

Review

Collective wisdom and decision making in surgical oncology

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Accepted 4 January 2010

Available online 27 January 2010

Abstract

Aim: To describe systems for capturing and optimising collective knowledge and insight in areas of complexity and uncertainty in surgical oncology, with particular reference to the Delphi process and related systems.

Methods: Internet search engines (Google, Google Scholar) and four databases (SCOPUS, PubMed, Medline and Embase) were searched to find English language articles on the use of The Delphi Process and related systems in surgical oncology, using a variety of search terms.

Findings: There are a number of established systems for co-opting group knowledge and facilitating collective decision-making. These find applications in commerce, industry, government and defence. They have also been applied to problems in surgical oncology, for example using the Delphi process to optimise the management of colorectal cancers and metastases.

Conclusions: Collective decision making tools find practical applications in the allocation of resources and in clinical decision making in fields of surgical oncology practice where there is a wide range of evidence and expert opinion. Such methodologies set new standards for the collating of professional expertise and for the writing of “best clinical practice” guidelines in the cancer subspecialties.

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Keywords: Delphi process; Wisdom of crowds; Crowdsourcing; Surgical oncology

Introduction

There are many areas of uncertainty in clinical and oncological practice. The breadth and extent of the published literature in any one subject area is now huge, and accruing at an enormous rate. The “cloud” experience of huge numbers of individual clinicians treating individual patients with their infinite variety of presentations and responses to treatment across the world often goes uncaptured and unrecorded. There is no prospect of any one person collating, analysing and distilling this mass of published and unpublished knowledge in a realistic time frame, even with the help of modern search engines.

Digital technologies and the opening up of the Internet have driven forward the science of understanding mass behaviours, and have provided means for the efficient dissemination and collation of responses and opinions from large numbers of people. We see these processes in daily use in dissemination by scientific search engines such as

SCOPUS, Google Scholar and Web of Science, and in communal interactive systems such as Facebook, Twitter and MySpace.

Individual genius, insight and intellectual courage drives human society forward in many ways, as illustrated by the work of Galileo, Newton, Einstein and Darwin. However, many challenges in medicine and public health require a collective approach. They need systems which tap into many different sources of wisdom and experience if resources are to be allocated most efficiently, and if clinical outcomes are to be optimised on an individual and a population basis.

In recent times, we have seen a major shift in medical decision making from the “wise individual” to the multi-disciplinary team. Our horizons have risen from the local and parochial to the regional, national and supranational. The Internet has brought worldwide and near instantaneous visibility to the key literature and as email has radically simplified cross border communications. Internet development has also brought a whole new thinking and language of terminologies which recognises “the wisdom of crowds” and which captures this collective knowledge through

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processes such as “crowdsourcing”, and “collaborative filtering”. Perhaps the best known of these techniques in Medicine is the Delphi process. This has already found a number of practical applications in surgical oncology. It is a substantial advance over simple questionnaire based surveys.

Methods

Four databases (SCOPUS, PubMed, Medline and Embase) were searched using a variety of terms to find English language articles pertaining to collective knowledge systems such as the Delphi System in general and in respect of surgical oncology in particular.

Keywords included “Crowdsourcing”, “the wisdom of crowds”, ‘Delphi System’, ‘Delphi Method’ and ‘Delphi Method in Surgical Oncology’.

No Cochrane reviews were found on this topic. The search identified that there were no prospective randomised controlled or systematic reviews, one observational study and three studies involving the Delphi technique and oncology.

The Delphi system

The Delphi System is an approach used to gain consensus among a panel of nominated voting experts. It was originally developed in the 1950s by the Research and Development Corporation, RAND, for forecasting future warfare after World War II.^{1,2} In 1959, Helmer and Rescher published a paper describing a tool for pooling the predictions of a panel of experts for questions that could not be answered as yet by exact science.³

In addressing major organisational problems, group decision-making is open to bias from single experts and ‘follow thy leader’ tendencies. There is often a reluctance to abandon previously stated opinions and groups may be subject to a variety of pressures. The Delphi System offers anonymity, and asynchronicity in time and place, thus allowing individual beliefs to be expressed independently in contributing to the conclusions of the whole group.

The Delphi System has been widely applied outside healthcare in strategic military and political planning and in business decision making.^{4–7} However, there is as yet no level 1 evidence to prove the value of the process as an alternative to group discussion for clinical decision-making.

The Delphi system lends itself to a range of applications in cancer management, both in the allocation of resources and in interpreting a complex clinical evidence base, so as to aid multidisciplinary decision making across diverse disciplines. Professional guidance to interpreting the literature using the Delphi technique may also assist clinical MDT decision making and hence optimise practice in a rapidly changing practice and technical environment.

Components of the Delphi process

The Delphi system is a structured process with four core principles of anonymity, asynchronicity, controlled feedback and statistical analysis. A question or problem is identified and defined by the leading body. An extensive factual information search should take place and evidence-based statements provided to potential members of the panel. The panel should be experts in their field and be adept at structural, critical analysis of information. Debriefing sessions can be used to ensure panel experts are aware of the educational resources. Information is provided as a list of statements for submission to the Delphi experts.

A group moderator is then nominated. The moderator does not vote but provides information, delegates tasks, submits statements to the panel, collects response, analyses data, submits the response for further panel scrutiny in repeated rounds and collaborates the result for presentation to the panel.

A series of voting rounds take place which may be separated in time and place, and which may be conducted through a variety of media, including email. Early voting rounds help to define study objectives. Subsequent rounds rank these objectives in order of importance and develop criteria for further consideration, which are then ranked. The process identifies areas where there are differences in opinion or agreement, which may or may not lead to a consensus view on each of the questions posed.

The four key principles of the Delphi system

Anonymity: This ensures that the personalities and status of the voting experts cannot influence group behaviour. Opinions perceived as unpopular or maverick can be freely expressed. Experts may change their opinions without pressure to match preconceived expectations.

Asynchronicity: This allows the process to move forward without depending upon participants being together in time and place. This allows time for reflection and for geographically widely dispersed experts to contribute effectively.

Controlled feedback: This allows the results of each subsequent round formulate the next, under direction of the moderator.

Statistical output: The Delphi process produces quantitative results from the qualitative beliefs of the panel. The Delphi group can then assign a level of confidence in the results and gauge satisfaction with the outcome.

The Delphi rounds

The facilitator submits a questionnaire or list of factual statements to the Delphi experts. The experts respond anonymously. A list of goals and criteria are developed from the result analysis of this questionnaire and processed by the facilitator to formulate a second questionnaire, which

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