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Critical care outreach referrals: a mixed-method investigative study of outcomes and experiences

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ABSTRACT

Aim: To explore referrals to a critical care outreach team (CCOT), associated factors around patient management and survival to discharge, and the qualitative exploration of referral characteristics (identifying any areas for service improvement around CCOT).

Method: A single-centre mixed method study in a specialist hospital was undertaken, using an explanatory design: participant selection model. In this model, quantitative results (prospective and retrospective episode of care review, including modified early warning system (MEWS), time and delay of referral and patient outcomes for admission and survival) are further explained by qualitative (interview) data with doctors and nurses referring to outreach. Quantitative data were analysed using SPSS +17 and 19, and qualitative data were analysed using grounded theory principles.

Results: A large proportion of referrals (124/407 = 30·5%) were made by medical staff. For 97 (97/407 = 23·8%) referrals, there was a delay between the point at which patients deteriorated (as verified by retrospective record review and MEWS score triggers) and the time at when patients were referred. The average delay was 2·96 h (95% CI 1·97–3·95; SD 9·56). Timely referrals were associated with improved outcomes; however, no causal attribution can be made from the circumstances around CCOT referral. Qualitative themes included indications for referral, facilitating factors for referral, barriers to referral and consequences of referral, with an overarching core theory of reassurance. Outreach was seen as back-up and this core theory demonstrates the important, and somewhat less tangible, role outreach has in supporting ward staff to care for at-risk patients.

Conclusion: Mapping outreach episodes of care and patient outcomes can help highlight areas for improvement. This study outlines reasons for referral and how outreach can facilitate patient pathways in critical illness.

Key words: Clinical research • Critical care without walls/outreach • Outreach • Outreach services • Research methodology • Statistics

INTRODUCTION

This article presents data from a mixed method study which explored the impact of a critical care outreach team (CCOT, also referred to as 'outreach' in this article). Quantitative analysis was undertaken for prospective and retrospective data of a cohort of 407 outreach episodes referred to the CCOT over the course of 8 months. Predictive factors associated with 30-day mortality were established and are presented in a separate article (Pattison *et al*., 2010). This article presents quantitative data around referral factors alongside qualitative interview data, exploring experiences of referrals with staff referring to outreach. Data from both the qualitative interviews and quantitative data were analysed according to mixed method study techniques.

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BACKGROUND

The inception of critical care outreach a decade ago in the UK, based on the medical emergency team (MET) model from Australia (Lee *et al*., 1995), was heralded as a way of dealing with at-risk or deteriorating ward patients (Department of Health, 2000). It has not, however, proved to be a solution for all (Cuthbertson *et al*., 2007; Gao *et al*., 2007) particularly given difficulties around the CCOT evaluation; a difficult but necessary task, subject to many confounding factors. Ball *et al*. (2003), Esmonde *et al*. (2006), McGaughey *et al*. (2007) and Endacott *et al*. (2009) have also noted the complexities in evaluating the CCOT efficacy. As studies have raised, finding suitable parameters with which to assess

outreach's impact is not easy (Garcea *et al*., 2004; Peberdy *et al*., 2007). Indeed, CCOTs range widely from one nurse for a few hours a week to consultant physician-led, multidisciplinary teams covering 24 h a day, 7 days a week (NHS Modernisation Agency, 2003; McDonnell *et al*., 2007), the variations in team structures contributing to difficulties in assessing impact in multicentre studies. Evidence in certain areas related to CCOT implementation has been found by several authors such as mortality, intensive care unit (ICU) admissions and readmissions, adverse events and discharge delay (Ball *et al*., 2003; Chellel *et al*., 2006; Salamonson *et al*., 2006; Pirret, 2008; Endacott *et al*., 2009). Conversely, no evidence for effectiveness of the CCOT, in relation to facilitating ICU discharge and mortality, has been found by others (Hillman *et al*., 2005; Gao *et al*., 2007; Williams *et al*., 2010). While only Hillman *et al*.'s (2005) cluster randomised controlled trial (RCT) was an intervention study of the CCOT [but which has itself been criticized for being underpowered (Brindley *et al*., 2007; Buist *et al*., 2007)], so some degree of causality can be inferred, there are different potential reasons for the lack of evidence for the CCOT in observational studies. These could relate to different management, and even costing and performance indicators related to ICU beds (Gao *et al*., 2007), as well as out-of-hour support structures which can affect how the CCOT operates (Williams *et al*., 2010). Referrals to critical care are also subject to wide variation, in spite of the introduction of early warning scoring systems (EWSS) (Cuthbertson *et al*., 2007; Smith *et al*., 2008). Cioffi (2000a, 2000b), in her qualitative work, highlighted the cues that nurses rely on to know when to alert METs, such as CCOTs, to at-risk or deteriorating patients. These cues appear not to be as clear-cut as relying solely on the parameters of early warning systems. Furthermore, EWSS often rely insensitive or best-guess parameters for triggering patient referrals (Cuthbertson, 2008).

REFERRAL LITERATURE

There is a lack of literature surrounding nurses' reasons, or lack of, for using and referring to the CCOT. Cioffi (2000a, 2000b) qualitatively explored such reasons in a study looking at the MET and found an uncertainty associated with calling, and being able to identify at-risk situations and changes in patients' conditions. That uncertainty led to nurses checking with peers, for example, before even calling the MET. However, they articulated a gut feeling associated with knowing when needing to call the MET. Cioffi's (2000a, 2000b) qualitative findings are reinforced by Young *et al*. (2008), who found being worried as one of the two most common reasons for referral to a MET. Massey *et al*. (2009) reviewed studies that looked into qualitative and quantitative factors affecting suboptimal ward care of acutely ill patients, grouping them into various factors such as failure to seek advice, lack of knowledge, failure to appreciate clinical urgency, failure of the organization and lack of supervision. They concluded that there were many unexplored factors in suboptimal ward care and that evaluation of strategies and systems to identify at-risk patients is important. A positive relationship with regard to referral to METs that comes with nursing experience was noted in Salamonson *et al*.'s (2006) survey study. They highlighted that those qualified less than 5 years were less likely to call METs, suggesting there is an issue around confidence to refer. This sentiment of experience as an important part of referral was echoed in another survey by Galhotra *et al*. (2006), who found that greater experience was important with regard to nurses' perception that METs had a positive contribution to improvement in patient care. An evaluative study by Baker-McClearn and Carmel (2008), who undertook semi-structured interviews with 100 health care staff, found with outreach intervention that care was timelier, there were fewer ICU referrals, ICU discharges were smoother and links were improved between ward nurses and medical teams. Furthermore, nurses' and junior doctors' confidence and skills increased with contact with outreach on the wards but concerns remained about the sustainability of improved skills and some participants felt that junior doctors were becoming deskilled.

Andrews and Waterman (2005) and Cox *et al*. (2006) found a failure to recognize and communicate deterioration by nurses and doctors, related to self-knowledge deficits, in their studies. Early warning scores have been highlighted as an important tool in managing this aspect of communication (Andrews and Waterman, 2005). However, conveying 'worry' that might be outside EWSS parameters, as described by Young *et al*. (2008), was an important premise for the study described here. Rattray *et al*. (2011) described how professional, situational and patient characteristics predict nurses' judgements of patient acuity, and how they also predicted nurses' referrals of acutely ill patients in a factorial survey of nurses working with deteriorating patients. Vignettes were used to determine whether nurses would refer and this was correlated with EWSS data from the vignettes. Nurses used a combination of cues and clinical information to decide to refer to outreach, rather than just one piece of information (Rattray *et al*., 2011). Aside from Rattray *et al*. (2011), there is limited evidence about how the EWSS supports or affects clinical

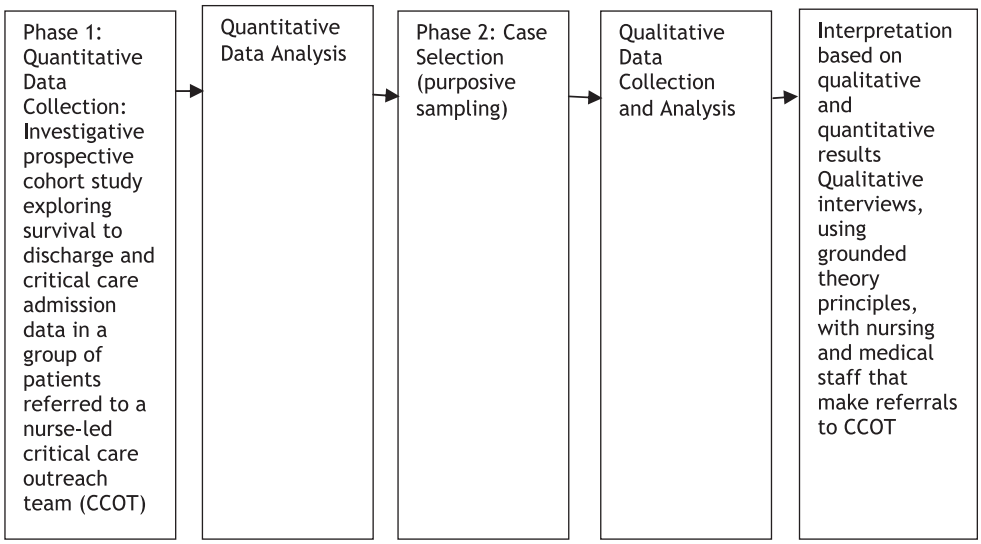

Figure 1 Explanatory design: participant selection model (Creswell and Plano Clark, 2007).

decision-making; however, there is some allusion to how it plays a complementary role in supporting clinical decisions (Duncan *et al*., 2006; Page *et al*., 2008).

OVERALL AIMS

The primary aims were to explore referrals to the CCOT, the associated factors around patient management and survival to discharge, and the qualitative exploration of referral characteristics (identifying any areas for service improvement around CCOT). Secondary aims included exploring 3 and 6 month survival, alongside unit and hospital outcome.

DESIGN

Study design followed Creswell and Plano Clark's (2007) explanatory design: participant selection model where quantitative results are further explained by qualitative data. This mixed methodology approach uses findings from each part of the research and iteratively moves between these findings to draw further conclusions beyond simply the two separate designs (Tashakkori and Teddlie, 2003; Creswell and Plano Clark, 2007). Prospective observational data were collected in Phase 1 and analysed, informing qualitative sampling for Phase 2 (Figure 1).

Samples

Phase 1: All patients with cancer referred to the CCOT (postoperative patients seen routinely as part of the CCOT service was excluded) in a specialist hospital over a period of 8 months.

Phase 2: Theoretical sample of a range of doctors and nurses across wards, in a specialist hospital.

METHODS

Phase 1: Data for each referral to the CCOT were collected by the CCOT using a prospective database specifically created for the data collection for the study. We aimed to collect all the data prospectively; retrospective data was collected to ensure minimal missing data and to assess points of deterioration (discussed below). Data included (Table 1).

Retrospective data were also collated from case notes for physiological variables for point of deterioration by the eight CCOT members (all nurses) where possible (defined by a MEWS score) >3 that would

Table 1 Prospective data for the CCOT referrals

- Time/date of referral
- Area (ward) of referral; referrer (speciality, grade)
- Presenting problem defined by outreach
- Presenting problem as ascertained by case notes
- MEWS at referral (from observation chart)
- MEWS at point of deterioration (from retrospective chart review)
- Patient diagnosis
- Outcome data: initially – admitted/readmitted to ICU within 7 days of outreach initiation?
- Outcome data: survival to discharge
- Timeliness/appropriateness of referral
- Physiological data: BP, U/O, HR, K+, Mg+, Temp, RR, GCS, fluid assessment, chest exam, procalcitonin (if apt), cap refill, bowel assessment, ECG, Limitation of care order, i.e. initiation of Do Not Attempt Resuscitation (DNAR) discussion and subsequent outcome (presented in a separate article by Pattison *et al*., 2010)

BP, blood pressure; ECG, electrocardiogram; GCS, glasgow coma scale; HR, heart rate; K+, potassium; Mg+, magnesium; RR, respiratory rate; U/O, urine output.

have triggered, or physiological deterioration outside MEWS including documented oxygen saturation (SaO_2) ≤90% and ≥35% which was the trigger figure for referral in the trust to CCOT) and were ascertained by case note review by two critical care practitioners.

Phase 2: After analysis of referral data, identification of areas of high, medium and low referral rates were identified [and areas of high/low (high was counted as referrals from wards exceeding more than 15% of workload and as less than 10% of referrals during study period. Referrals came from 20 ward areas in total) and inappropriate (referrals were deemed inappropriate without physiological abnormality and a MEWS less than three, or where there was pre-existing Do Not Attempt Resuscitation (DNAR) form alongside documentation that the patient was not for critical care unit (CCU) admission or escalation of treatment. Exceptions to this were palliative patients with reversible causes such as atrial fibrillation (AF), supra ventricular tachycardia (SVT), severe hypokalaemia and mini-trach for airway clearance) and timely and untimely referrals]. Timeliness was determined by time of referral versus time of deterioration. Where patients triggered a MEWS >3 at a previous time point in the previous 72 h related to that episode, and outreach had not been informed, this was considered untimely (or where patients had become unwell as deemed by the 'other' clinical criteria – see results for list of 'other'). This was later affirmed on independent retrospective record review. Using theoretical sampling from these areas, interviews were carried out by the Clinical Nursing Research Fellow (N. P.) and nurse researcher (E. E.) with staff nurses and junior doctors from areas of differing referrals and across grades. In-depth loosely structured interviews, using grounded theory principles, were conducted to qualitatively explore the characteristics of referral episodes and what influencing factors there might be for why referrals are or are not made. All interviews were audio taped and transcribed. Interviews were carried out and data were analysed using grounded theory methodology. Written informed consent was taken for the interviews and the study was reviewed and approved by the institutional committee for clinical research and the hospital research ethics committee.

Data analysis

Statistical Package for Social Sciences (SPSS+) 17 and 19 were used for all quantitative data analysis. Data were investigated (as described in results) using chi-squared, non-parametric and T-test analyses (multivariate analysis is presented in Pattison *et al*. (2010) in relation to physiological variable and 30-day mortality). Data sets were split into patients and episodes (because outcome data for survival cannot be counted more than once); the subset of patient data is referred to as subset or patient data in description of the results. Survival analysis was not deemed appropriate because of the non-constant hazard rate; despite patients having an increased risk of death in critical care, this is much reduced on critical care discharge. Two-sided significance at 5% (0·05) level is used throughout. Interview data from Phase 2 were analysed using grounded theory (Glaser and Strauss, 1967). The analysis process involved open coding where the data was considered in detail to gain an understanding of the meaning behind the raw text. Once the information was distilled down, initial categories were developed for the emerging themes. Constant comparative technique, the core method of grounded theory analysis, was used to compare incidents with incidents, thus allowing the generation of categories. Incidents were then compared with categories, which allowed identification of the properties of a category. This comparative process was continued through development of categories to construct and ultimately, to theory generation (Benton, 2000). This emergent theory can be tested as interviews progress (Strauss and Corbin, 1998). Developing theory was then compared and tested against existing literature and theory. Joint analysis of final results from Phases 1 and 2 was carried out to identify any further issues and needs, and to provide deeper explanation for each phases' results as per Creswell and Plano Clark (2007). Missing data is described throughout the Results section.

RESULTS

Phase 1

Referrals from 407 episodes for 318 patients were evaluated (a proportion of patients were admitted twice or more during the study period) (Patients referred less than 48 h apart were not counted as new referrals. Survival and 3 and 6 month outcome data uses patient subset not episode dataset). Results are given in the following areas: grades of referrers, types of referrals (patient illnesses), treatment, time of referral, delay in referrals, admission to critical care and survival.

Grades of referrers

For all episodes, referral patterns according to grade can be seen below in Table 2. 'Other' included allied health professionals and consultant doctors.

A large proportion of referrals (124/407 = 30·5%) were made by medical staff. Very junior nurses (lower

Table 2 Grade of referrers

Referred by whom		
	Frequency	%
Band 5	18	4·4
Upper band 5 + lower band 6	79	19·4
Upper band 6	80	19·7
Band 7	43	10·6
FY2 (junior doctor)	61	15·0
SpR (registrar)	53	13·0
Other (including consultant/physiotherapist)	38	9·3
Missing (referrer not documented)	35	8·6
Total	407	100·0

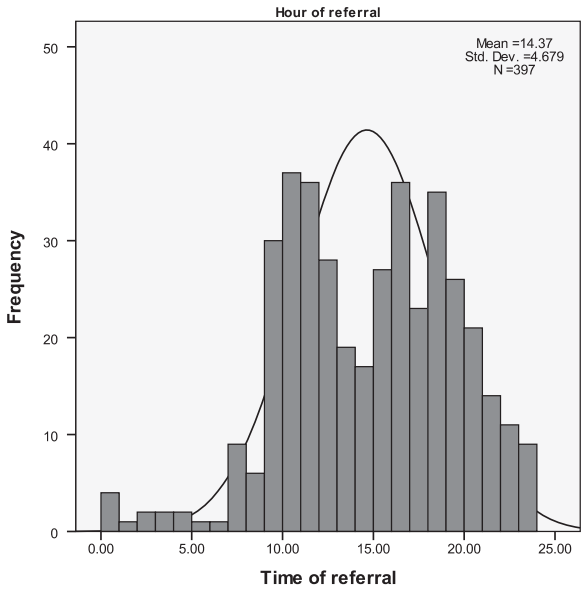

Figure 2 Referral time.

band 5) made few referrals in comparison with more senior colleagues.

When referrals are made

The mean time for referral was around 2·30 p.m. but there was a peak midmorning and towards the end of the afternoon (Figure 2). One hundred and fifty-three referrals (37·6%) were outside normal working hours (9 a.m. to 5 p.m.) and 30·7% ($n = 125$) were on the weekend (Saturday/Sunday). For 97 (97/407 = 23·8%; missing data $n = 43$; 11·3%) referrals there was a delay between the point at which patients deteriorated (as verified by retrospective record review and MEWS triggers) and the time at when patients were referred. The average delay was 2·96 h (95% CI 1·97–3·95; SD 9·56).

Delays in referrals

Referral delay is further supported by exploring MEWS at actual deterioration, the point at which patients first triggered a MEWS of >3 or should have warranted a call to the CCOT (see appropriateness defined earlier) against MEWS at referral ($Z = -4·069$: $p \leq 0·001$) (Table 3). Mean of MEWS at referral: 3·76 (95% CI 3·49–3·99); at deterioration: 3·96 (95% CI 3·67–4·18) (missing data for MEWS at referral $n = 14$ (3·4%) and at deterioration $n = 34$ (8·4%). Untimely referrals were associated with lower survival to discharge ($\chi^2 p = 0·004$) and 3 and 6 month mortality ($\chi^2 p = 0·004$; $p = 0·026$) [$n = 309$; missing data for timeliness, $n = 9$ (2·8%)].

Survival to discharge and outcome

Types of patients referred

All referrals were for cancer patients. Patients were referred with various illnesses (Table 4) and were at different points in cancer treatment:

Give the wide variation in treatments, treatment was categorized into main treatment type and included

Table 4 Presenting problem

Problem	Frequency (*n*)	%
Sepsis/SIRS	123	30·22
Respiratory compromise	83	20·39
Cardiac compromise/arrhythmias	78	19·16
Abdominal/gastrointestinal	24	5·90
Neurological event	15	3·70
Acute renal failure	24	5·90
Other	56	13·76
Missing (and could not be determined retrospectively)	4	1·00
Total	407	

SIRS, systemic inflammatory response syndrome.

Table 3 MEWS at deterioration and referral

				95% CI of the difference			
Paired samples statistics	Mean	Mean	SD	Lower	Upper	T	Significance
MEWS at referral – MEWS at deterioration ($n = 373$)	3·7560–3·9598	−.20375	.94259	−.29972	−.10778	−4·175	<0·001

Table 5 Treatment and outcome

Main treatment at 3 and 6 months										
	Survival to discharge				3 months			6 months		
Main treatment	Alive	Died	Discharge to hospice	Total	Alive	Died	Total	Alive	Died	Total
Chemotherapy	131	60	8	191	102	97	199	93	106	199
Transplant	20	11	0	31	19	12	31	18	13	31
Surgery	31	7	2	38	31	9	40	30	10	40
Radiotherapy	6	4	0	10	6	4	10	5	5	10
None within past 3 months	22	15	1	37	23	15	38	21	17	38
Missing data	0	0	0	0	0	0	0	0	0	0
Total	210	97	11	318	181	137	318	167	151	318

chemotherapy, radiotherapy, surgery, no treatment within past 3 months and haemopoetic stem cell transplant. There was an association with patients who had recently undergone chemotherapy and poorer outcome at 3 and 6 months ($p = 0{\cdot}023$; χ^2 9·94 and $p = 0{\cdot}041$; χ^2 11·03) but not survival to discharge ($p = 0{\cdot}291$; χ^2 4·98) (Table 5) ($n = 318$, no missing data).

MEWS, ICU admission, appropriateness and outcome

Three- and 6-month mortalities were significantly associated with a higher MEWS at referral ($p = 0{\cdot}022$, $Z = 2{\cdot}119$; $p = 0{\cdot}010$, $Z = -2{\cdot}575$). Additionally, there was a trend towards a higher MEWS at deterioration with 3 month mortality data (significant with 6-month data) ($p = 0{\cdot}077$, $Z = -1{\cdot}771$; $p = 0{\cdot}011$, $Z = -2{\cdot}536$). As earlier, data missing for MEWS at referral, $n = 14$ (3·4%), and at deterioration, $n = 34$ (8·4%). There was no difference between mean MEWS at referral and whether doctors and nurses were referring ($p = 0{\cdot}932$; $t = -0{\cdot}088$), or with MEWS at deterioration ($p = 0{\cdot}847$; $t = 0{\cdot}193$). Patients seen by outreach and admitted to critical care requiring level 2/3 care: 26% ($n = 106$). Average unit length of stay was 151·19 h or 6·3 days (95% CI 114·80–187·57; SD 196·949; median 77 h, no missing data). Table 6 outlines how those admitted to critical care were less likely to survive to discharge ($p =< 0{\cdot}001$; FE 10·715), but there was no association with unit outcome ($p = 0{\cdot}424$; FE 1·436) ($n = 318$, no missing data). Two patients were discharged to a hospice from the unit.

Of all referrals, 26·5% did not survive to discharge (for survival data, as with outcome data, patients were only counted in subset of patients ($n = 318$) to ensure data were not skewed by outcome being counted greater than once, no missing data). Few referrals were inappropriate: 6·9% ($n = 28$, missing $n = 3$) (i.e. patients had a DNAR order and were not for outreach intervention, or had not triggered a MEWS and had no presenting problem, outside MEWS criteria). As might be expected, inappropriate referrals were less likely to survive to discharge ($p = 0{\cdot}035$; FE 4·869).

Phase 2 – interview data

Seven nurses and two doctors were interviewed. Participants were recruited from both hospital sites. Subjects with differing levels of seniority, years of clinical practice and from a variety of clinical areas were theoretically sampled, based on results from the quantitative data in Phase 1, in relation to experience of referring to outreach. Eight were approached from each of the areas (high and low referrals) as described in the methods, and a further two to gain one further doctor's and junior nurse's perspective, which was

Table 6 Critical care unit outcome

Outcome following admission to critical care								
		Hospital outcome				Unit outcome		
		Survived to discharge	Died	Discharge to hospice	Total	Alive	Died	Total
Critical care admission	Admitted for up to level 3 care	43	37	2	80	48	24	
	Not admitted for level 3 care	167	60	9	227	7	1	
Total		210	97	11	318	55	25	80

indicated in the developing data as necessary from other participant's data. One participant wished to participate but left the trust before the interview could be arranged. Certain questions were revised and added as the interviews proceeded, to enhance and test the developing theory, such as the addition of further questioning around timing: 'How do you decide when is the time to make the call to outreach?', which yielded more data around indications for referral. Further examples of the dynamic nature of theory development are given in Section on Facilitating Factors for Referral.

Analysis of the interview data resulted in an overarching core theory of 'support' which spanned the following main categories:

- Indications for referral;
- Facilitating factors for referral;
- Barriers to referral;
- Consequences of referral.

Indications for referral

Referral would often be prompted by the culmination of various factors, including blood results, MEWS, and how patients said they felt. Patients' appearances were also seen as a significant sign.

> *'She just had this sweaty clammy look and just going from previous experience again, it was like there is something really not right here.' (R1, Nurse)*

MEWS was seen as a tool that could be used to dictate referral need, but experienced nurses said they used it less and relied on their own judgement as to when to involve outreach. It was acknowledged that it was sometimes difficult to determine how sick a patient was, which in turn, made a timely referral to outreach more complicated to judge correctly.

> *'. . .she didn't look particularly unwell, but she was deviously unwell, in the sense that it was difficult to, if you looked at her, you didn't think she was actually that sick.' (R8, Doctor)*

Instinct was combined with experience and clinical data to reach a decision. Reliance on intuition was conveyed by most participants. It was felt this intuition developed with experience and time, and became honed into a more reliable professional instinct. Familiarity from continuous care was attributed to aiding the detection of subtle changes in a patient's condition. Practical critical care experience and theoretical knowledge from teaching sessions were highlighted as beneficial for making referral decisions. The doctors stated it was good how nurses could contact outreach if they were concerned about a patient.

> *'I think it's really good that nurses often initiate it as well and suggest shall we refer and often they refer, um on their own, without any medical input which I think is very good. . .' (R9, Doctor)*

Facilitating factors for referral

There was a general feeling of confidence in participants' ability to make the referral decision and an awareness of the significance of early referrals, as well as notifying outreach of potentially sick patients.

> *'. . .obviously you have to do a thorough assessment from head to foot and then when I check that the patient is still fine although they look septic, nothing that we can't manage but we just alert outreach that this might be a potential but we are holding on.' (R2, Nurse)*

The importance of early referrals extended to how this was best taught to inexperienced health professionals. Nurses cited the importance of junior nurses experiencing caring for sick patients (with senior support) and encouraged use of intuition and early referral if there were any concerns. The doctors favoured teaching through discussion of signs of deterioration in observations. However, finding time for teaching, especially when a patient is deteriorating, was cited as difficult by both doctors and nurses.

Outreach's approachable style and non-critical attitude regarding referrals was evident throughout the interview data. One registrar highlighted how a decrease in UK junior doctors' hours had resulted in a lack of practical experience when it comes to managing the acutely unwell and how they relied on outreach more than junior doctors. This aspect of theory developed from amended questioning to delve further into how to teach others about recognizing deteriorating patients, reflecting the dynamic of grounded theory informed interviewing. Potentially, the lack of experience could represent a knock-on effect for outreach and may be demonstrated by the considerable number of referrals made to outreach by doctors (Figure 2). A smooth referral process was evident from the data. All participants noted the ease of accessibility, and prompt responses, whether giving advice over the phone or through reviewing the patient in person, thus enabling patients to receive acute care swiftly. Outreach was consistently referred to as a trusted resource; nurses found that their advice and thorough documentation provided clarity

and reassurance in what were sometimes anxiety provoking and unfamiliar situations. The presence of outreach on the ward, while reassuring, also seemed to increase the number of referrals, which otherwise may not have warranted a 'formal' referral. Furthermore, support from doctors was also a factor in referrals.

> *'It goes back to what medical support you have got round you, like I would personally use them more. When there's maybe an on-call doctor on, that doesn't fill you with confidence as much as someone you know.' (R6, Nurse)*

Barriers to referral

Explanations around delayed or missed referrals related to misjudgement of their ability to handle patients' condition and ward busyness. There were several other difficulties in managing ward workload, which could potentially contribute to untimely referrals.

> *'Sometimes it's overconfidence or false confidence that you think you are in control of the situation… sometimes it is to do with workload and time constraints and how your time is split between different patients. You could spend slightly less time with a person and then go back to them and realise their condition has changed but not noticed those subtle changes because you haven't seen them for an hour or so.' (R6, Nurse)*

Reflection on these late referrals were apparent, they were seen as learning experiences for the future. Outreach was notably viewed as specialist practitioners with superior knowledge in acute care. For one or two participants, however, there was a slight sense of intimidation. Staff might relinquish control they had in caring for the patient, but equally outreach input could result in an increase in workload, which was difficult to manage with other patient workloads.

> *'…half of me thinks it detracts from you looking after the patient. It is not that you are giving over control but you are kind of sharing things, but it is nice sometimes to have the back up.' (R1, Nurse)*

Nurses and doctors described how outreach referral might threaten trust between ward nurses and doctors who had been managing the situation. A difference in medical opinion was also noted by one nurse as a source of conflict, and another noted that outreach might question doctors' assessments, management or communication of the situation.

Consequences of referral

Nurses found that once outreach was involved it became easier to liaise with doctors regarding patient care. Nurses were independently proactive with doctors, and were confident to question plans of care, ask for a patient review, or discuss medication. However, questioning could be met with resistance. Some found that mentioning outreach or having outreach present would facilitate these discussions, and add weight to nurses' opinions. They were seen as instrumental in ensuring that doctors made decisions around appropriate levels of medical intervention.

> *'…they are great if you have a doctor that is reluctant to, I tell you where they're really helpful is resuscitation status, they can be exceptionally helpful then because they can give clarity to the situation.' (R4, Nurse)*

However, one doctor had observed that when outreach became involved, the more junior doctors would back away slightly from their role in the care of the patient, and to some extent handover the responsibility to outreach.

The doctors outlined how they usually called outreach first if their patient was deteriorating, rather than the critical care doctors. They were confident that outreach would immediately inform the critical care doctors, thus equating to an intensive care referral in itself. Outreach's ability to think laterally and encompass both critical care and medical/surgical team perspectives, while also remaining focused on the patient's needs, was praised. Seamless working alongside both teams meant they were considered part of both the medical and critical care teams. This affiliation, along with communication skills, enabled them to pacify any potential difficulties that might arise as care was negotiated between medical teams.

> *'They're a very calming influence. When two doctors speak to each other and there is a difference in opinion on what should be done, it can get a bit, I guess, rocky is the word I would use, and I think outreach…they'd probably be able to calm things down probably from both sides about it…they've got also a, quite a good understanding about sometimes the relationship between intensivists from the medical side and how we can see things quite differently.' (R8, Doctor)*

Overarching core theory of support

The overwhelming theme derived from the interviews was the supportive role that outreach played throughout the different interactions and varied situations

that arise when caring for unwell patients. Beyond the support mentioned for staff, several participants commented on the supportive relationship they witnessed between outreach, patients and families, which reinforced this concept as a core theory. The outreach nurses were seen to set aside uninterrupted time which they would dedicate to providing the patients with explanations for their care and reassurance regarding their current situation. Outreach also covered discharge from critical care. Relocation anxiety from transferring between the critical care environment; and its intensive monitoring and nursing observation, to the relative independence of the ward, was a common phenomenon. According to ward staff, patients and relatives appreciated the extra monitoring and information that the outreach service offered. They were seen as knowledgeable specialist practitioners, whose input reduced patients' anxiety levels.

The spectrum ranged from practical expert advice regarding equipment and management plans, to enabling improved communication when liaising with other teams involved in the patients care. This was emphasized throughout the four main categories and is exemplified by the following participant:

> *'. . .an extra pair of eyes and ears for patients who are at risk of deteriorating or are in the process of deteriorating; and really able to bring critical care experience to a ward environment, to support the nurses and doctors on the ward to care for deteriorating patients on the ward. It's a very supportive role, bringing that extra degree of knowledge and skills that we may not have on the ward to care for the patient.' (R7, Nurse)*

All participants found their support invaluable regardless of their own seniority or experience. Interestingly, they managed to work in such a way that both critical care, nursing and medical teams felt ownership of the outreach service. This illustrates outreach's ability to successfully meet the needs of varying colleagues. In addition to supporting staff, they were instrumental in ensuring the patient's needs were kept at the forefront of care interventions.

DISCUSSION

This study explored some of the issues around the CCOT referrals in a specialist hospital. Joint analysis and interpretation of the data between the two phases has raised further interwoven issues, potentially affecting care provision.

Phase 1 outlined various issues around the characteristics of those making referrals, with few being made by very junior staff. When these referrals were made, a fair proportion was out of hours. This can be correlated with facilitating factors and related ward workload constraints. Delays identified in Phase 1 in relation to untimely referrals, were reinforced in the interviews. Reasons for delays were apparent in inhibitory factors, where late referrals were related to overconfidence in managing the at-risk patient, or delays as a result of conflict. Outreach was seen as back up and the overarching theory of reassurance iterates the important, and somewhat less tangible, role outreach have in supporting ward staff to care for at-risk patients.

There was an issue in relation to outreach boundaries and the 407 referrals over the 8-month period did not reflect the outreach activity in seeing routine postoperative patients after discharge from critical care (excluded from this study). Ward staff sometimes saw outreach as a solution to many problems, beyond their main role of support for the at-risk patient, and consequently they took on too many roles, including gap-filling for services which were depleted, which could potentially compromise the scope of their role. Activity is now at 1400 patients per year which highlights a need to delineate those boundaries in order to meet patients' needs.

Survival data was perhaps unsurprising; in patients who had delayed referral to the CCOT, there was an association with poorer outcome. However, what cannot be drawn from this methodology is whether this was related to patients underlying condition, or the circumstances around the CCOT referral. While this study was not strictly a review of care prior to critical care admission, elements of it echo that of McQuillan *et al*.'s (1998) study nonetheless, particularly failure to appreciate clinical urgency.

A surprising element to the qualitative findings was the talk of gut instinct and intuition as reasons for referral to outreach, particularly when MEWS was 'normal'. There was a low incidence of inappropriate referrals which backs up practitioners' articulation of there being something wrong that falls outside of MEWS. This was also important in Young *et al*. (2008) where being worried was one of the most common, and legitimate reasons for referral. In this study, it meant that some practitioners disregarded clinical guidance of referring to the CCOT with a MEWS >3 because they were overconfident, which potentially could compromise the patient, as seen with the longer term survival data association in untimely referrals. Indeed, it might be that while intuition and expertise are posited as uneasy bedfellows (Greenhalgh, 2002), these participants' interpretation of intuition was that gut instinct was an important factor for them making the clinical decision to refer or not.

Elements of confidence arose as factors that impacted on ward nurses' ability to care for patients, as Endacott *et al*. (2009) and Massey *et al*. (2009) noted. Overconfidence, as described above, skewed nurses and doctors ability to make timely referrals to outreach. Junior doctors may feel they can handle situations and not refer in a timely manner. Overconfidence has an effect on patients and clinical outcomes, according to Kissinger (1998). An increased awareness of overconfidence has been described as potentially enhancing nursing judgment (Kissinger, 1998). Nurses' risk assessment, and that corresponds with the actions they take and patient outcomes is important. As Yang and Thompson (2010) noted in their confidence calibration study of students, inappropriate levels of overconfidence may lead to omissions or delay in remedial or proactive clinical interventions. Equally, as with Salamonson *et al*. (2006) and Cioffi (2000a) who found that inexperienced nurses did not call or checked with peers before referring to MET or CCOT, very junior nurses deferred to senior colleagues when deciding to refer. As Rattray *et al*. (2011) articulated, use of simulation teaching sessions, mimicking real-life situations with deteriorating patients in a clinical skills laboratory, may be one way of dealing with confidence and competence issues around CCOT referrals. The role of CCOT as a bridge between the critical care unit and the ward is one that has not been articulated before. It was interesting to note how CCOT were perceived by ward staff as having a role in mediation of conflict between teams. In making decisions to admit, or not, to critical care, or at the very least triaging patients in relation to admission, the CCOT have a valuable position in both ward and critical care management. The specialist skills of the CCOT extended beyond the clinical management of caring for the at-risk patient to prevent admission or optimize patients' conditions, and also involved the negotiation of patients' disease pathways. By documenting outcome of patients after critical care we also tried to capture how discharge included those patients referred to hospice, emphasizing how the CCOT are involved in all aspects of negotiation and how this can be a successful outcome for patients (even though it skews survival figures). The fact this was a small study specific to one hospital and one population was a significant limitation. In an observational study like this, however, it is inevitable that there are confounding factors that cannot be accounted for. This study was not an evaluation of impact of outreach, and therefore no causality can be attributed to outreach interventions. However, associations related to outreach's management and subsequent patient outcome can be seen.

CONCLUSION

Mapping patient acuity and correlating care at point of referral and deterioration with outreach care episodes helped us clearly define areas for improvement, namely: timeliness of referral, education issues and reviewing our MEWS criteria.

This study has outlined some of the reasons behind the CCOT referral and how outreach can facilitate patient pathways in critical illness.

WHAT IS KNOWN ABOUT THIS TOPIC

- Critical care outreach team remits vary considerably within trusts, and their impact is difficult to evaluate.
- Few studies have explored both patient outcomes and the characteristics of referral.
- Outreach referral is often informed by early warning or track and trigger system scores.

WHAT THIS PAPER ADDS

- Additional cues, which are difficult to define clinically, also appear to inform outreach referral.
- Personal confidence, alongside situational ward factors of ward nurses affects referrals to CCOT, which potentially delays referrals.
- Identifying areas of high referral and high acuity patients highlights how services can be shaped to meet specific needs. For instance, increasing the MEWS referral criteria or using CCOT to up-skill areas known to be competent in caring for higher acuity and at-risk patients might be potential solutions to the ever-increasing numbers of referrals. Using tools (and measuring their use) such as Situation Background Action Response (SBAR), which campaigns such as Patient Safety First (www.patientsafetyfirst.nhs.uk) advocate the use of, should help ward staff refer appropriately to CCOT and respond to patients appropriately while waiting CCOT review.
- Critical care outreach can be highly influential in shaping patient's critical illness pathways, either through facilitating access to critical care units, or to initiate limitation of treatment orders. In this sense, they are a valuable resource to ward staff who see them as a reassuring presence.

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