model, which is much bigger and where the family mentality has to evolve to one much more based on a commune."

In addition to these quality improvement activities, we have a lot of research going on which has been hampered by the dispersed model of care and which will now become a great deal easier to sustain once we are all in one location.

SS – Have you some wisdom to impart to those entering the critical care field?

JB – Well, if I were to summarise my thoughts on critical care, I would say that it is one of the few places in the hospital where you can be a holistic practitioner, providing real quality care to the most acutely ill and susceptible patients in the hospital system. ■

THE NEW ERC GUIDELINES ON RESUSCITATION

In October 2010, the European Resuscitation Council (ERC) launched the new European Guidelines for cardiopulmonary resuscitation, based on new scientific evidence published since the last revision five years ago.

"Numerous studies on the effectiveness of resuscitation procedures have been reviewed for the new ERC Guidelines 2010, paying particular attention to convincing scientific evidence and simplification", said Dr. Jerry Nolan, ERC Board member. Besides chest compression, another main focus today is automated external defibrillators (AEDs), which can now be widely found in public places. The new ERC Guidelines clearly recommend the use of these devices: AEDs are simple to use as voice prompts guide the user through the defibrillation process safely. Early defibrillation may, in addition to chest compressions, be a life saving procedure many cardiac arrest victims.

Furthermore, the ERC Guidelines 2010 confirm the importance of therapeutic hypothermia following cardiac arrest. Cooling the post arrest victim to 32-34°C for 12-24 hours significantly increases the chance of good neurological survival. However, surprisingly this simple method is still not used by many emergency medical services and hospitals in Europe. The 2010 ERC Guidelines now also recommend extending therapeutic hypothermia therapy to newborns suffering from lack of oxygen during birth. Immediate and hard chest compressions, early defibrillation, and cooling are the key factors of resuscitation in the new 2010 ERC Guidelines.

The following excerpt highlights a few of the recent changes, adapted with permission from the executive summary provided by the ERC.

Adult Advanced Life Support

The most important changes in the 2010 ERC Advanced Life Support (ALS) Guidelines include:

- Increased emphasis on the importance of minimally interrupted high-quality chest compressions throughout any ALS intervention: Chest compressions are paused briefly only to enable specific interventions.
- Increased emphasis on the use of 'track and trigger systems' to detect the deteriorating patient and enable treatment to prevent in-hospital cardiac arrest.
- Increased awareness of the warning signs associated with the potential risk of sudden cardiac death out of hospital.
- Removal of the recommendation for a pre-specified period of cardiopulmonary resuscitation (CPR) before out-of-hospital defibrillation following cardiac arrest unwitnessed by the EMS.
- Continuation of chest compressions while a defibrillator is charged -this will minimise the pre-shock pause.

Picture 1. A view of Porto, site of the ERC's recent congress

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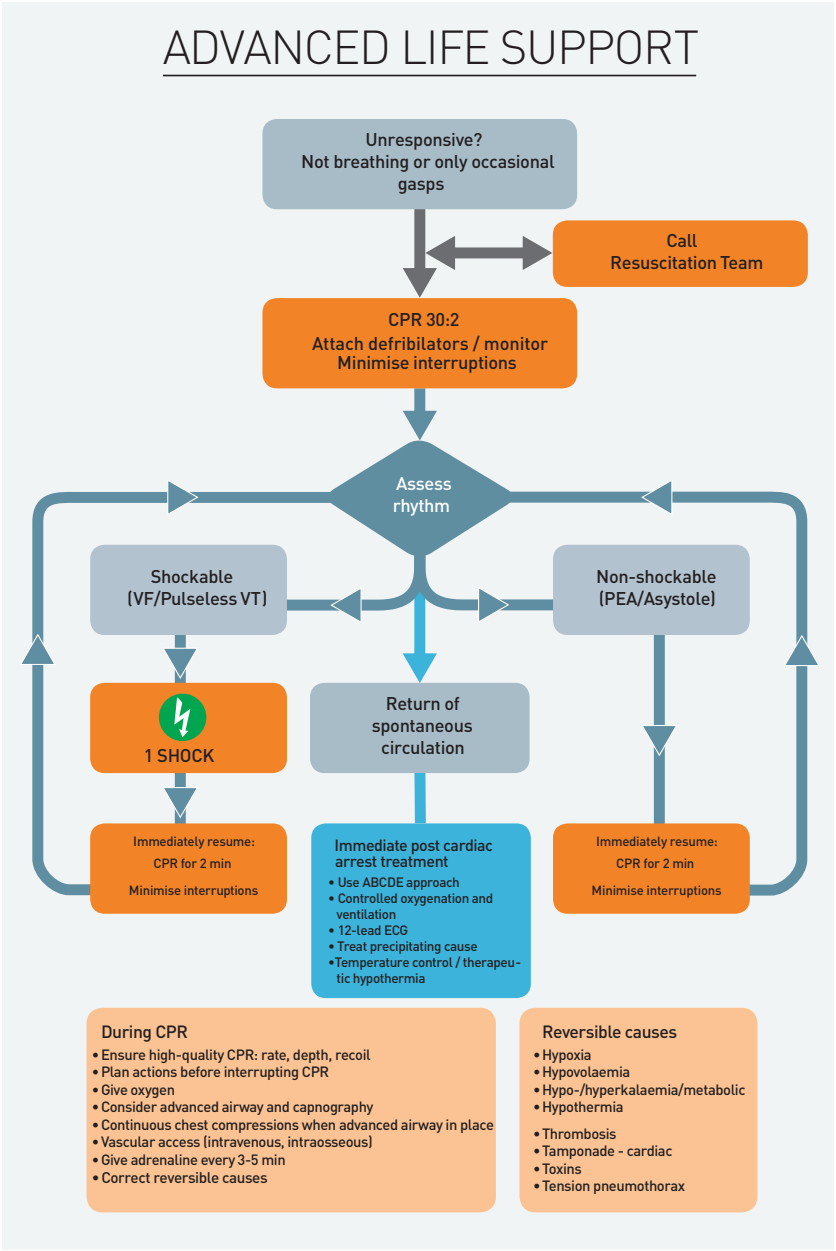
- The role of the precordial thump is de-emphasised.
- The use of up to three quick successive (stacked) shocks for ventricular fibrillation/pulseless ventricular tachycardia (VF/VT) occurring in the cardiac catheterisation laboratory or in the immediate post-operative period following cardiac surgery.
- Delivery of drugs via a tracheal tube is no longer recommended – if intravenous access cannot be achieved, drugs should be given by the intraosseous (IO) route.
- When treating VF/VT cardiac arrest, adrenaline 1 mg is given after the third shock once chest compressions have restarted and then every 3-5 minutes (during alternate cycles of CPR). Amiodarone 300 mg is also given after the third shock.
- Atropine is no longer recommended for routine use in asystole or pulseless electrical activity (PEA).
- Reduced emphasis on early tracheal intubation unless achieved by highly skilled individuals with minimal interruption to chest compressions.



- Increased emphasis on the use of capnography to confirm and continually monitor tracheal tube placement, quality of CPR and to provide an early indication of return of spontaneous circulation (ROSC).
- The potential role of ultrasound imaging during ALS is recognised.
- Recognition of the potential harm caused by hyperoxaemia after ROSC is achieved: once ROSC has been established and the oxygen saturation of arterial blood (SaO2) can be monitored reliably (by pulse oximetry and/or arterial blood gas analysis), inspired oxygen is titrated to achieve a SaO2 of 94 – 98 percent.
- Much greater detail and emphasis on the treatment of the post-cardiac arrest syndrome.
- Recognition that implementation of a comprehensive, structured post resuscitation treatment protocol may improve survival in cardiac arrest victims after ROSC.
- Increased emphasis on the use of primary percutaneous coronary intervention in appropriate (including comatose) patients with sustained ROSC after cardiac arrest.
- Revision of the recommendation for glucose control: in adults with sustained ROSC after cardiac arrest, blood glucose values >10 mmol l-1 (>180 mg dl-1) should be treated but hypoglycaemia must be avoided.
- Use of therapeutic hypothermia to include comatose survivors of cardiac arrest associated initially with non-shockable rhythms as well shockable rhythms. The lower level of evidence for use after cardiac arrest from non-shockable rhythms is acknowledged.
- Recognition that many of the accepted predictors of poor outcome in comatose survivors of cardiac arrest are unreliable, especially if the patient has been treated with therapeutic hypothermia.

Further information, full guidelines and posters for the public and healthcare professionals are available for free at www.erc.edu. ■

EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE

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15–19 Society of Critical Care Medicine (SCCM) Annual Congress
San Diego, California, US
www.sccm.org

19–20 IT @ Networking 2011
Brussels, Belgium
www.hitm.eu

FEBRUARY 2011

16-21 17th Annual Congress of the Indian Society of Critical Care Medicine & International Critical Care Congress 2011
Vigyan Bhawan, New Delhi, India
www.criticare2011.org

23-25 2011 8th Annual Canadian Critical Care Conference
Whistler, BC, Canada
www.canadiancriticalcare.ca

25-26 16th International Symposium on Infections in the Critically Ill Patient
Porto, Portugal
www.infections-online.com

MARCH 2011

13-17 6th World Congress on Pediatric Critical Care
Sydney, Australia
www.pcc2011.com

22-25 31st International Symposium on Intensive Care and Emergency Medicine
Brussels, Belgium
www.intensive.org

MAY 2011

13-18 American Thoracic Society International Conference
Denver, Colorado
www.thoracic.org

JUNE 2011

11-14 Euroanaesthesia 2011
Amsterdam, the Netherlands
www.euroanaesthesia.org

15-17 SSAI 31st Congress on Anaesthesiology and Intensive Care Medicine
Bergen, Norway
www.ssai2011.com

MAY 2011

10-13 Fifth World Congress on the Abdominal Compartment Syndrome (WCACS)
Orlando, Florida
www.wsacs.org

In our Next Issue

COVER STORY
- The Airway

COUNTRY FOCUS
- Sweden

MATRIX
- "Metabolic staging" after major trauma: A guide for clinical decision making?

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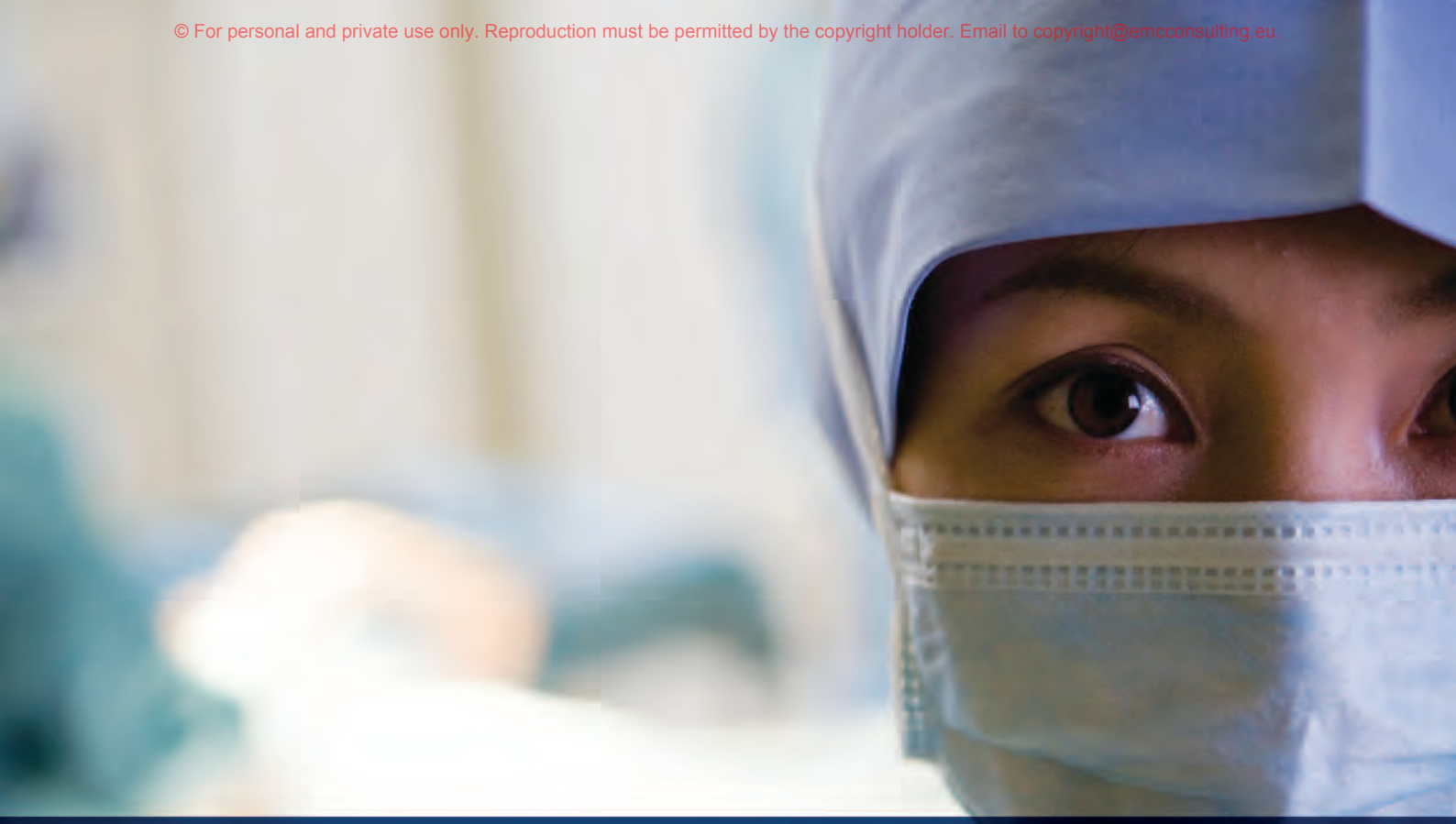

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1. Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. N Engl J Med. 2009; 360(14): 1418-1420.
2. FDA 510(k) clearance.

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