

PAPER

Access to intensive care unit beds for neurosurgery patients: a qualitative case study

D K Martin, P A Singer, M Bernstein

J Neurol Neurosurg Psychiatry 2003;74:1299–1303

See end of article for authors' affiliations

Correspondence to:
Dr D K Martin, University of Toronto Joint Centre for Bioethics, 88 College Street, Toronto, Canada ON M5G 1L4;
douglas.martin@utoronto.ca

Received
16 January 2003
Accepted in revised form
4 April 2003

Objectives: The purpose of this study was to describe the process used to decide which patients are admitted to the intensive care unit (ICU) at a hospital with special focus on access for neurosurgery patients, and evaluate it using "accountability for reasonableness".

Methods: Qualitative case study methodology was used. Data were collected from documents, interviews with key informants, and observations. The data were subjected to thematic analysis and evaluated using the four conditions of "accountability for reasonableness" (relevance, publicity, appeals, enforcement) to identify good practices and opportunities for improvement.

Results: ICU admissions were based on the referring physician's assessment of the medical need of the patient for an ICU bed. Non-medical criteria (for example, family wishes) also influenced admission decisions. Although there was an ICU bed allocation policy, patient need always superceded the bed allocation policy. ICU admission guidelines were not used. Admission decisions and reasons were disseminated to the ICU charge nurse, the bed coordinator, the ICU resident, the intensivist, and the requesting physician/surgeon by word of mouth and by written documentation in the patient's chart, but not to the patient or family. Appeals occurred informally, through negotiations between clinicians. Enforcement of relevance, publicity, and appeals was felt to be either non-existent or deficient.

Conclusions: Conducting a case study of priority setting decisions for patients requiring ICU beds, with a special focus on neurosurgical patients, and applying the ethical framework "accountability for reasonableness" can help critical care units improve the fairness of their priority setting.

Allocating intensive care unit (ICU) beds to support the general medical and surgical services of a large teaching hospital is a major challenge. Though there is a substantial literature on resource allocation and utilisation in ICUs including the assessment and predictors of outcome,^{1–12} and guidelines for triage of critically ill patients and ICU admissions and discharges,^{11–13} we are unaware of any research that describes actual priority setting in an ICU with particular reference to neurosurgery patients.

Many neurosurgical patients require an ICU bed during their hospital care, and there is an emerging literature on the special critical care needs of these patients and how best to meet them.^{14–22} There are also medical criteria to suggest how best to allocate ICU beds to neurosurgical patients.²³ In the late 1990s cancellation of elective neurosurgical cases and inability to accept referral of acutely ill neurosurgical patients from other hospitals became a common problem at Toronto Western Hospital, University Health Network (TWH), a large tertiary and quaternary referral centre and the largest teaching hospital within the University of Toronto. This was perceived to be attributable to two main factors: (1) a significant nursing shortage that resulted in diminished capacity in the ICU; and (2) inadequate protection of ICU beds for neuroscience patients.

From January 1997 until March 2002, on average, 14.6% of neurosurgical patients requiring admission to an ICU bed at TWH were denied access (that is, about every seventh patient) (personal communication). The problem was partially alleviated by the institution in the summer of 1999 of an eight bed neurosurgical step-down unit where patients who were not ventilator dependent—that is, about 50% of neurosurgery patients requiring a critical care bed—could receive special neurological nursing and monitoring. This meant that ICU beds could be used for other critically ill patients.

This is a priority setting problem. In general, priority setting refers to the allocation of resources (human, fiscal, physical, or

other) to programmes or people with competing interests.²⁴ In this case, the problem is deciding which patients should be admitted to the ICU; the resources are nursed ICU beds and the competing interests are held by patients with different disease entities and by different medical services.

International experience has shown that there is no consensus regarding "correct" priority setting outcomes.²⁵ Zussman, after a five year study of critical care, concluded that, "It is all very well and good to develop [priority setting criteria]. But such criteria matter not at all if they are ignored, for what is left out of the predictive models—as well as of the ethical reflections on triage—is any sense of the socially structured pressures operating on physicians, ... that generate indifference to some patients and commitments to others."²⁶ Strosberg and Teres found that most "gatekeeping" decisions in critical care units were "ad-hoc and political" and not conforming to "clear rules".²⁷ In the absence of consensus about priority setting criteria in critical care, a key goal is a fair decision making process. "Accountability for reasonableness"^{27a–27b} is a leading conceptual framework that specifies conditions that define a fair priority setting process. It has been used to evaluate priority setting at the health care system level.^{28–30} But has not previously been used to evaluate priority setting at the level of a hospital programme, such as in critical care.

This report describes the process used to decide which patients are admitted to the ICU at TWH with special focus on access for neurosurgery patients, and evaluates the process using "accountability for reasonableness". We also identify "good" practices and opportunities for improvement.

METHODS

Design

This was a qualitative case study. This is the appropriate approach for investigating a complex social phenomenon in its real life context.³¹

Box 1 Documents examined

- 1 Admission and discharge policy for ICU at the University Health Network
- 2 Specific admission guidelines for ICU at Toronto Western Hospital
- 3 Description of the “flow phone” policy at TWH (an initiative to centralise within the hospital the flow of patients in and out)
- 4 Data from “Critical Ontario” (a province-wide initiative with an 24 hour/day and 365 days/year office that places patients requiring access to special services not available at the hospital they are in)
- 5 Data on “turn-aways” from the TWH ICU because of bed shortages
- 6 Minutes of two committees re-examining the admission policy for the ICU at TWH
- 7 Minutes of regular meetings of the neurosciences programme at TWH
- 8 Draft action plans for institution of a new neurosciences ICU at TWH
- 9 Results of a survey assessing ICU nurses’ views toward working in a separate neurosciences ICU
- 10 Updated guidelines statement in response to nursing shortage, proposing optimal number of total nursed beds in ICU and allocation to neurosciences patients
- 11 Document describing details of a closed neurosurgical ICU at one of the other two adult hospitals with neurosurgery units in Toronto

Setting

TWH is one of three hospitals comprising a larger organisation—The University Health Network (UHN). This study involved the following divisions, departments, and groups: ICU, critical care medicine, neurosurgery, internal medicine, emergency medicine, cardiology, administration, and nursing. The ICU at TWH is a “closed” unit; the ICU physicians assume care for the ventilated patients while the neurosurgeons are responsible for management of the neurosurgical aspects of the patient.

A guideline was established in 1997 by the chief of the department of surgery, in collaboration with neurosurgeons and ICU staff, that in the situation of full staffing of 23 nursed beds, nine will be dedicated for medical/surgical patients, 10 for neurosurgery patients, and four for cardiac patients.

Sample

Key documents, people, and meetings were sampled. Theoretical sampling was used to determine which documents, people, and meetings were “key”. Theoretical sampling is “sampling on the basis of emerging concepts”³²—for example, when someone was identified as having a key role in the process, we sought to interview them. As is customary in qualitative research, sampling continued until theoretical saturation was reached—that is, until no new concepts emerged in successive interviews; sample size for individual interviews was not formally calculated. Additionally, involvement of representatives of all key stakeholder groups was ensured.

Box 2 Key informants interviewed

- 1 Nurse manager in ICU (1)
- 2 Critical care physicians in ICU (2 staff and 1 resident)
- 3 Neurosurgeons (4)
- 4 Internist (1)
- 5 Cardiologist (1)
- 6 Emergency room physician (1)
- 7 Administrator (chief operating officer) (1)
- 8 Bed and “flow phone” coordinator (1)

Box 3 Observations transcribed and analysed

1. Committee meetings (two committees working in parallel to re-examine the policies regarding allocation of beds in ICU at TWH)
- 2 Information sessions with ICU nurses about their attitudes on possibly working in a separate neurosciences ICU
- 3 Morning rounds in ICU with charge nurse, neurosurgeon, neurosurgery residents, and ICU resident (for 14 days in February and March, 2002)
- 4 Daily impact of shortages of ICU resources on ability to proceed with elective surgery for patients requiring an ICU bed postoperatively
- 5 Impact of ICU shortages on ability to accept critically ill neurosurgical patients while the neurosurgeon was on call (during nine days on call during February and March, 2002)

Data collection

Data for this study were collected between January and April 2001. The three primary sources of data for this case study were: (1) key documents (for example, admission guidelines, minutes of meetings; box 1); (2) 13 interviews with key informants (for example, physicians and others involved in the process; box 2); and (3) observations (for example, the scheduled meetings of committees; personal observations by the first author of day to day problems with access to ICU beds; box 3). Key informant interviews were audiotaped and transcribed. An initial interview guide was developed based on the relevant literature and previous research. As is customary in qualitative research, the interview guide was revised as data were collected and analysed to exploit emerging findings. Observations of meetings and first hand experience on call were described in field notes taken by the researcher.

Conceptual framework

To evaluate the description, we used the conceptual framework called “accountability for reasonableness”. An institution’s priority setting decisions may be considered legitimate and fair to the degree they satisfy its four conditions: *relevance*, *publicity*, *appeals*, and *enforcement* (described in box 4). The input for the evaluation was the description of priority setting developed in the case study. The description was compared with the “accountability for reasonableness” to identify good practices, practices that conform to the framework, and opportunities for improvement, areas where the framework’s conditions are not optimally met.

Box 4 The four conditions of accountability for reasonableness**Relevance**

Priority setting decisions must rest on rationales (evidence and principles) that fair minded parties (managers, clinicians, patients, and consumers in general) can agree are relevant to deciding how to meet the diverse needs of a covered population under necessary resource constraints

Publicity

Limit setting decisions and their rationales must be publicly accessible

Appeals

There is a mechanism for challenge and dispute resolution regarding limit setting decisions, including the opportunity for revising decisions in light of further evidence or arguments

Enforcement

There is either voluntary or public regulation of the process to ensure that the first three conditions are met

Data analysis

Data analysis involved reading through all the data and identifying concepts that related to specific aspects of priority setting decisions or decision making (for example, reasons for admission, identity of decision maker). These concepts were then compared within and between data sources and similar concepts were organised under overarching themes related to priority setting decisions and decision making. Descriptions of these themes were then developed using verbatim quotes from the data sources to bolster the verisimilitude of the descriptions. This analysis process has been called a modified thematic analysis. The analysis was facilitated by, and culminated with, writing, which is an important tool in formalising concepts and making explicit assumptions about what data say and how the data were interpreted.³³ The “output” from the case study was a description of the process for priority setting in the ICU with specific focus on access to resources for neurosurgery patients at TWH.

We addressed the “validity” of our findings in four ways.³⁴ Firstly, we “triangulated” data from three different sources (documents, interviews, and observations) to maximise comprehensiveness and diversity.³⁵ Secondly, members of an independent interdisciplinary group of professional master’s students (including physicians, nurses, journalists, bioethicists, and health policy scholars) enhanced the “reflexivity” in the analysis by reviewing and commenting on the data analysis. Thus the role of prior assumptions and experience, which can influence any inquiry, were acknowledged and examined. Thirdly, all research activities were rigorously recorded to permit a critical appraisal of the methods.³⁶ Fourthly, a draft of the findings was distributed to a subgroup of seven participants and comments were invited as a “member check”. The participants verified the accuracy of the report and the reasonableness of the findings.

Research ethics

This project was approved by the research ethics board of the University Health Network. Informed consent was obtained from each individual before being interviewed. Confidentiality and anonymity was ensured for key informants who were interviewed, those individuals providing documents, and those individuals who were observed. No patients were interviewed in this study.

RESULTS

We now provide the findings organised according to the four conditions of “accountability for reasonableness” (relevance, publicity, appeals, enforcement). We have included verbatim quotes from participants to illustrate key points.

Relevance

The main reason to admit a patient to the ICU was medical need, including requirement for ventilation and/or invasive monitoring requiring ICU support. One participant said, “*How are decisions made?... Clinical need first and then bed availability.*”

In addition, priority was given to inpatients within the hospital requiring ICU (for example, patients on the medical ward who deteriorated and required ventilation and/or inotropes) and to patients in the emergency room, “*I think for in-hospital patients, we often go out of our way more.*”

Family requests were also honoured when possible. A typical situation was a catastrophic subarachnoid haemorrhage resulting in brain stem death for a patient with children living in a distant part of the world; at the family’s request, the body was maintained in the ICU for several extra days until the children arrived, then support was terminated.

ICU admissions at TWH are primarily based on the assessment of the physician who referred the case and are predicated on the medical need of the patient for an ICU bed (that is, the need for artificial ventilation and/or specialised

monitoring only available in the ICU). For example, neurosurgeons decide whether their patients required ICU care; the ICU team, in collaboration with the neurosurgeon, determines when patients are ready for discharge from the ICU.

When a critically ill patient is referred to a doctor on call, and he/she deems that the patient medically qualifies for admission to an ICU bed, the doctor pages the hospital bed coordinator (known as the “flow phone coordinator”) who monitors the status of the ICU beds. If no bed is available, the patients in the ICU are assessed by the ICU resident and/or by the subspecialty service resident (for example, neurosurgery) to see if any ICU patients are well enough to be moved to the step-down unit or to the ward. If a bed from one service needs to be borrowed to admit a patient from another, a staff to staff courtesy call is made. After this, if no bed is available, the referring doctor is informed that the ICU at TWH is unable to accommodate the patient and he/she tries another hospital.

ICU Admissions Guidelines, which had been developed and approved two years previously, were not used by clinicians making admission decisions—few knew they existed.

Publicity

The decision to admit a patient to the ICU and the reasons behind it were disseminated to the ICU charge nurse, the bed coordinator, the ICU resident, the intensivist, and the requesting physician/surgeon by word of mouth and by written documentation in the patient’s chart. This information was not disseminated more widely. Admission criteria and reasons for refusal were not accessible to patients, families, or the public. The ICU Admission Guidelines had not been widely disseminated either within or outside the hospital. The guidelines were not known to many users, such as internists and emergency room physicians, but were fairly well known to a few neurosurgeons, cardiologists, and ICU physicians.

Appeals/revisions

Appeals occurred informally, through negotiations between clinicians. Although there was a formal appeals process described in the ICU Admission Policy, it was not used. If a nursed bed was not available, a physician/surgeon could appeal by contacting the on call physician from another service and attempting to borrow a bed. Only rarely did one service deny a bed to a “competing” service if a bed were available. On occasion, pressure or persuasion exerted by a doctor (usually upon the “flow phone” coordinator on call) was effective in making a bed available. This reflected a perception that the flow phone coordinator either did not have all the appropriate information and/or had not exhausted every possible solution to find a bed. The impact of pressure tactics and its favourable use has decreased with the increased reliance on the flow phone.

“I think it’s actually gotten fairer with the flow phone because before that it used to be . . . whoever screamed the loudest got the bed.”

Success, in terms of determining if it would be safe for a marginally ready patient to be moved to the step-down unit or to the ward, often depended on how hard a doctor worked to appeal the initial refusal to admit.

“It’s to a large extent the personality and the work ethic of the individuals . . . there are situations where you . . . push a little harder . . . to get someone in.”

There were times when ICU beds were not available and all “appeal” mechanisms failed. In these cases, elective neurosurgery cases were often cancelled and critically ill neurosurgical patients from other hospitals were denied admission. In these situations, the neurosurgeons involved were forced to accept these decisions, but they experienced profound frustration and discouragement.

Enforcement

There was a general perception that statistics were being kept “somewhere” on reasons for admission, policies on the

appeals process, publicity of the information, and the overall efficacy of the process. This monitoring process did indeed exist but was not well known to the stakeholders. Enforcement of relevance, publicity, and appeals/revisions was felt to be either non-existent or deficient. One participant suggested,

"Is the overall process monitored? . . . Not that I'm aware of, no. I guess we monitor it ourselves and when things happen we hear about it . . . and it's not foolproof, it's more of . . . a crisis versus a continuum."

Guidelines regarding proportional allocation of beds by service (that is, nine for MedSurg, 10 for neurosurgery, four for cardiology) were not closely adhered. Occasionally this was because the guidelines were not well known. However, in making admission decisions, the patient's need always superceded bed allocation guidelines.

DISCUSSION

In this paper we have described and evaluated the process for deciding how patients are admitted to the ICU at a large urban hospital with emphasis on neurosurgery patients. This process is valuable because it can be used to identify good practices and opportunities for improvement that can help institutions with critical care units improve the fairness of their decision making regarding admissions. Other critical care units may find the specific findings of this study helpful; also, it is likely that they would benefit from using these methods to improve priority setting in their own context.

In the institution we studied we have identified three examples of good practice. Firstly, patient need is the prime criteria for ICU admission, even to the extent of overriding guidelines for allocating beds between services. In the context of critical care, patient care considerations should override other considerations. Secondly, reasons for admissions or refusals are communicated to the referring clinicians so that they can engage with ICU decision makers in determining which reasons are most relevant to the critical care context. Thirdly, refusals may be appealed and the decisions revised based on further arguments by the referring clinician.

This study has also identified areas where the decision making process can be improved. Firstly, non-medical criteria that often influence admission decisions may not be relevant to the context—for example, when one physician "works" harder, or exerts more pressure on others, and is successful in "finding" an ICU bed. Clinicians' personal characteristics, such as perseverance, arguably should not be a criterion relevant to priority setting in critical care. Secondly, reasons that are used for admissions decisions should be made more widely known. In particular, making the reasons accessible to the public would help them understand the resource limits under which hospital physicians and surgeons work, and the reasoning used in such a context of limits. This is particularly important for patients and family members who are the most affected by critical care admissions decisions. Ultimately, making this reasoning publicly accessible would provide a wider group of stakeholders with information necessary to engage with decision makers in determining which reasons are most relevant to a publicly funded critical care context. Thirdly, a formal appeals mechanism, or conflict resolution policy, should be implemented to allow other clinicians and even patients and/or families to engage with decision makers. This policy should include a formal "bed borrowing" policy and should close informal routes of "negotiation" that permits some clinicians to bypass the flow phone coordinator. Fourthly, the process of decision making concerning critical care admissions should be more closely monitored and evaluated, perhaps by an oversight committee that captures and shares the lessons within the hospital and with other critical care units.

Though this ICU had a bed allocation policy, our study found that need for ICU services superceded the bed allocation policy. Needy patients from, for example, medicine were admitted to the ICU even though that service may have already filled its quota of ICU beds. Consequently, neurosurgery patients were often denied access to care in this ICU; they were transferred to a step-down unit or to another hospital. This finding has important implications for neurosurgery patients' access to critical care, but a detailed examination is beyond the scope of this paper.

Limitations of this study

The primary limitation of this research is its generalisability. Our results from an ICU in a large urban teaching hospital may not be generalisable to other ICUs in other teaching hospitals, general hospitals (either urban or rural), or specialty hospitals (for example, children's hospitals). Furthermore, some might question the generalisability of findings in a hospital in the Canadian health care system to hospitals in the American system and around the world. However, generalisability is seldom an all or none phenomenon. Fairness is a common goal for priority setting and every ICU faces admission and discharge problems. It is likely that ICUs at other hospitals will "see themselves" in our findings and that at least some of our lessons will be helpful to them.³⁷ A second limitation is that demands on ICU resources fluctuate on a day to day and week to week basis and during a finite time period the "snapshot" obtained may be significantly different than the epoch immediately before or after the study period. This experience may colour the observer's experience and also the attitudes of individuals being interviewed. Thirdly, it is practically difficult to sample all key informants involved in priority setting in the ICU. We feel that a good representative sample was accessed and conceptual saturation was achieved, but one has to be aware of the limits of making analyses and recommendations based on potentially incomplete datasets. Fourthly, we have selected one ethical framework to assess the fairness of a priority setting process, while there are other approaches using legal arguments and other ethical analyses,³⁸⁻⁴⁵ which were not applied in this study. We justify this approach based on the fact that "accountability for reasonableness" is gaining substantial recognition and acceptance in the priority setting literature and seems to have traction in real world settings.

Conclusions

In this study we described and evaluated the process of making admissions decisions in a hospital's critical care unit. When conducted using an explicit ethical framework, such as "accountability for reasonableness", this process can be used to identify good practices and opportunities for improvement that can drive decision making improvements in this institution and can help guide improvements in other critical care units. Ultimately, priority setting in critical care, within and across health systems, could be improved by systematically applying the learning processes described here.

ACKNOWLEDGEMENTS

We thank all those who gave their time for interviews and those who allowed meetings to be observed in the course of this study. Also, we thank the Joint Centre for Bioethics MHSc students who reviewed this work and provided many helpful comments.

.....

Authors' affiliations

D K Martin, Department of Health Policy, Management and Evaluation, University of Toronto, Canada
D K Martin, P A Singer, Joint Centre for Bioethics, University of Toronto
P A Singer, Department of Medicine, University of Toronto
M Bernstein, Division of Neurosurgery, Toronto Western Hospital and Department of Surgery, University of Toronto

Funding: this study was supported by a Canadian Institute for Health Research (CIHR) Grant (number 6606-06-1999/2590074). DKM is supported by an Ontario Ministry of Health and Long-Term Care Career Scientist award. PAS is supported by a Canadian Institute of Health Research Investigator Award.

Competing interests: none declared.

REFERENCES

- American Thoracic Society Bioethics Task Force.** Fair allocation of intensive care unit resources. *Am J Respir Crit Care Med* 1997;**156**:1282-301.
- Detsky AS, Stricker SC, Mulley AG, et al.** Prognosis, survival, and the expenditure of hospital resources for patients in an intensive-care unit. *N Engl J Med* 1981;**305**:667-72.
- Farnalls M.** The use of limited critical care resources: an ethical dilemma. *Journal of the Canadian Association of Critical Care Nurses* 1997;**8**:23-6.
- Ferreira FL, Bota DP, Bross A, et al.** Serial evaluation of the SOFA score to predict outcome in critically ill patients. *JAMA* 2001;**286**:1754-8.
- Kelly DF, Becker DP.** Advances in management of neurosurgical trauma: USA and Canada. *World J Surg* 2001;**25**:1179-85.
- Lanken PN, Terry PB, Osborne ML.** Ethics of allocating intensive care unit resources. *New Horizons* 1997;**5**:38-50.
- Lantos JD, Mokalla M, Meadow W.** Resource allocation in neonatal and medical ICU's. Epidemiology and rationing at the extremes of life. *Am J Respir Crit Care Med* 1997;**156**:185-9.
- O'Brien MS, Ricotta JJ.** Conserving resources after carotid endarterectomy: selective use of the intensive care unit. *J Vasc Surg* 1991;**14**:796-800.
- Singer DE, Carr PL, Mulley AG, et al.** Rationing intensive care - physician responses to a resource shortage. *N Engl J Med* 1983;**309**:1155-60.
- Society of Critical Care Medicine Ethics Committee.** Consensus statement on the triage of critically ill patients. *JAMA* 1994;**271**:1200-3.
- Task Force on Guidelines, Society of Critical Care Medicine.** Recommendations for intensive care unit admission and discharge criteria. *Crit Care Med* 1988;**16**:807-8.
- Wong DT, Gomez N, McGuire GP, et al.** Utilization of intensive care unit days in a Canadian medical-surgical intensive care unit. *Crit Care Med* 1999;**27**:1393-4.
- Task Force on Guidelines, Society of Critical Care Medicine.** Recommendations for intensive care unit admission and discharge criteria. *Crit Care Med* 1988;**16**:807-8.
- Chua HC, Lew TW, Ng PY, et al.** Advances in neurointensive care. *Ann Acad Med Singapore* 2001;**30**:300-9.
- Diringer MN, Edwards DF.** Admission to a neurological/neurosurgical intensive care unit is associated with reduced mortality rate after intracerebral hemorrhage. *Crit Care Med* 2001;**29**:635-40.
- Franklin DF, Bargsley L.** Comprehensive patient monitoring in a neurosurgical intensive care unit. *Journal of Neurosurgical Nursing* 1993;**15**:205-12.
- Hyman SA, Williams V, Maciunas RJ.** Neurosurgical intensive care unit organization and function: an American experience. *J Neurosurg Anesthesiol* 1993;**5**:71-80.
- Jeevaratnam DR, Menon DK.** Survey of intensive care of severely head injured patients in the United Kingdom. *BMJ* 1996;**312**:944-7.
- Johnson S, Nenov VI, Martin NA, et al.** The neurosurgical intensive care unit in an era of health care reform. *Neurosurg Clin N Am* 1994;**5**:829-35.
- Knaus WA, Draper E, Lawrence DE, et al.** Neurosurgical admissions to the intensive care unit: intensive monitoring versus intensive therapy. *Neurosurgery* 1981;**8**:438-42.
- Mirski MA, Chang CWJ, Cowan R.** Impact of a neuroscience intensive care unit on neurosurgical patient outcomes and cost of care. Evidence-based support for an intensivist-directed specialty ICU model of care. *J Neurosurg Anesthesiol* 2001;**13**:83-92.
- Zimmerman JE, Junker CD, Becker RB, et al.** Neurological intensive care admissions: identifying candidates for intermediate care and the services they receive. *Neurosurgery* 1998;**42**:91-101.
- Taylor WA, Thomas NW, Wellings JA, et al.** Timing of postoperative intracranial hematoma development and implications for the best use of neurosurgical intensive care. *J Neurosurg* 1995;**82**:48-50.
- McKneally MF, Dickens B, Meslin EM, et al.** Bioethics for clinicians: resource allocation. *Can Med Assoc J* 1997;**157**:163-7.
- Ham C, Coulter A.** Explicit and implicit rationing: taking responsibility and avoiding blame for health care choices. *Journal of Health Services Research and Policy* 2001;**6**:163-9.
- Zussman R.** *Intensive care.* Chicago: University of Chicago Press, 1992:191.
- Strosberg MA, Teres D.** *Gatekeeping in the intensive care unit.* Chicago: Health Administration Press, 1997:196.
- Daniels N, Sabin JE.** *Setting limits fairly: can we learn to share medical resources?* Oxford: Oxford University Press, 2002.
- Daniels N.** Accountability for reasonableness. *BMJ* 2000;**321**:1300-1.
- Ham C, McIver S.** *Contested decisions: priority setting in the NHS.* London: King's Fund, 2000.
- Martin DK, Giacomini M, Singer PA.** Fairness, accountability for reasonableness, and the views of priority setting decision-makers. *Health Policy* 2002;**61**:279-90.
- Martin DK, Singer PA.** Priority setting for health technologies in Canada. In: Ham C, Roberts G, eds. *Reasonable rationing: international experience of priority setting in health care.* London: Open University Press. (In press).
- Yin RK.** *Case study research: design and methods.* Thousand Oaks, CA: Sage, 1994:1.
- Strauss A, Corbin J.** *Basics of qualitative research: techniques and procedures of developing grounded theory.* Thousand Oaks, CA: Sage, 1998:73.
- Richardson L.** Writing: a method of inquiry. In: Denzin NK, Lincoln YS, eds. *Handbook of qualitative research.* London: Sage, 1994.
- Altheide DL, Johnson JM.** Criteria for assessing interpretive validity in qualitative research. In: Denzin NK, Lincoln YS, eds. *Handbook of qualitative research.* Thousand Oaks: Sage, 1994:485-99.
- Mays N, Pope C.** Qualitative research in health care: assessing quality in qualitative research. *BMJ* 2000;**320**:50-2.
- Mays N, Pope C.** Rigour and qualitative research. *BMJ* 1995;**311**:109-12.
- Green J.** Generalizability and validity in qualitative research. *BMJ* 1999;**319**:420-1.
- Eddy DM.** Health system reform: Will controlling costs require rationing services? *JAMA* 1994;**272**:324-8.
- Light DW.** The real ethics of rationing. *BMJ* 1997;**315**:112-15.
- Mehlman MJ.** The patient-physician relationship in an era of scarce resources: is there a duty to treat? *Connecticut Law Review* 1993;**25**:349-91.
- Martin DK, Pater JL, Singer PA.** Priority-setting decisions for new cancer drugs: a qualitative case study. *Lancet* 2001;**358**:1676-81.
- Norheim OF.** Healthcare rationing - are additional criteria needed for assessing evidence based clinical practice guidelines? *BMJ* 1999;**319**:1426-9.
- Norheim OF, Ekeberg O, Evensen SA, et al.** Adoption of new health care services in Norway (1993-1997): specialists' self-assessment according to national criteria for priority setting. *Health Policy* 2001;**56**:65-79.
- Rawls J.** *Justice as fairness. A restatement.* Cambridge, MA: The Belknap Press of Harvard University Press, 2001.
- Ubel PA.** Physicians, thou shalt not ration: the necessary role of bedside rationing in controlling healthcare costs. *Healthcare Papers* 2001;**2**:10-21.