

Clinical knowledge management at ICU

Llagunes Herrero J. Anesthesia Service, Critical Care and Pain Therapy. University General Hospital of Valencia. Spain.

Management of Clinical Knowledge at Intensive Care Unit (ICU) consists of production, distribution, storage, evaluation, transfer and the own practical management of that knowledge. The principal drivers of knowledge management at ICU are structure of clinical knowledge by pathologies or main clinical areas. Technological knowledge is based on the organ support and possible diagnosis and general organization knowledge is acquiring data through Information and Communication Technologies (ICT), assistant quality and patient's safety. This paper exposes from a clinical point of view how to structure knowledge management inside ICU and its future development.

Introducción

Knowledge provides health professionals the power to improve health systems, has obvious benefits that could really make a difference in people's lives, something evident in an intensive care unit (ICU). In the field of critical medicine we are always faced with situations in which it is necessary to think quickly with the aim of processing the clinical information and the information obtained through the available technology, in order to establish a treatment and evaluate its effectiveness. Management of knowledge (MK) is the key to patient care in these difficult situations, so we will have to plan and use the available knowledge: basic research, technology and clinical experience. In this way, the CG helps to improve the organization's objectives: it improves the care for pathologies and allows generating the necessary information for an improvement in the care of these patients. It implies an organizational vision in which people cooperate carrying out care processes based on evidence, efficacy and efficiency. Therefore, good talent management (human capital) is important with the push of new professionals and its combination with senior professionals who bring experience and values in clinical practice (1). Thus, knowledge management is a strategy that converts the intellectual values of organizations into an improvement in productivity, added value and increased competitiveness. Therefore, knowledge management consists of the production, distribution, storage, evaluation, transfer and in the practical management of that knowledge.

The main drivers of in intensive care, is to structure the clinical knowledge (CK) for pathologies, promote and train in technology knowledge (TK) for diagnosis at bedside and

organ support; and the global knowledge of the organization (GK): with the obtaining of data with the information and communication technologies (ICT), the welfare quality and the security of the patient. Below I discuss from a clinical point of view how the CK should be structured within an ICU, as well as the areas that should be implemented in the future.

Áreas de conocimiento

A.- Main knowledge

A1.- Clinical knowledge (CK) of the pathologies, linked to the research, values and individual skills of the members of the medical team, nursing staff and other personnel involved in critical patient care. It is undoubtedly the most important factor of the organization because they are the application, diffusion and re-evaluation of knowledge by specific areas of pathology.

The areas of knowledge by pathologies (infectious, cardiovascular, etc.) will depend on the service portfolio of each unit. Its development involves a protocolization in diagnosis and treatment, research projects and transmission through publications, communications and meetings. In each clinical area there must be a leader who informs and involves the rest of the members about the latest advances in the specific pathology and measures to be implemented.

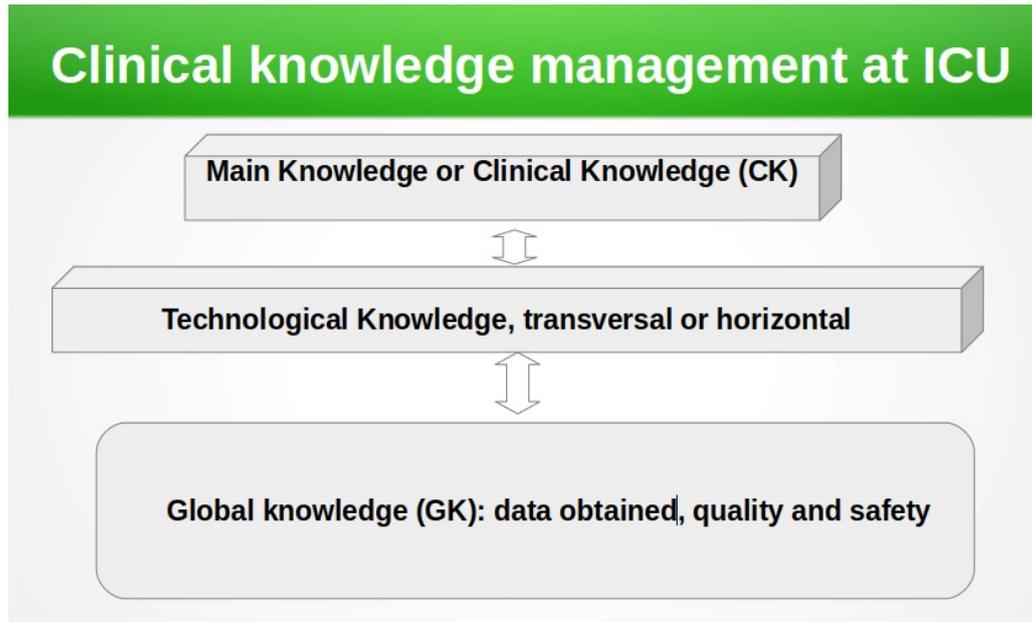
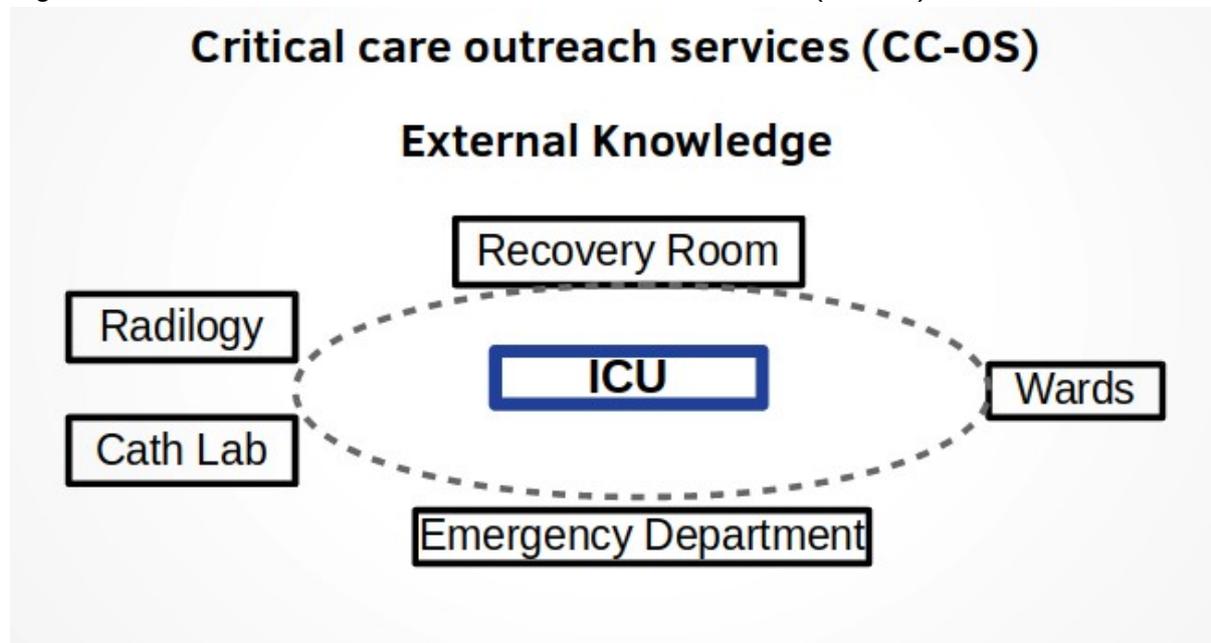


Fig.1: Clinical management of knowledge

A2.- Critical care outreach services (CC-OS) at present, the knowledge generated by the care of critical patients susceptible to admission to an ICU should be added, as well as the follow-up of patients discharged from the unit. This activity, called outreach critical care

services (CC-OS) (2), contributes a lot of value and quality in the care, since it allows an early admission in the ICU of the serious patient admitted to the hospital or critical patient care with good evolution, that after the discharge of the unit deteriorates in the ward, being able to improve its clinical state "in situ" or early readmission in the ICU. The delay standart admission to the ICU produce an increase of 1.5% in mortality (3) and late re-entry in the ICU increases mortality (4)

Fig. 2: Area of influence of the Critical care outreach services (CC-OS)



It also provides external knowledge, both of the patients who benefit from early intensive care, and the final results of the patients treated: early mortality, alive at discharge from the hospital, etc.

B.- Technological knowledge, transversal or horizontal: applicable to any type of pathology Technological knowledge (TK):

It arises mainly due to the need to maintain organs with dysfunction, which has made technological technology necessary to support them. Here they fit mainly: the respiratory support therapy (mechanical ventilation -VM-), continuous renal replacement therapy (CRRT), circulatory and respiratory support known as extracorporeal membrane oxygenation (ECMO) and finally the need for diagnostic technology at the point of care, mainly ultrasound (ECO) and hemodynamic monitoring. This knowledge is also subject to the unit's own service portfolio, which can be extended or reduced.

As in the TK there must be a leader available technology that motivates and transmits the knowledge that is generated with your application. At the same time, data collection of its usefulness and results should be done. Here, an analysis of costs and results is also important, seeking the application to the right patient at the right time.

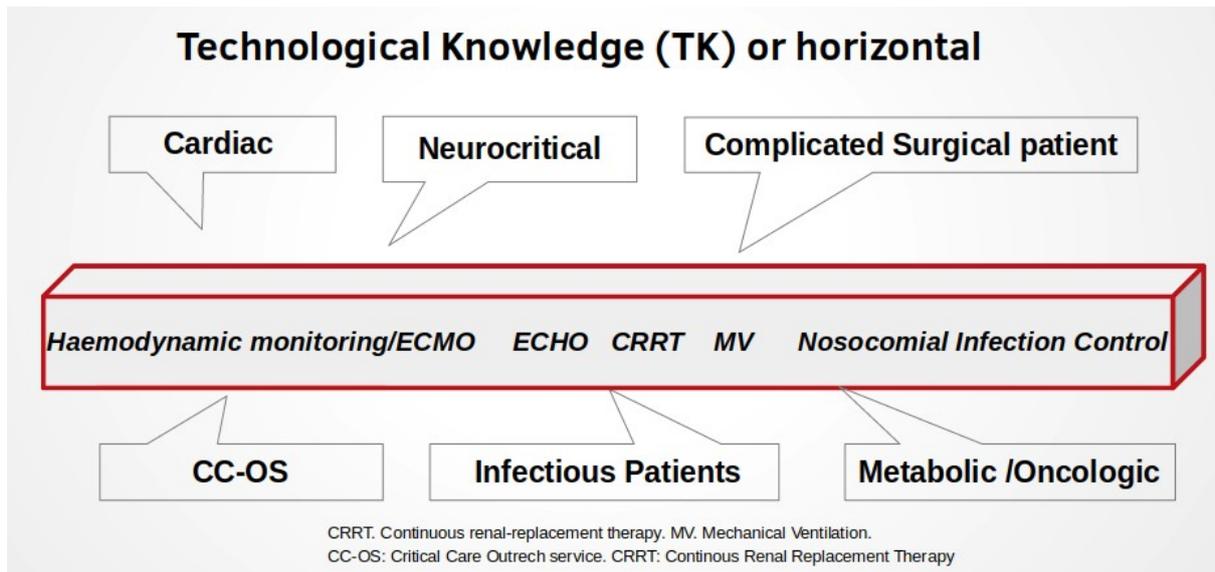


Fig. 3: knowledge technological or horizontal knowledge

C.- Global knowledge (GK): data obtained, quality and safety (5)

Global knowledge areas (GK)		
ITC	SAFETY	QUALITY
HUMANIZATION IN ICU		

C1.- Obtaining data and analyzing them through information and communication technology (ICT): here we highlight the Electronic Health record (EHR) that allows: 365-day data availability 24 hours a day, immediate accessibility, security in the storage of clinical data, minimizes the loss of data, avoids errors by medical calligraphy, unifies and compels compliance in the collection of data, reduces the use of paper and reduces transcription errors. It should also be noted that the EMr must be well designed to facilitate the handling of basic and clinical data, without supposing an overload for the doctor or reducing the time of patient care. In reference to the latter, more and more criticisms of EMr should be mentioned due to the increase in burnout syndrome (6) and the increase in "copy and paste" (7) in the clinical history of patients.

C2.- Quality systems in the care:

* C2.1.- Surveys of patient and family satisfaction

* C2.2.- Control of nosocomial infection: programs pneumonia, bacteremia, resistance and surgical wound infection zero in Spain.

* C2.3.- Global project of Humanization of the Intensive Care Unit (HICU: Humanization in ICU) (8), it covers practically everything, it is a system of attention to the patient and his

relatives, based mainly on the human quality. The open-door ICU concept: increase contact and extend visiting hours for family members, which improves patient, family and professional communication and the ICU without walls: involvement, participation and exchange of clinical impressions with other specialists. Without forgetting an adequate care at the end of life: limitation of life support, palliative care and respecting the anticipated wills.

C3.-*Security systems*: Mainly based on notification systems of incidents or adverse effects (9), as well as the need to be proactive in the design of protocols and actions anticipating errors or complications that may arise.

The conclusion is that knowledge in an ICU implies an *INTERNAL KNOWLEDGE*: CK, TK and GK within the unit itself, and an *EXTERNAL KNOWLEDGE*: outside the unit and that is contributed by the CC-OS. Therefore, all this external knowledge must be developed for the prevention and management of the post-ICU syndrome: physical, psychological or social sequelae, and also informs us of hidden or in-hospital mortality after discharge from the ICU and improves our clinical relationship with the rest of the specialties. Everything should provide better numbers of stay in the ICU and a containment of health spending, which could be reinvested in training, education and research, to be later reverted in an increase of knowledge and promoting a virtuous or ideal circle .

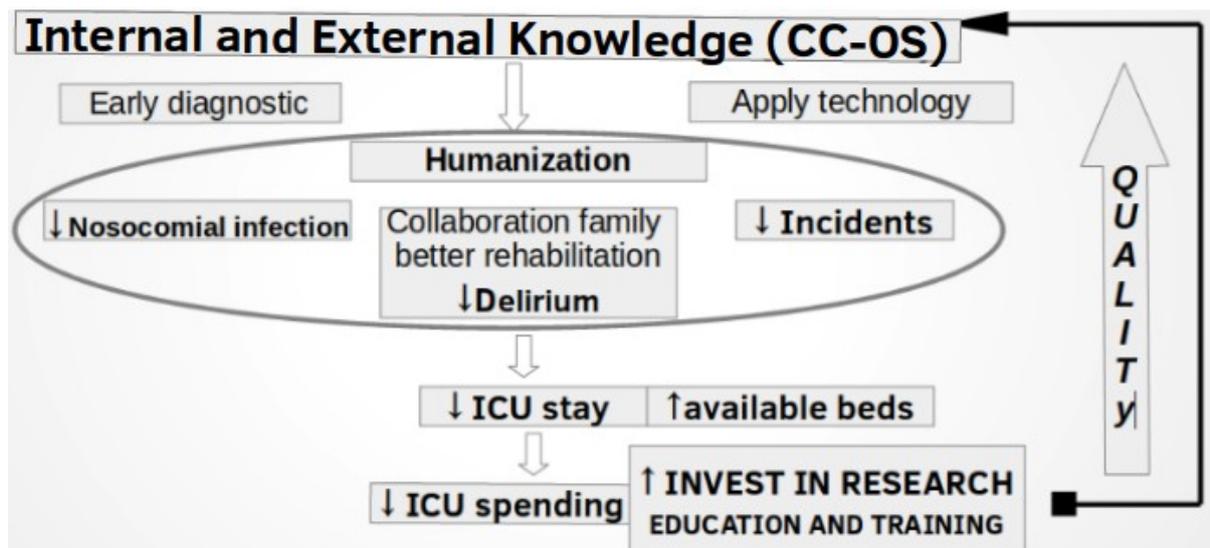


Fig. 4: Final knowledge strategy

Bibliografía

- 1.- Lorri Zipperer. Knowledge Management in Healthcare. First edition April, Taylor & Francis Ltd. U.K. 2016. ISBN: 140943883X.
- 2.- Programa de la UCI extendida del Hospital del Henares aumenta la seguridad del paciente. ([HTML](#))
- 3.- Kramer A. A, Higgins T. L, Zimmerman, J. E. Intensive care unit readmissions in U.S. hospitals: Patient characteristics, risk factors, and outcomes. Critical Care Medicine. 2012 January. 40(1):3-10. ([PubMed](#))
- 4.- Campbell J. A. Cook G. Adey B. H. Cuthbertson. Predicting death and readmission after intensive care discharge. British Journal of Anaesthesia , Volume 100 , Issue 5 , 656 – 662. ([HTML](#)) ([PDF](#))
- 5.- Needham Dale M. Patient Safety, Quality of Care, and Knowledge Translation in the Intensive Care Unit. Respir Care 2010;55(7):922–928. ([PubMed](#))
- 6.-Verghese A, Shah NH, Harrington RA. What This Computer Needs Is a Physician Humanism and Artificial Intelligence. JAMA. 2018;319(1):19–20. ([PubMed](#)) ([HTML](#))
- 7.-Sheehy AM, Weissburg DJ, Dean SM. The Role of Copy-and-Paste in the Hospital Electronic Health Record. JAMA Intern Med. 2014;174(8):1217–1218. ([PubMed](#)) ([HTML](#))
- 8- Proyecto Humanizando los cuidados intensivos. ([HTML](#))
- 9.- [SENSAR \(Sistema Español Notificaciones Seguridad en Anestesia y Reanimación\)](#).