

Effect of implementation of a weekly multidisciplinary team meeting in a general intensive care unit

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Although large trials are lacking, the evidence from small studies suggests that a multidisciplinary team approach to patient management improves outcomes in intensive care¹⁻³ and other specialties.⁴⁻⁹ Multidisciplinary teams in the ICU can reduce hospital and ICU length of stay, duration of mechanical ventilation, rates of ventilator-associated pneumonia, costs and possibly mortality.¹⁻³ It is difficult to determine which aspects of the multidisciplinary team approach are responsible for improvements, as implementation programs often involve the simultaneous introduction of many changes to patient care, such as multidisciplinary ward rounds, daily bed-flow meetings and bundles or sets of evidence-based protocols, as well as culture changes to the workplace.¹⁰ Multidisciplinary team meetings (MDTMs), attended by patients and family to discuss the transition to palliative care, have been shown to reduce ICU length of stay,¹¹ but there have been no published studies of the effect of MDTMs that involve hospital staff only, without patients or family, on the outcomes of general ICU patients.

The multidisciplinary team approach to patient care has some potential problems. It cannot be assumed that different professions will work together in pursuit of patient goals, and problems can occur through disagreements about patient management and demarcation of roles and responsibilities, professional defensiveness, and professional dominance.¹² Multidisciplinary teams also have potential medicolegal implications.¹³ As the multidisciplinary group has no legal identity, and cannot attract liability for a negligent act, non-dissenting individual participants may be liable for decisions made by the group.

In 2006, it was decided to introduce an MDTM to the ICU in our hospital to improve interdisciplinary communication. As the benefits of an MDTM were uncertain, this study was devised to evaluate the effect of its introduction. The study aimed to determine whether the introduction of the weekly MDTM to the general ICU improved selected clinical indicators of patient outcome and staff satisfaction with patient care.

Methods

Setting

The study was a single-centre, observational, before-and-after study, conducted in a 14-bed general medical, surgical

ABSTRACT

Objective: To determine whether the introduction of a weekly multidisciplinary team meeting (MDTM) to a general intensive care unit improved selected clinical indicators of patient outcome, and staff satisfaction with patient care.

Design: A single-centre, observational, before-and-after study.

Setting: A 14-bed general ICU in an urban, tertiary teaching hospital.

Study population: All patients admitted to the ICU during June–December 2006 (before the intervention) and June–December 2007 (after the intervention), and staff employed in the ICU in December 2006 and December 2007.

Intervention: Introduction of a weekly MDTM to the ICU.

Main outcome measures: The primary outcome was the number of patients who stayed in the ICU longer than 5 days. Secondary outcomes included nurses' scores for satisfaction with patient care on a questionnaire; ICU and hospital mortality; duration of mechanical ventilation; readmissions to the ICU within 72 hours of discharge; and after-hours discharges.

Results: There were 376 ICU admissions in the "before" period and 432 in the "after" period. Baseline characteristics of the two groups were similar except for a lower proportion of patients admitted directly to the ICU from the operating theatres in the after period (34.2% v 45.2%, $P=0.002$). There were no significant differences in any of the primary or secondary outcomes, with the exception of one questionnaire score: a fall in the score nursing staff gave for value of all meetings held in the ICU following the introduction of the MDTM (from 6.6 to 3.9 on a scale of 0–10, $P=0.001$).

Conclusion: The introduction of a weekly MDTM to a general ICU did not improve selected clinical indicators of patient outcome or staff satisfaction with patient care.

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and burns ICU in an urban, tertiary teaching hospital. Approval was obtained from the hospital's human research ethics committee, and the study was funded solely by the ICU.

The ICU was staffed by full-time intensivists who remained on-call after hours, senior registrars who remained on-site from 08:00 to 23:00 on weekdays and were intermittently on-call overnight and on weekends, and junior registrars and residents who provided 24-hour cover. Nurse to patient ratios were 1 : 1 for patients receiving mechanical ventilation (invasive or non-invasive), circulatory support or continuous renal replacement therapy, or deemed critically ill. Ratios could be downgraded to 1 : 2 for high-dependency patients. The ICU catered for a broad spectrum of general medical and surgical problems, and was a referral centre for major burns. Respiratory weaning was performed by nursing staff, in consultation with medical staff.

Intensivists conducted formal ward rounds each morning with junior medical staff. Dietitians, pharmacists, and physiotherapists conducted regular rounds independently of the medical staff, and referrals could be made to occupational therapists, social workers, or speech pathologists when required. Patients with burn injuries were allocated specific allied health staff who specialised in burns, from the above specialties. Nursing staff undertook individual handovers between shifts, and held formal unit nursing handover meetings, where all patients were discussed in the presence of all incoming nurses, before the morning and night shifts.

Study population

The study population comprised all patients admitted to the general ICU during the 6-month periods June to December 2006 (before the intervention) and June to December 2007 (after the intervention). The study periods ended 1 week before the compulsory Christmas and holiday hospital downtime. They were chosen to minimise confounding caused by seasonal variation and to allow a 6-month implementation period for the MDTM between the study periods.

All intensivists and ICU, nursing and allied health staff were invited to complete a questionnaire in December 2006, with respondents being asked to complete a follow-up questionnaire in December 2007.

Intervention

A weekly MDTM was introduced to the ICU in January 2007, with the aim of improving interdisciplinary communication. Previously, the ICU had no formal multidisciplinary meeting to discuss patients. As most staff considered multiple MDTMs per week, with a predicted duration of 1 hour each, to be too time-consuming, a single, weekly meeting was held on a Wednesday afternoon.

The MDTM was chaired by an intensivist not involved with patient care that week, and was attended by all medical and allied health staff. All senior nursing staff

attended; attendance of bedside nursing staff was discretionary as the meeting time coincided with their lunch break. Only patients present in the ICU at the time of the MDTM were discussed. Discussion followed a set format following a case introduction, with each discipline providing comment. Relevant problems were recorded, and major management plans were documented in the patient notes.

Concurrently, the morning "sit-down" medical handover meeting, which was conducted in a meeting area away from patients' bedsides and was attended by nursing staff, was changed to a "walk-round" format to save time, with the handover conducted at patients' bedsides.

Outcomes

Given that the MDTM was held once a week, it was hypothesised it would have little effect on day-to-day bedside patient management that would alter patient outcomes, such as mortality. It was hypothesised that its maximum effect would be on the processes of care, such as discharge planning, in longer-stay patients. The study was therefore powered to measure ICU length of stay greater than 5 days as its primary outcome.

The secondary outcomes had two components. The first was satisfaction of nursing staff scored on a questionnaire. The second comprised traditional ICU indicators of patient outcome: ICU and hospital mortality, duration of mechanical ventilation, readmissions to the ICU within 72 hours of discharge, and number of patients discharged to the wards between 18:00 and 06:00 (after-hours discharges).

Questionnaires

The first questionnaire was administered to staff in December 2006, before the introduction of the MDTM in January 2007, and the follow-up questionnaire was administered in December 2007. Because of the dependent nature of the relationship between the authors and participants, particular care was taken to avoid coercing staff to participate.

The questionnaire was developed for this study and had not been previously validated. It comprised six questions (Appendix 1), designed to assess staff views on overall patient care, communication between staff, involvement and contribution to patient care, clarity of treatment goals, and the value of ICU meetings. For each question, consenting respondents were asked to circle a score on an analogue scale of 0–10. Missing or incomplete replies to questions were assumed to be neutral. Participants were invited to provide additional comments and feedback. Questionnaires were de-identified. Follow-up questionnaires in December 2007 were administered to staff who had signed a consent form for the first survey.

Table 1. Baseline data for ICU patients before (Group 1) and after (Group 2) implementation of the MDTM

	Group 1 2006	Group 2 2007	P
No. of ICU admissions (no. of patients)	376 (345)	432 (398)	
Average age, years (SD)	66 (18)	65 (18)	0.17
Male, no. (%)	233 (62%)	259 (60%)	0.61
Average APACHE II score (SD)	19 (8)	18 (8)	0.07
Non-postoperative patients, no. (%)	206 (55%)	284 (66%)	0.002
Patient diagnostic code on ICU admission			
Non-postoperative patients, %			0.14*
Cardiovascular	12%	20%	
Respiratory	37%	28%	
Gastrointestinal	6%	9%	
Neurological	7%	6%	
Sepsis	13%	9%	
Trauma	14%	14%	
Metabolic	6%	6%	
Haematological	0.5%	2%	
Renal	3%	3%	
Musculoskeletal/skin	0	1%	
Other	2%	1%	
Postoperative patients, %			0.42*
Cardiovascular	17%	14%	
Respiratory	8%	3%	
Gastrointestinal	42%	48%	
Neurological	10%	7%	
Trauma	2%	2%	
Renal/genitourinary	7%	9%	
Gynaecological	1%	0	
Orthopaedic and musculoskeletal/skin	0	0.4%	
Haematological	14%	17%	
Metabolic	0	0	
Other	0.6%	0.7%	
Patients mechanically ventilated, no. (%)	170 (45%)	177 (41%)	0.25

MDTM = multidisciplinary team meeting. * Pearson's χ^2 test.

Statistical analysis

In 2005, 30% of patients stayed in the ICU for 5 days or longer. The calculated number of patients required to show a significant 10% absolute reduction in length of stay with a power of 0.80, and significance at the 0.05 level was 380. As the ICU admitted about 70 patients per month, study periods of 6 months were chosen.

Assuming a baseline composite satisfaction score on the questionnaire of 60%, it was estimated that 400 completed questionnaires would be required to show a significant change of 10%. As the ICU employed only 70 nursing staff, it was apparent that results would not be significant because of underpowering. However, a decision was made to proceed with the questionnaire component of the study to generate preliminary data and to receive staff feedback.

Questionnaire data were analysed by an independent statistician using an independent samples *t* test and Levene's test for equality of variances (SPSS version 13.0, SPSS Inc, Chicago, Ill, 2004), then re-analysed using the Mann-Whitney test to assess the hypothesis that the data were non-parametric. A significant *P* value on Levene's test indicates that the groups have unequal variance, and thus individual group variances rather than the pooled variance are used to calculate the *t* value. Clinical data were analysed using an independent samples *t* test and χ^2 tests with continuity correction.

Results

In February 2007, 1 month after the introduction of the MDTM, the ICU was closed to new admissions for 3 weeks to contain an environmental outbreak of multiresistant organisms originating from a patient with severe burns. Existing infection control procedures were subsequently reinforced, but there were no significant changes to protocols and guidelines governing clinical management of patients during the study periods, and the ICU returned to normal functioning in March 2007. The ICU had 14 physical beds, but in 2006 only 11 beds were funded for use. Funding increased to 14 beds in 2007.

Baseline data

Baseline data for patients are summarised in Table 1. The number of admissions increased in 2007, coinciding with the increase in bed funding. There were no significant

Table 2. Primary outcomes of patients before (Group 1) and after (Group 2) implementation of the MDTM

	Group 1 (n = 376)	Group 2 (n = 432)	P
No. of patients who stayed in the ICU > 5 days* (%)	76 (20.2%)	97 (22.5%)	0.49
Median ICU length of stay, days (IQR)	4 (5)	4 (6)	0.08

IQR = interquartile range. * > 5 days = > 120 h.

Table 3. Nurses' responses to the questionnaire before (Group 1) and after (Group 2) implementation of the MDTM

	Group 1	Group 2	Mean difference between groups*	95% CI	P
No. of questionnaires returned	25/70	15/20 [†]			
Mean score on scale of 0–10 (SD)					
Satisfaction with overall patient care	5.5 (1.9)	5.7 (2.0)	-0.1	-1.4 to 1.1	0.82
Grading of communication	5.4 (1.7)	5.9 (2.5)	-0.5	-1.8 to 0.9	0.49
Satisfaction with involvement in patient care	5.6 (2.0)	6.1 (2.4)	-0.5	-1.9 to 0.9	0.49
Clarity of treatment goals	4.7 (1.7)	4.5 (2.1)	0.2	-1.0 to 1.4	0.72
Value of all ICU meetings	6.6 (2.2)	3.9 (2.5)	2.8	1.2 to 4.3	0.001
Value of contribution to patient care	6.2 (1.8)	4.9 (2.3)	1.2	-0.1 to 2.6	0.07

* Group 1 — Group 2. † Only 20 of the 25 respondents from December 2006 still worked in the ICU in December 2007.

differences at baseline between the 2006 and 2007 patient groups in age, sex, average APACHE II score, or proportion of patients requiring mechanical ventilation. In 2007, a significantly lower proportion of patients were admitted directly from the operating theatre (34.3% v 45.2%, $P=0.002$), but there was no significant difference in the distribution of diagnostic codes for admission condition.

Primary outcome

Patient length of stay in the ICU is summarised in Table 2. There was no statistically significant difference in the proportion of patients who stayed in the ICU longer than 5 days after the introduction of the MDTM compared with before (22.5% v 20.2%), with a median length of stay of 4 days for both study periods.

Secondary outcomes

Of 70 full-time and part-time ICU nurses, 25 (36%) returned the initial questionnaire. Twenty of the respondents still worked in the ICU 12 months later, and 15 of these completed the second questionnaire. Initial questionnaires were also completed by dietitians (2), intensivists (4), physiotherapists (2), an occupational therapist, a pharmacist, a social worker, and a speech pathologist, but their results were not analysed because of the small sample sizes.

Nurses' responses to the questionnaire are summarised in Table 3. Results of Levene's test were not significant. There was no significant change in scores for the variables satisfaction with overall patient care, satisfaction with their involvement in patient care, communication, clarity of treatment goals, and perceived value of their contribution to patient care. However, the score for value that the nursing staff gave to all the meetings held in the ICU decreased significantly, with a mean fall of 2.8 from a

Table 4. Other patient outcomes before (Group 1) and after (Group 2) implementation of the MDTM

	Group 1 (n = 376)	Group 2 (n = 432)	P
ICU mortality, no. (%)	44 (12%)	50 (12%)	> 0.99
Hospital mortality, no. (%)*	67 (19%)	68 (17%)	0.45
Median duration of mechanical ventilation, hours (IQR)	43 (66)	45 (82)	0.46
Readmissions to ICU within 72 hours of discharge, no. (%)	6 (2%)	7 (2%)	> 0.99
After-hours discharge from ICU, no. (%)	55 (15%)	56 (13%)	0.54

IQR = interquartile range.

* Hospital mortality calculated from total number of patients.

baseline of 6.6. The Mann–Whitney test revealed a similar pattern of significance for all variables.

The results of other secondary outcomes are detailed in Table 4. There were no significant differences in ICU or hospital mortality, median duration of mechanical ventilation, readmissions to ICU within 72 hours of discharge, or after-hours discharge from the ICU.

Discussion

This single-centre, before-and-after study of 808 admissions to a general ICU was unable to demonstrate that the introduction of an MDTM improved selected clinical indicators of patient outcome. The questionnaire component of this study demonstrated no improvements in nursing satisfaction with overall patient care following implementation of the MDTM, and a statistically significant fall in the value that nurses placed on all ICU meetings.

A possible explanation for the lack of effect of the MDTM is that major decision-making that affects patient care occurs primarily at the bedside, during the day-to-day nursing and medical management of patients. An efficient process may already result in patients being managed appropriately, then discharged expeditiously. The MDTM may simply provide another forum for communication of information that already occurs. Another explanation for the lack of effect of the MDTM is that the management strategies implemented by the MDTM, such as referrals to other clinical or allied health teams, may have no beneficial effect on patient outcomes. Studies of the effect of physiotherapy in the ICU, for example, have not conclusively shown benefit to patients.¹⁴ A further possibility is that the MDTM may have a beneficial effect on patient outcomes, but that a weekly meeting is too infrequent for its impact to be apparent, especially given a median patient length of stay of 4 days. To realise its full potential, the MDTM may need to be held daily, but this would have significant implications for the time staff have available for patient care.

The reason for the decrease in value that nursing staff placed on all ICU meetings is uncertain. Three respondents suggested that bedside nursing staff wanted to attend the MDTM but were unable to do so because of the clash with their lunch break. Formal attendance figures were not collected, but most bedside nursing staff did not attend the MDTM. Two nurses mentioned the amount of time already devoted to non-clinical work each week, and an additional meeting may have added to an already heavy administrative workload. Four respondents raised concerns about patient confidentiality with the change in format of the morning handover round from "sit-down" to "walk-round". Dissatisfaction with this change may have cancelled any improvements resulting from the MDTM. One respondent was concerned that discussion of some issues took too long. As an hour was allocated for each meeting, this may have led to patients discussed at the end of the meeting receiving less time or attention (so-called alphabetical prejudice¹⁵). Finally, during July and August 2007, a process of complaint management for the ICU was conducted, which included a unit meeting chaired by an independent arbitrator, to attempt to resolve several administrative and personal issues between ICU staff. The effect that this had on the results is unknown.

A significant logistical problem in implementing the MDTM was the inability to arrange a meeting time that satisfied all stakeholders. Many staff were unable to attend the MDTM regularly because of other commitments, and therefore were potentially unable to contribute to patient management.

A general comment from allied health staff was that they found the MDTM useful for obtaining information on the

conditions and plans for patients. They also found the forum useful to air concerns and opinions. However, due to their limited sample sizes we were unable to analyse their comments.

Study limitations

This study had several important limitations. It was conducted in a single centre. Because of its before-and-after nature, changes in medical and nursing practices during the study period that might have biased the results could not be prevented or excluded. An interrupted time-series analysis would help adjust for confounders, but would require significantly more sampling points in an already underpowered study.

In addition, the impact of increasing the number of ICU beds available for regular use during the study period is unknown. This may be partly responsible for the difference in baseline characteristics between the periods, with a significantly lower proportion of patients admitted to the ICU directly from the operating theatre during the MDTM period. We did not perform post-hoc analyses on these subgroups because of the significant confounders already present.

Although the study periods were June to December each year, the impact of the 3-week ICU closure in February 2007 on results is unknown. We did not collect information on subsequent multiresistant organism infections and their effect on length of stay or other secondary outcomes. We also did not collect information on staff practices and the possible confounding effects of junior medical and nursing staff rotating through the unit. The effect of the conflicts between staff during July and August 2007, which resulted in activation of the complaint process, is also unknown.

The questionnaire used for the study was developed in consultation with staff, and deliberately kept brief to improve completion rates, but has not been previously validated. Comparison with existing validated tools is needed before its effectiveness can be assessed. The completion rate for the questionnaires was also low, but particular care was taken to avoid coercing staff to participate in the study, because of the unequal relationship between investigators (senior staff) and participants.

Finally, the study was powered only to examine patient length of stay in the ICU, and not other important clinical outcomes. It was not possible to power the study to detect significant differences in staff responses, because of the small number of staff. Even though there was a statistically significant drop in the value that nurses placed on meetings, this conclusion was based on the replies of 15 respondents and, at best, can be viewed only as hypothesis-generating.

Conclusions

This study was unable to show an improvement in selected clinical indicators of patient outcome after the introduction of a weekly multidisciplinary team meeting to a general ICU. A significant fall in the value that nurses placed on ICU meetings was seen in a questionnaire-based survey, but limitations in study design mean that any conclusions are at best hypothesis-generating.

Given the potential problems, further studies are needed before MDTMs can be recommended for routine clinical care of general ICU patients. However, adequately powered studies will be logistically difficult to conduct.

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Appendix 1. Questionnaire for the multidisciplinary team meeting (MDTM) study

- Currently, how satisfied are you with the total overall care provided to patients in the ICU (including management of all medical, nursing and social issues, nutrition, medications, physiotherapy, discharge planning, etc)?
(0 = very dissatisfied, 5 = neutral, 10 = very satisfied)
- Currently, how do you grade the level of communication between yourself and all the other staff (including medical, nursing and allied health) in the ICU?
(0 = extremely poor, 5 = average, 10 = excellent)
- Currently, how satisfied are you with your involvement in the care of patients in the ICU?
(0 = very dissatisfied, 5 = neutral, 10 = very satisfied)
- How clear do you think the goals of treatment are for patients in the ICU in general?
(0 = extremely unclear, 5 = neutral, 10 = extremely clear)
- Currently, how valuable to you are all the meetings in the ICU that involve the discussion of patient care? (eg, handover rounds, multidisciplinary team meetings, etc)
(0 = not valuable, 5 = neutral, 10 = extremely valuable)
- Currently, do you feel your contribution to patient care is valued?
(0 = not valued at all, 5 = neutral, 10 = valued extremely)