

# Knowledge Management for Clinical Decision Making

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**Abstract.** In daily practice, professionals have to take critical decisions continuously, involving a great deal of risk: the less optimum the decision, the more mistaken the diagnosis and prescription will be.

Optimisation of decision making is closely related to having adequate information and knowledge available in an accessible manner at the right time. This requires a **system that manages the knowledge of each specific pathology**, bringing the professional closer to the necessary information and knowledge and at the same time channelling all gained experience towards a repository of this knowledge.

The GALEKNOW project arose from this context. Its idea is to provide the staff from the Emergency Unit of the Galdakao Hospital with a support system that aids in clinical decision-making in the shortest possible period of time, at the cheapest possible cost giving the best possible service to the patients.

## 1. Introduction of the research environment and targets

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The GALEKNOW project has optimised management decision making on both a strategic and operational level.

- It facilitates strategic management decisions on providing specific information about the treatment of patients as regards performed diagnostic tests (number, age of patient, symptomatology), co-ordination and consultation between services, transfers to other hospitals, etc. thus making it possible to manage relevant information which can easily be accessed by the organisation of the services, expense control, etc.
- In a more clinical context, the analysis of the casuistry present in the system makes it possible to validate the implemented protocol and to propose changes as a result of continuous improvement schemes in patient services.

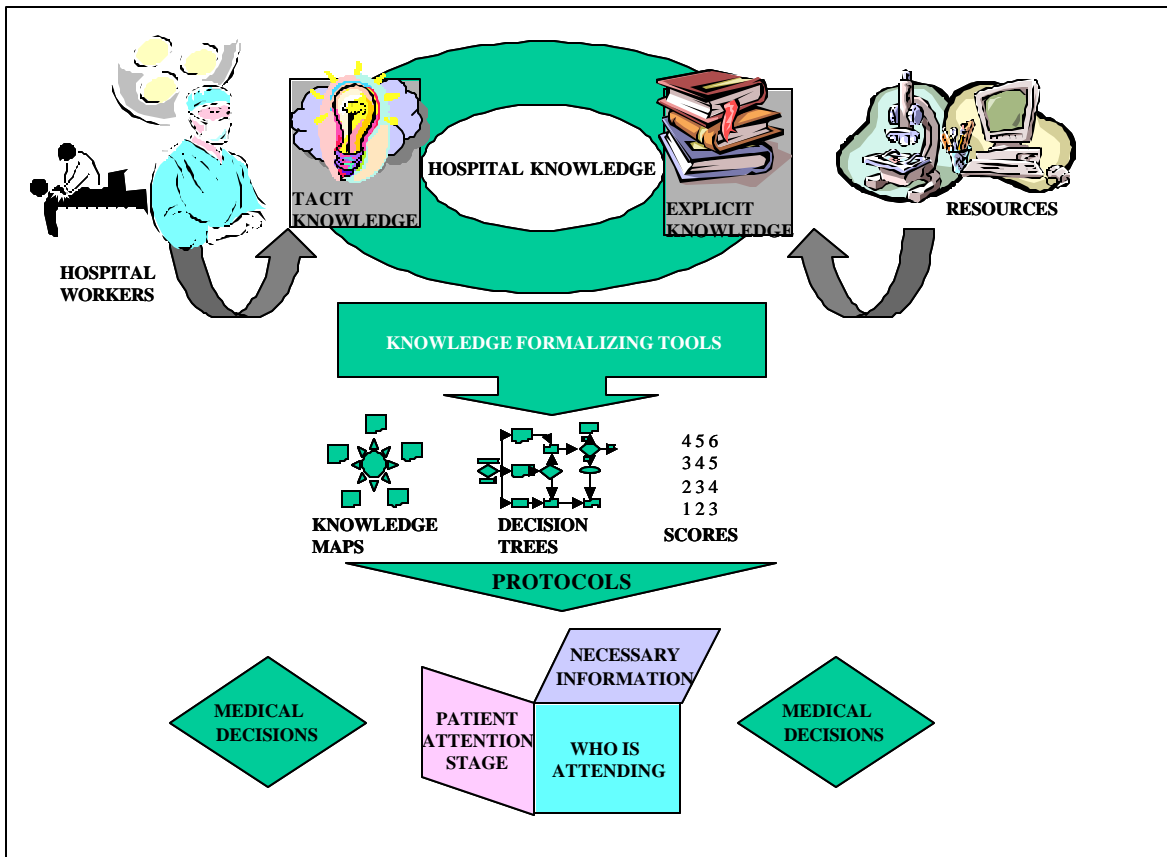


Figure 1 Methodology used in the "Galeknow" project.

Some of the objectives and fundamental achievements in the Knowledge Management for clinical decision making with patients with traumatic brain injury (TBI) are as follows:

- Better quality of clinical decision making
- Optimisation of Medical knowledge management in the scope of TBI
- More uniform approach in dealing with patients with TBI
- Better co-ordination between involved areas in treatment of patients with TBI.

## **2. Knowledge Management for clinical decision making for patients with TBI in the Galdakao Hospital.**

Setting up of the Knowledge Management System for decision making in the scope of TBI in the Galdakao Hospital spanned a period of over two years. The participation of the work group of the Emergency Unit throughout this period was fundamental. Their professional and personal effort made this project possible.

Below you may find a chronological overview of all steps taken to set up and implement the Knowledge Management system for clinical decision making in TBI cases:

- a) Definition of the eligible hospital knowledge areas.

On deciding the performance scope, the research team chose to focus its attention on the Emergency Unit.

Their decision was based on the following grounds:

- Staff (academic staff and medical residents) from a variety of specialities.
- Wide variety of patients
- High number of patients
- Need for co-ordination with other hospital areas

- b) Analysis of resources and people involved in this knowledge area of the hospital.

Once we delimited the performance scope, we studied what pathology would be most suitable for our decision making management system.

Finally we settled for patients who suffered from multiple traumas, as this was a major field eligible for improvement because of the problems of this service. Bearing in mind the time limits of the project, we focused in on patients with TBI within the group of multiple trauma patients.

- c) Selection of means necessary for the “tangibilisation” of knowledge.

Basing ourselves on the study of existing problems, we concentrated on analysing all habitual support means employed in hospitals to “tangibilise” knowledge.

These means excel in the implementation of protocols, algorithms, clinical ways, scores, pharmacological appendixes ... All of them provide many advantages to their users as they establish reference values in dealing with patients. Nevertheless, the variety in formats and documentation noticeably reduce their applicability.

Eventually, we decided to use the algorithms as the main project tool, and supplemented this with other supports such as scores, clinical ways or pharmacological appendixes. Furthermore, after receiving feedback from the users in the implementation process, the need to integrate all developments in one single computer application presented itself. The objective of this was to secure the synergy from all developments and the use of the support tools whenever this was required. The immediate availability and accessibility were two evident advantages of the software application for clinical decision-making.

- d) Working out of a protocol that provides information about consultations of patients with TBI in the Emergency Unit.

Once the tools or means were decided on, and all necessary information to deal with patients with TBI was collected, a deployment methodology of the protocol of how to deal with TBI patients was established.

To that purpose a "data collection sheet" was drawn up with the main tools:

Algorithm of dealing with patients with TBI in the Emergency Unit, Glasgow Scale, Symptom Register, Register of Risk Factors, Register of Scan results and CAT, Register of diagnoses and Destination after release. The potentiality of this record lies in:

- Support for Decision Making
- Didactic Function
- Providing relevant information
- Allowing decision validation
- Simplicity (easy to fill out, user-friendly, supplements record, includes patient's affiliation details)
- It provides a perfect element which can be used to perform a pilot implementation

- e) Display of information referring to protocol (pilot implementation)

The aims were focused on the following:

- To assess the suitability of the developed means
- To measure the usefulness of the support system for decision making
- To measure staff satisfaction
- To include possible improvements
- To devise proposals for data processing

Taking the "data collection sheet" as a starting point, the developed means were implemented and opportunities for improvement were used as feedback to enhance the system. As a general conclusion we can state that the emergency unit validated all developed means up to date and ***proposed to work out a computer application integrating all elements.***

The support computer application was designed after an analysis of its advantages:

- The data are automatically fed to the application
- The entered information can be processed
- Records can be called up for analysis
- It allows to skip protocols, i.e. recording performances and decisions that fall beyond the scope of the protocol.
- It allows to store cases that are finished or in course
- It provides support information whenever required

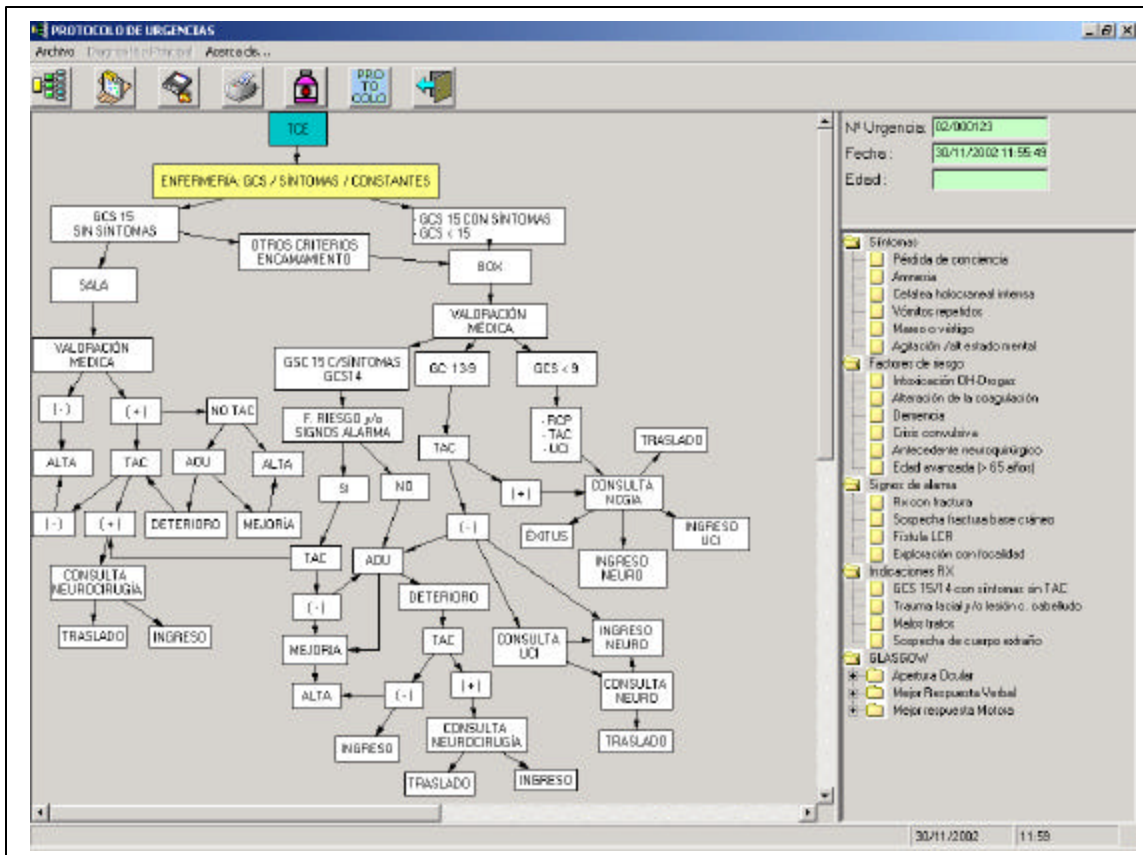


Figure 2 Fragment of the computer application

f) Definition of the protocol control indicators.

As a supplementary method, the computer tool disposes of a module that allows to process the data in order to draw conclusions. Any type of control indicator can be newly developed, which remains at the total disposal of the "owner of the system", the Head of the Emergency Unit, consultation and subsequent indicators.

g) Practical application of the protocol by the workers of the involved areas.

Once the computer application has been designed, the system implementation is transferred from paper format to computer application.

The resulting decision making management system can be run on any PC in the emergency area, both in consultation rooms as well as in central services.

h) Monitoring and assessment of the application and effectivity of the established protocol by means of indicators.

The computer application provides the analysis of performed treatments on TBI patients. This can be done by means of the information-processing module that complements that system and that collects all information generated during the treatment of the patient.

Furthermore, precise information about the compliance of the protocol is available. The analysis of the "protocol skips" makes it possible to determine whether this happens on an arbitrary basis or whether it is sufficiently justifiable with well-founded scientific reasoning. This analysis lies at the base of any modification of the algorithm of the TBI or any other element of the system.

### 3. Conclusions

As a general conclusion, the main merits of the clinical decision-making GALEKNOW system in Traumatic Brain Injury centre on the issue of devising an integral support system to deal with TBI which allows and guarantees :

- ✓ a more homogenous medical response to certain situations
- ✓ training of the staff of the emergency unit: transfer of expert knowledge of senior doctors and academic staff to trainee doctors (residents)
- ✓ enhancement of the co-ordination between services
- ✓ optimisation in the use of available resources
- ✓ the conversion of data - information - knowledge
- ✓ to process information and draw conclusions to make decisions:
  - clinics: enhancement of TBI protocol
  - management: establishing quality indicators, improvement of co-ordination between areas, knowledge of number of performed diagnoses...

From a technological point of view, working out a methodology of "tangibilisation of knowledge" is an important achievement in many ways:

- Simplicity
- Use of several "tangibilisation" systems (algorithms, clinical ways, scores ...) depending on the type of knowledge to specify.
- Integration of all elements in one single computerised system
- Easy to copy without the help of an expert team in knowledge management
- Guarantees a more homogeneous decision-making

From an economic point of view the system provides the emergency system with information – not available up to now – which allows for establishing indicators for quality and others in order to make improvements to the resource management policy.