

# Features and perceptions of a critical care outreach physician role

The Austin Health Critical Care Outreach Physician (CCOP) Investigators

Medical Emergency Teams (METs) have been progressively implemented into hospitals worldwide and have been associated with decreased risk of in-hospital cardiac arrest and all-cause hospital mortality in systematic reviews.<sup>1-4</sup> Australia was an early adopter of this reactive model for recognising and responding to ward-based clinical deterioration,<sup>5</sup> and the majority of Australian services have substantial involvement with intensive care unit (ICU)-based staff.<sup>6</sup>

An additional element of mature Australian critical care outreach services is the intensive care liaison nurse, or intensive care nurse consultant (ICNC). This service tends to be more pre-emptive in providing follow-up of ICU discharges and routine ward referrals, although ICNCs also participate in MET reviews.<sup>7,8</sup>

Several problems have been observed in mature MET services in the Australian setting, including increasing case load,<sup>9</sup> simultaneous calls, and moral distress related to end-of-life care issues during the MET review.<sup>10</sup> For these reasons, the College of Intensive Care Medicine of Australia and New Zealand has recommended that a dedicated ICU specialist should be rostered to provide oversight of the MET when there are more than 2000 calls annually.<sup>11</sup> Despite the increasing implementation of this role, there are very few reports outlining the nature and features of the role of this ICU specialist doctor.

In April 2020, we introduced a critical care outreach physician (CCOP) to provide oversight for both the ICNC and MET services. The purpose of this study was to outline the interventions provided by the role and the perceptions of the role by clinical staff involved in the MET and ICNC service.

## Methods

### Ethics approval

Ethics approval was obtained for the collection of data related to the introduction of the role (Audit/20/Austin/23) as well as for the conduct of the survey of clinical staff associated with the role (RiskmanQ No. 39692).

### Details of hospital, MET and ICNC services

Austin Health is a large teaching hospital in the north of Melbourne which has more than 80 000 admissions per

## ABSTRACT

**Objective:** To describe the tasks completed by the critical care outreach physician (CCOP) and staff perceptions of the CCOP role.

**Design:** Prospective observational study and survey of intensive care unit (ICU) staff.

**Setting:** University-affiliated teaching hospital in Australia.

**Participants:** ICU consultants, registrars and nurses.

**Interventions:** Implementing a dedicated ICU consultant to review deteriorating patients outside the ICU.

**Main outcome measures:** Prospective collection of CCOP tasks and survey of ICU staff.

**Results:** During 101 clinical shifts, the CCOP had 1524 encounters (mean, 15.1 [standard deviation, 6.1]; median, 14 [interquartile range, 10–19] per day). The three commonest interventions were emergency department visits, direct consultant communication, and coordinating ICU admissions. Involvement in Medical Emergency Team (MET) calls, expediting patient care, and goals of care discussions were also relatively common. Survey responses were obtained from 55/84 (66%) eligible participants. Most respondents thought the CCOP would improve the predefined processes of care and patient-centred outcomes. The areas of greatest perceived benefit included supporting the MET registrar and coordinating simultaneous emergencies outside the ICU. Areas where the role was perceived to be less beneficial included improving handover, identifying patients at clinical risk outside the ICU, and reducing repeat MET calls.

**Conclusions:** The tasks of a CCOP involved high level communication, coordination of care, and supervision of ICU staff. The effect of this role on patient-centred outcomes requires further research.

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year, about 26 000 of which are multiday stays. The MET is staffed by a dedicated ICU registrar and MET nurse at all times. A general medicine registrar also attends MET calls when available. In addition, there is a senior ICU nurse in the role of an ICNC from 08:00 to 18:00, 7 days per week.<sup>8</sup>

During the study period, there was a senior registrar rostered 24/7 to provide senior assistance for patient assessment and transport for complex patients, as well as a rostered evening consultant to deal with potential coronavirus disease 2019 (COVID-19) referrals. Between 1 July 2018 and 30 June 2019, there were 3836 MET calls, 3250 ICNC reviews, 343 Respond Blue calls, at least 200 pre-emptive ward reviews, and 23 patient and carer escalation (PACE) calls.

### Details of the CCOP role

The details of the CCOP role and daily schedule were developed in consultation with the ICU consultant group (Online Appendix, table 1) and were outlined in an orientation handbook. The stated aims for the role were prospectively defined (Online Appendix, table 2) and the study was registered prospectively on the Australian and New Zealand Clinical Trials Registry (ACTRN12620000357954). The service operated from Monday to Friday between 08:00 and 18:00.

The nature of the role and timing of the outcome assessment was modified due to the emergence of the COVID-19 pandemic. An additional role of the CCOP included the need to liaise with clinicians caring for patients with confirmed or suspected COVID-19 infection (Online Appendix, table 1).

The *a priori* aims of the role were to:

- improve the timeliness of assessment of admission of patients from the emergency department (ED) to the ICU;
- assist with the triage of COVID-19 patients potentially needing ICU;
- provide oversight and support for the MET and ICNC services;
- provide an organisational awareness of the most at-risk patients in the hospital; and
- coordinate all ICU referrals.

The CCOP completed a one-page case report form at the end of the shift and the data were subsequently entered into a MS Excel spreadsheet to permit analysis. Additionally, the report form recorded instances of clinical education, issues identified during morning handover, and important clinical encounters.

### Details of survey development and implementation

A questionnaire was developed and implemented to evaluate ICU staff perceptions on the CCOP role and activities using principles previously published.<sup>12</sup> The questionnaire contained 14 unidimensional statements regarding the major aims of the role, and a Likert agreement scale to record the respondent's perception of changes in that aspect of clinical care or ICU staff support.

The questionnaire also recorded the respondent's job group and two open-ended questions asking, "what are the three best aspects of the CCOP role?" and "please provide three constructive suggestions for how the CCOP role can be improved".

The survey was conducted 5 months after the CCOP role was commenced and was open for one month. Staff were eligible to participate in the survey if they had worked as a CCOP, ICNC, ICU MET registrar or ICU MET nurse during the study period. Reminders were sent out weekly to potential respondents.

### Details of data analysis

Quantitative data were summarised as counts with proportions of appropriate totals or as median with interquartile range (IQR) or mean with standard deviation (SD). Data on the number of MET and Respond Blue calls were obtained from the relevant databases. We provide both overall numbers and those occurring during the days and hours of service of the CCOP.

Results of survey questions are presented on a Likert agreement scale and the number of results for each response are indicated. Two investigators independently evaluated open-ended responses to identify themes and met to agree on the number and nature of the themes. They then independently evaluated the number of comments that fitted into each theme, before reconvening to achieve consensus. A third investigator was required to achieve consensus for one of the domains.

## Results

### Summary of encounters and interventions provided by the CCOP

During 101 consecutive weekday clinical shifts between 8 May and 25 September 2020, the CCOP had 1524 encounters (mean, 15.1 [SD, 6.1]; median, 14 [IQR, 10–19] encounters per day) (Table 1). The three most common interventions were ED visits, direct consultant communication, and coordination of ICU admissions. Attending and subsequent review of MET calls, expediting patient care, and involvement in goals of care discussions were also relatively common (Table 1). The CCOP attended the ED at least once in 96/101 (95%) shifts and reviewed at least one ED referral in 60/101 (59.4%) clinical shifts.

The three most common themes around CCOP involvement in education of staff included provision of feedback to clinical staff, multidisciplinary training and didactic teaching (Online Appendix, table 3). The two most common themes reported during clinical handover were

**Table 1. Summary of tasks performed each day during the first 101 weekday clinical shifts for the Critical Care Outreach Physician**

	Total	Mean (SD)*	Median (IQR)*
ED visits	227	2.2 (1.1)	2 (2–3)
Direct consultant-to-consultant communication	221	2.2 (1.8)	2 (1–3)
ICU admissions coordinated	201	2.0 (1.1)	2 (1–3)
MET call patients follow-up	136	1.3 (1.3)	1 (0–2)
Expedited patient care	125	1.3 (1.0)	1 (1–2)
ED referrals reviewed	112	1.1 (1.2)	1 (0–2)
Patients handed over to evening consultant	98	1.0 (1.0)	1 (0–2)
MET calls attended	96	1.0 (1.2)	1 (0–2)
External referrals taken	73	0.7 (0.9)	0 (0–1)
GOC discussions	68	0.7 (0.8)	0 (0–1)
New ward consultation	41	0.4 (0.6)	0 (0–1)
Discussions with COVID-19 team	40	0.6 (0.9)	0 (0–1)
Guiding of GOC discussions by others	31	0.5 (0.7)	0 (0–1)
ICNC referrals	31	0.3 (0.6)	0 (0–0.5)
Respond Blue calls attended	24	0.3 (0.5)	0 (0–1)
Total encounters	1524	15.1 (6.1)	14 (10–19)

COVID-19 = coronavirus disease 2019; ED = emergency department; GOC = goals of care; ICNC = intensive care nurse consultant; ICU = intensive care unit; IQR = interquartile range; MET = Medical Emergency Team; SD = standard deviation. \* Mean and median number of tasks performed per day, respectively.

setting and guiding goals of care, and identifying at-risk and deteriorating patients (Online Appendix, table 4). Several themes were identified under the topic of important clinical encounters and/or patient outcomes including providing direct (in-person) patient care, involvement in patient triage and decisions around disposition, coordinating patient flow and/or expediting care, setting and guiding goals of care, and participation in high level communication (Online Appendix, table 5).

#### Number of MET and Respond Blue calls occurring during hours of CCOP operation

During the study period, there were 101 Respond Blue calls, 48 of which occurred during the hours of CCOP service. Thus, the CCOP attended 24/48 (50%) of all the Respond Blue calls in person during the hours of service.

In addition, there were 1321 MET calls during the study period, of which 422 occurred during the hours of CCOP service. Therefore, the CCOP attended 96/422 (22.7%) MET calls in person during the hours of service.

#### Summary of staff perceptions the CCOP

Overall, 55 respondents participated in the survey (response rate, 55/84; 66%): which included ICU registrar (response rate, 18/27; 67%), ICU MET nurse (response rate, 16/32; 50%), ICU consultant (response rate, 12/18; 67%), ICNC (response rate, 5/5; 100%), flow coordinator (response rate, 2/2; 100%), unknown (responses, 2). The majority of respondents thought that the CCOP would result in improvement of the predefined processes of care and patient-centred outcomes (Table 2).

The areas of greatest perceived benefit included support for the MET registrar, coordination of simultaneous emergencies outside the ICU, and clinical decisions for deteriorating patients outside the ICU. Areas where the role was perceived to be less beneficial included improvements in the morning and evening handover processes, identification of patients at clinical risk outside the ICU, and reducing repeat MET calls for the same patient (Table 2).

#### Thematic analysis of open-ended questions

The three most frequently cited themes around the best elements of the CCOP role included the capacity for high level communication and expediting patient care, the ability to support and supervise critical care outreach staff, and the availability for senior decision making (Online Appendix, table 6).

The three most frequently cited themes around areas for improvement of the CCOP role included the need for consistency and clarity of roles and responsibility of CCOP, a more proactive approach and enhanced integration into the hospital, and improved communication within and outside the critical care outreach team (Online Appendix, table 7).

## Discussion

#### Summary of major findings

We conducted a prospective audit of the tasks completed by a CCOP and surveyed ICU staff about their perceptions of the role. During 101 consecutive weekday shifts, the most common tasks completed included the review of at-risk and deteriorating patients in the ED or in the context of MET calls, directly communicating with other consultants in the hospital, participating in goals of care discussions, and expediting and coordination of care.

**Table 2. Details of 55 responses to the questionnaire regarding perceptions of the likely benefit of the critical care outreach physician role**

	Greatly improved	Improved	No change	Diminished	Greatly diminished	Cannot comment
Support for the MET registrar	28 (50.9%)	22 (40.0%)	1 (1.8%)	0	0	4 (7.3%)
Clinical decisions for deteriorating patients outside the ICU	27 (49.1%)	23 (41.8%)	2 (3.6%)	1 (1.8%)	0	2 (3.6%)
Coordination of simultaneous emergencies outside the ICU	26 (47.3%)	23 (41.8%)	1 (1.8%)	0	0	5 (9.1%)
Protection of morning ICU consultant ward round	23 (41.8%)	13 (23.6%)	4 (7.3%)	0	0	15 (27.3%)
End-of-life care and GOC setting in patients outside the ICU	18 (32.7%)	29 (52.7%)	6 (10.9%)	0	0	2 (3.6%)
Impact on repeat MET calls in the same patient	18 (32.7%)	26 (47.3%)	8 (14.6%)	0	0	3 (5.5%)
Overall care of patients outside the ICU	17 (30.9%)	32 (58.2%)	2 (3.6%)	0	0	4 (7.3%)
Morning critical care outreach handover process	17 (30.9%)	26 (47.3%)	8 (14.6%)	0	0	4 (7.3%)
Consultants from the ICU and parent unit communication	16 (29.1%)	28 (50.9%)	5 (9.1%)	0	0	6 (10.9%)
Identification of patients at clinical risk outside the ICU	14 (25.5%)	29 (52.7%)	7 (12.7%)	0	0	5 (9.1%)
Coordination of ICU referrals	14 (25.5%)	32 (58.2%)	4 (7.3%)	0	0	5 (9.1%)
Protection of evening handover process	14 (25.5%)	14 (25.5%)	11 (20.0%)	0	0	16 (29.1%)
Timeliness of assessment of patients in the ED	10 (18.2%)	26 (47.3%)	1 (1.8%)	0	0	18 (32.7%)
Timeliness of admission of patients from the ED to ICU	7 (12.7%)	31 (56.4%)	4 (7.3%)	0	0	14 (25.5%)

ED = emergency department; GOC = goals of care; ICU = intensive care unit; MET = Medical Emergency Team. Shown are the number and percentage; *N* (%) for 55 respondents.

Staff involved in the delivery of the CCOP service rated the role positively and perceived that support of critical care outreach staff and patient care would be improved with the role.

### Comparison with published literature

We are unaware of any other publications describing the features and daily schedule of a critical care outreach consultant. Hyde-Wyatt and Garside<sup>13</sup> surveyed 195 staff members on their perceptions of a critical care outreach service and obtained a 30% response rate. They similarly found positive attitudes toward the service. Our study differs from this study in that we focused on more specific elements of the consultant role, rather than the entire outreach service.

The College of Intensive Care of Australia and New Zealand recommends that the MET “should be overseen by an intensive care specialist who is immediately available for advice to the ICU medical officer and to attend to the

Rapid Response System (RRS) call where specialist expertise is required. In large tertiary ICUs with RRS calls of > 2000 per annum a separate specialist roster for RRS oversight is recommended”.<sup>11</sup> The daily schedule, defined roles and documented interventions performed by our CCOP accord with these recommendations. The CCOP was able to review in person a relatively high proportion of MET and Respond Blue calls. Importantly, most Respond Blue calls in our hospital are not due to true cardiac arrests<sup>14</sup> and, as such, in-person consultant review is not required in most instances.

### Strengths and limitations

Strengths of the study include the prospective design, structured nature of the daily schedule, and provision of novel data around the involvement of an ICU consultant in a CCOP role.

Limitations of the study include the single-centre design and the relatively small cohorts. However, our hospital

is similar to other teaching hospitals in relation to the MET composition and patients reviewed. The study was conducted during the COVID-19 pandemic, which likely affected the relative proportions of tasks completed. A further limitation is that we collected data on activities undertaken as counts and did not record the relative time spent on each task. Furthermore, there may have been instances of overlap between the tasks listed as they were not completely discrete. While we had a large number of consultants perform the role, some consultants performed more shifts, and we were not able to ascertain any level of interobserver agreement on the interpretation of the data elements recorded.

In addition, we used a survey to evaluate the CCOP role and only obtained a response rate of 65%, raising the possibility of responder bias from staff who were enthusiastic about the role. Although such data cannot guide clinical care, a survey is one of few methods for acquiring perceptions around possible approaches to improve the functionality of the CCOP role. Finally, we did not obtain feedback on staff outside the ICU who interacted with the role, such as staff from the ED.

#### Areas of future research and quality improvement

Beyond the auditing and surveying discussed above, there is a need to evaluate the effectiveness of implementing the CCOP role on patient-centred outcomes as well as evaluating its cost effectiveness, impact on hospital logistic and overall value, much as has occurred for METs over the past two decades. The emergency of the COVID-19 pandemic disrupted and delayed such evaluations and necessitated modification of the role. Therefore, we have modified the timelines for evaluation of the role in the Australian and New Zealand Clinical Trials Registry (ACTRN12620000357954).

Although the CCOP conducted twice daily ED visits, on average only one patient was referred, and in 40% of clinical shifts, no referrals were seen. Since the implementation of the role, we have developed an ED-ICU special interest group to enhance identification and referral of patients in the ED who may require ICU admission.

The feedback obtained suggests we will need to improve clarity and consistency around aspects of the role as well as communication within and outside of the critical care outreach team.

Finally, we intend to undertake several detailed analyses to explore the impact of the CCOP role on the timeliness of ED to ICU admissions and on various elements of the MET responses and in-hospital cardiac arrests.

#### Conclusions

In the implementation phase of a CCOP in a teaching hospital, the most common tasks performed included

review of at-risk and deteriorating ED and MET patients, high level and direct specialist-to-specialist communication, goals of care discussions, and expediting and coordination of care. There is now a need to evaluate the effectiveness, impact and value of this role on patient-centred, institution-centred and cost of care outcomes.

#### Competing interests

No relevant disclosures.

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[Corrections added on 10 September 2021 after first online publication: the spelling errors in the names of three members of the Austin Health Critical Care Outreach Physician Investigators (Angus Banh, Tamishta Hensman and William Ainslie) were amended.]

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