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A Conceptual Framework to Manage and Improve the Decisions of Multidisciplinary Committees in Oncology Using Computer-based Supports

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Abstract

Medical decision making and health care managements are more and more a multidisciplinary approach especially in the field of oncology. Multidisciplinary meetings have to be supported in order to improve decisions taken and patients care. To meet this objective, supporting the various decision making processes and facilitating the use of the best medical knowledge is essential. We have identified and explained six decision making processes to assist MCO (multidisciplinary committees in oncology). We are offering a conceptual framework aiming at pointing the means to be used for decision making in order to improve this process. Support for structuring and carefully presenting each patient's case, support for the selection of the most appropriate treatment using both computable guidelines and computable clinical trials is at the heart of our proposition.

Keywords:

professional staff committees,
decision support techniques, clinical practice guidelines,
clinical protocols, clinical trial, medical oncology

Introduction

Medical decision making and health care management are more and more a multidisciplinary approach especially in the case of complex or malignant diseases. Oncology is a typical example of such care organization. In many countries, multidisciplinary committees in oncology (MCO) have been set up in order to discuss patients' cases with the objective of optimizing each patient's healthcare management, taking into account the knowledge of the different domain specialists (including surgeons, radio-oncologist, pathologist, chemotherapist). Recently in France, a national plan has been launched to impose a mandatory consultation of such committees before any treatment strategy in oncology. These committees have to use multidisciplinary meetings, existing guidelines and standard protocols in order to provide patients with specific care recommendations according to the best accepted practices. Usage and compliance with guidelines and standards on care is one quality criteria explicitly mentioned in the French Cancer National Plan and have to be regularly reported by MCO.

As mentioned by Hammond et al. ten years ago [1]: "The number and wide variety of guidelines and protocols used in treatment trials, and the amount of clinical data generated suggest the need for computer-based support". Nowadays, because of the ever more important mass of information, we argue that using computers is mandatory if continuous quality improvement for patients care is required. Indeed, computable guidelines and decision support systems may be useful [2] at several levels for establishing and practically organizing a MCO. In this article, we present a conceptual framework which is efficient both in terms of improvement of the patients management, and in terms of producing and enriching the medical knowledge required for this improvement.

Our aim in presenting this conceptual framework is to offer an analysis that suggests decision support system solutions and organization principles that applies broadly to almost any situation in which multidisciplinary committees must be efficiently set-up and consulted in order to improve patient cares.

MCO Organization

There are several MCO in a care structure (one for each neoplasm domain: neurology, hematology, genecology …). These multidisciplinary committees follow similar work processes and often follow the same organization and planning in order to perform their tasks. The typical organization of a multidisciplinary committee in oncology has been analyzed by Castel et al. [3]. The MCO operational principle and the patient's case workflow on which a therapeutic opinion must be given can be summarized as follows:

- all cancer patients for whom the establishment or modification of an oncology treatment is required must be gathered and registered by the MCO secretariat;
- MCO regularly schedules Multidisciplinary Committee Meetings (MCMs) in order to provide therapeutic advice on the patients' cases submitted.
- each case submitted and registered is integrated in a summary clinical document used as basic information during each MCM to decide on the patient specific care management to recommend. It should be noted that those cases corresponding to a standard management procedure which has a multidisciplinary agreement translated into a clinical practice validated and up to date, are not systematically presented and discussed during an MCM. In some MCOs, an expert coordinator working in contact with the multidisciplinary committee members may decide for the most appropriate approach in compliance with the reference guidelines approved by this multidisciplinary committee. The expert's mandate aims at relieving the work load during MCMs who will then dedicate more time to complex and / or atypical cases);
- whether discussed during a MCMs or resolved by the expert, a written recommended therapy supported by reference practices and / or items of discussion stating any reason for non compliance to the existing reference guidelines, is given for each case;
- finally, the MCM's therapeutic recommendations are recorded and the referring practitioner is informed of the future management decision for the patient concerned.

MCO must organize and control the quality of the whole decision making process and the effective application of the opinion/recommendation given. Usage and compliance with clinical practice guidelines is a key point in this respect. Establishing procedures for controlling, monitoring and improving is paramount to check that the opinion given complies with the clinical practice guidelines approved by the MCO. The adequacy rate between the opinion given and the practice standards is one of the quality oriented indicators of the compulsory report activity required from any MCO.

The MCO typical workflow description must be supplemented with additional data for all MCO involved in therapeutic trials. In some care centers indeed, MCO have the responsibility to offer patients alternative treatments to the standard ones, informing them of the availability of one or several potentially promising therapeutic treatments they might benefit from. Improving patients' enrolment in on going therapeutic trials is a constant concern viewed as a supplement to a treatment or to standard alternatives possibly submitted to patients.

System design: objectives and features

The MCO workflow review highlights various processes in which several decision support systems might efficiently help optimizing the organization and improve the patient's management situation (figure 1):

1. **support for structuring the document presenting the case of each patient.** This document content is essential to the decision making process, given that therapeutic options are going to be founded on this information basically. It must contain all the relevant, rigorously informed decision making criteria. The decision focuses on the use of explicit criteria to which a value is attached [4]. The nature of these criteria is obviously dependent on the type of tumor (volume, lymph nodes, hormone receptors, chromosome deletion etc.). Within the collaborative medical decision making process framework, Christensen et al. [5] evidenced the relevance and importance of formatting and presenting problem-relevant information by means of such a document. This is conventionally a paper or an e-form filled-in before or during the MCM. The main objective of a system for structuring the case record of a patient would be to ensure that the relevant information for the patient's case and for the final decision is brought to light and shared by all members of the committee. All relevant information describing the patient's case must be drawn from decisional criteria available in the guidelines and protocols, from those cases already resolved and from on going therapeutic trials.
2. **support for selection of cases which have to be discussed within a MCM.** To that effect, a decision support system based on MCO approved guidelines is required. The system's main objective is to provide with recommendations relevant to the patient's case. When for instance such a system offers a standard therapy with no alternative solution, the expert may then support the system's decision and decide not to present the case to the MCM.
3. **decision and argument support for the MCM.** Such a system must make use of all the knowledge available to put forward alternative therapies issued from: 1) standard guidelines and protocols; 2) clinical trials in which the patient can possibly be enrolled; 3) the case database to identify similar cases for which a positive (or negative) therapeutic response was recorded. Using a case database presupposes the patient's follow-up and an adequate feedback on the effective observance of the therapy recommended by the MCO, with its effect on the patient. Rossille et al. [6] have proposed a system aiming at supporting the MCM in their decisions for non-standard cases (cases

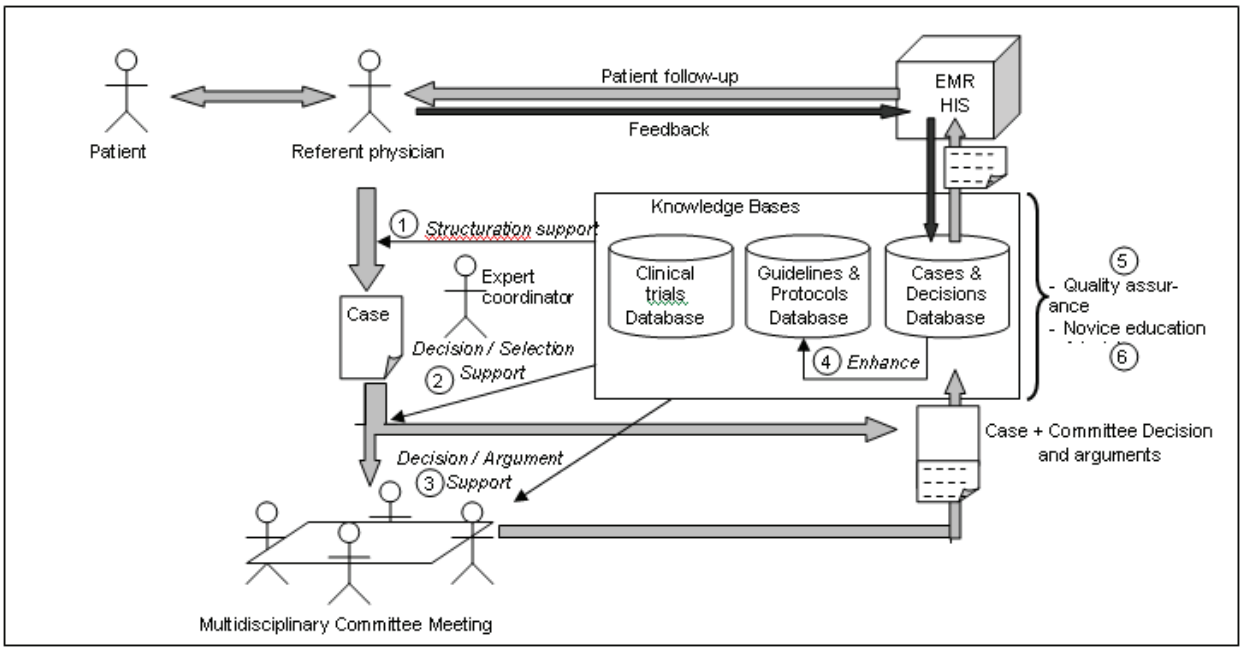

Figure 1 - MCO organization and workflow

that do not/cannot comply with guidelines' recommendations). This system technically used both rules basedand case based reasoning. In our opinion, such system could be improved taking into account clinical trials database in order to provide selection of relevant trials for a given patient. Using a comprehensive decision support system to decision making process would also be interesting used as a support to the discussion during MCMs and to support and evidence the committee's decision based on the system's proposition.

4. **guidelines improvement and local adjustment**. Sauvagnac et al [4]. argue that a multidisciplinary committee is the right place for advancement and particularization of protocols and guidelines. To that end, we must bear in mind that these care standards must be explicitly expressed in order to be clearly understandable and unambiguous for all the specialists. Computerization of guidelines is a good mean to achieve this in depth explanation. Guidelines become fully operational and can be checked and strengthened. In the same line, the decision criteria can be specified during to the computerization process and during their use within the MCMs. Thus, it can become a virtuous circle: guidelines operate for multidisciplinary committees; multidisciplinary committees operate for the advancement of the guidelines themselves. Improving the guidelines and their possible local adjustment or adaptation means using the knowledge derived from the MCMs decisions and using the information on the patient's follow-up (efficiency of the treatment, therapies available, side and noxious effects, quality of life, life expectancy,…). A review of cases for which a recommendation was put forward by the system and the MCM prescription who followed this recommendation on the one hand, and actions actually implemented for these patients on the other hand, is extremely useful in improving the Departments operational procedures (in those Departments treating these patients) and in assessing the guides and recommendations adaptation to the real clinical conditions.
5. **facilitating the quality control**. We need tools which provide help in order to analyze the cases for which the Committee has given an opinion beyond the usual guidelines. Setting up a cases and decisions database and computable guidelines database can facilitate the quality assurance process and results. A computable guidelines system can be used both 1) prospectively, to help the expert or the committee in their search of the best standard solution satisfying adequately the case of the patient; 2) retrospectively to identify and review those cases for which a non standard solution was recommended by the MCO.
6. **education and training**. Setting up and making available knowledge bases can also be used as tools for the physicians' formation and training. Such bases can be used to enrich a training environment and enable trained practitioners to look into the decision making rules, check their scope of implementation and identify their limitations.

Pilot implementations

Within our healthcare establishment's MCO, we have implemented the functionalities described above. This pilot implementation is based on a re-use of our guidelines development and dissemination platform described elsewhere [7].

Computable guidelines (neuro-oncology domain)

In a collaborative effort with the neuro-oncology MCO, we have established an I.T. based system using computable guidelines to facilitate the identification of standard and validated therapies applicable to each patient's case. Within this MCO, cases that will be reviewed during the next MCM are collected in a computer file and recorded in a proprietary database into the hospital information system (HIS).

We have developed a prototype focused on the treatment of gliomas. Textual guidelines provided by authoritative organization [8] have been successfully computerized using our platform. A software component has been built in order to couple this HIS database and the computable guidelines. This component is based on XSLT facilities in order to process the data extract from the HIS database into an XML document which can be processed by our computable guidelines system. The system output for each patient case is a synthetic and structured document on which the patient's data are summarized on the left hand side and the recommendations adapted to the patient's profile are displayed on the right hand side (figure 2). This document is designed for printing and use both by the MCO expert and by the multidisciplinary group during the MCM.

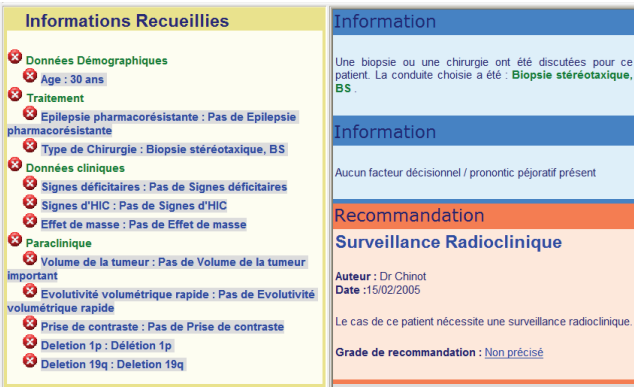

Figure 2 - Output of the computable guidelines system

So far we have computerized 4 guidelines focused on the different glioblastoma grades. We are working on computerizing other guidelines.

Clinical trials (thoraco-oncology domain)

In joint collaboration with the thoraco oncology MCO, we have developed a system aiming at improving the patient's enrolment rate in on going therapeutic trials.

To meet this objective, we have come up with additional developments to enrich and modify the functionalities of our decision support system and turn it into a management and reminder tool for those therapeutic trials in which patients are susceptible to be enrolled. The result is a definition of all inclusion criteria for the various therapeutic trials concerned and translation into the formal format used in our decision support system. The inclusion criteria correspond to the « rule-in » and the exclusion criteria are the « rule-out » elements of a conventional computerized guideline system. Here again we make use of a software component to link computerized therapeutic trials to the patients database used by the MCO (in this MCO they use a MS Access database). The software application is hosted in a laptop computer with real time use during the MCM. The screen displays the patient's data and possible inclusion protocols, and this is in turn displayed to the MCM participants (figure 3). For each individual patient, the system mentions inclusion or not within the therapeutic trials(top of the screen), the number and reason(s) for non inclusion in each trial (bottom right of the screen), and the relevant patient's data (bottom left of the screen).

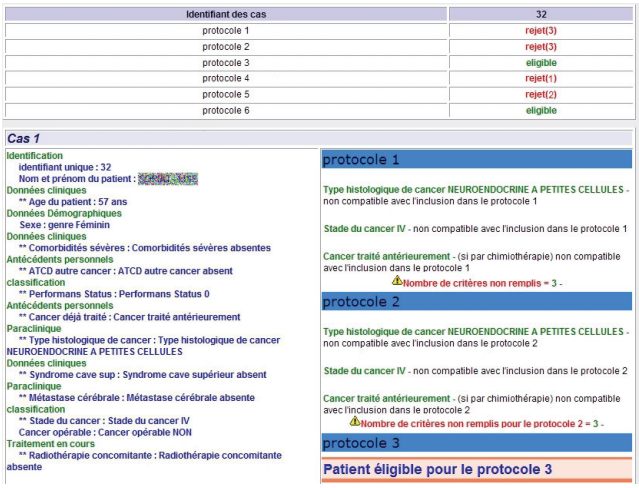

Figure 3 - Screen copy of the clinical trials selection system

Future work will be the enhancement of the graphical users interface and assessment of the efficiency of the system using a before- after study.

Discussion

The multidisciplinary decisions and management are a prerequisite to any medical act, especially when dealing with complex, intricate pathologies whose management

involves a delicate approach. As to oncology, MCO offer an organizational frame enabling to partly formalize the decision making process. The MCO ultimate objectives are to improve therapy management and to cut down any non justifiable deviation and disparity when managing patients. These objectives are best met when the various decisions making processes are supported to the best extent and when the best medical knowledge is used within the processes. We propose a conceptual framework to help identifying those decision support systems which should be used to improve the decision making process applied within the MCO. Support for structuring and carefully presenting case of the patient, support for selecting the most appropriate therapy using both computable guidelines and computable clinical trials is the core of our propositions.

Implementing computable guidelines is the way to make operational that knowledge directly in-bedded into the decision making process. The use of decision support systems which are based either on guidelines or/ and on case-bases validated within the MCO frames the approach while avoiding any drift when selecting therapeutic options. During the MCM, guidelines play a safeguard role in removing part of the unnecessary subjective opinions in order to opt for a treatment compliant with objective scientific data and meeting the patient's needs. Using guidelines for instance may contribute to put into perspective experts opinions and judgments which sometimes impact more than required on the final decision. The weight of the expert's knowledge during a MCM can indeed be deleterious if justified only by the authority representing the rule specific to that expert [4]. It should also be seen to it that the inevitable social component presiding during the MCMs becomes over important, and that the discussion should be turned into a « battle of experts » far from the standard, validated and shared knowledge [9]. To that effect, computerized operational guidelines may contribute to avoiding this type of deviation while refocusing the discussion on tangible, accepted and explicit facts and knowledge. Finally, a more rigorous use of data from the literature and from the guidelines should be encouraged given that it contributes to the strengthening and support of evidence based decisions taken during the MCM.

Another justification for implementing computable guidelines within the MCO comes from the need to optimize the case workflow for those patients for whom an opinion is required. Optimizing the time to processing a patient case is vital especially in the field of oncology where any delay in the therapeutic management can have a fatal impact. There are cases when the MCM discussion is fully justified when facing a special, non typical case, for which no guideline can rigorously be applied or when the wish of a patient may induce a reviewed protocol decision, assessing the risks generated by deviating from the approach recommended. But many are the cases subject to discussion during a MCM which actually pertain to the standard protocol decision making process [4] and could therefore be identified, as is our suggestions, by means of an I.T. decision support system based on computable protocols and guidelines. What is important is to identify those standard cases and improve their processing time to dedicate more time to complex patient cases.

Using guidelines within MCO is also beneficial to better adapt and upgrade guidelines themselves. National or international guidelines are seldom used "out of the box". They must be customized and require a preparatory work with the physicians so that they can be used more easily – computerization is part of this work- with update based on the latest publications or for strategic refinement. They must therefore be locally adapted before becoming fully operational. MCMs are the right forum for improving the guidelines given that this is where such guidelines can be upgraded not in the light of new data or knowledge but based on their actual use [4]. Such improvement is made possible if what is recorded following a MCM is not the decision only, but the features of the cases treated which must also be registered; above all the elements in the decision helping to better understand the reason behind the decision must be recorded. Thus, the 'discussion trace' must be rich: discussions should be recorded in full and not limited to the final decision taken; it should be justified, with other hypothesis presented, the reasons for discarding them, the knowledge not shared by all (i.e. over specialized) reported to all the meeting participants during the discussion. These elements must enrich the case database from which it will be possible to update or find new knowledge used in setting the healthcare management standards. What is essential is preparing a virtuous circle. This presupposes formalizing the MCO practices and having adequate tools which will be beneficially used for decision taking in these committees and for building up on medical knowledge. What we are proposing as a conceptual framework within the MCOs using these computer-based supports follow this line.

References

[1] Hammond P, Harris A, Das SK, and Wyatt JC. Safety and decision support in oncology. Methods Inf Med. 1994 Oct; 33(4):371-81.

[2] Dufour JC, Bouvenot J, Ambrosic P, Fieschi D and Fieschi M. Textual Guidelines versus Computable Guidelines: A Comparative Study in the Framework of the PRESGUID Project in Order to Appreciate the Impact of Guideline Format on Physician Compliance. *Proc. AMIA.* 2006 Nov.

[3] Castel P, Blay JY, Meeus P, Sunyach MP, Ranchere-Vince D, Thiesse P, Bergeron C, Marec-Berard P, Lurkin, A and Ray-Coquard I. [Organization and impact of the multidisciplinary committee in oncology]. Bull Cancer. 2004 Oct; 91(10):799-804.

[4] Sauvagnac C, Beckendorf V, Lesur A, Luporsi E, Stines, J, Falzon P and Bey P. [Decision committees in oncology: from standard to actual cases]. Bull Cancer. 1999 Sep; 86(9):767-72.
[5] Christensen C. and Larson JR. Collaborative medical decision making. Med Decis Making. 1993 Oct-1993 Dec 31; 13(4):339-46.
[6] Rossille D, Laurent JF and Burgun A. Modelling a decision-support system for oncology using rule-based and case-based reasoning methodologies. Int J Med Inform. 2005 Mar; 74(2-4):299-306.
[7] Dufour JC, Fieschi M, Fieschi D, Giorgi R and Gouvernet J. A platform to develop and to improve effectiveness of online computable guidelines. Stud Health Technol Inform 2003; 95:800-5.
[8] Standards Options and Recommendations (SOR) on the Fédération Nationale de Lutte Contre le Cancer (FNCLCC) web site : http://www.fnclcc.fr
[9] Castel P. and Merle I. [When standards become a resource for doctors: The case of oncology]. Sociol Trav. 2002; (44):337-55.

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