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Models and activities of critical care outreach in New Zealand hospitals: results of a national census

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ABSTRACT

Aim: To review clinical models and activities of critical care outreach (CCO) in New Zealand public hospitals.

Methods: Data were collected using a two-stage process. Stage 1 consisted of a cross-sectional descriptive online survey distributed to nurse managers of all CCO in New Zealand. Stage 2 requested that all respondent sites supply outreach documentation for analysis.

Results: Twenty acute care public hospitals replied to the data request (100%). Nine hospitals (45%) had CCO and completed the survey. There was considerable diversity in the models of CCO used. All nine hospitals had CCO that were nurse-led; 66% of these had intensive care medical input. There was variation in the size and scope of each CCO with only 4 (44%) sites providing 24-h clinical cover. The majority of referral requests made to CCO were for ward-based reviews (mean: 57%) and intensive care discharge reviews (mean: 31%). The most frequently performed activity was provision of support to ward staff (89%). All CCO routinely collected data on activities across a range of clinical areas.

Conclusion: Less than half of the public hospitals in New Zealand have a CCO service despite national recommendations that every hospital utilize one to support deteriorating ward patients. New Zealand hospitals that have critical care outreach have adopted recognized international models and adapted these to meet local demands. Whilst the evidence base demonstrating impact of critical care outreach continues to be established, international support for critical care outreach continues. Given this, critical care outreach should be more widely available 24/7 and activities standardized across New Zealand to align with national recommendations.

Relevance to clinical practice: Critical care outreach service models and activities in New Zealand hospitals continue to be diverse. Awareness of these variances will help influence critical care outreach service development and regional integration.

Key words: Critical care without walls/outreach • Outreach • Outreach and follow-up services after ICU discharge • Outreach services • Questionnaire design/survey

INTRODUCTION

Much has been written over the past 10 years of the increasing acuity within hospitals, corresponding with higher demand for critical care expertise outside of the intensive care unit (Coombs and Dillon, 2002; Hillman *et al.*, 2005; Steel and Reynolds, 2008; Jones *et al.*, 2011; Jones *et al.*, 2013). To address this increasing need, a range of clinical response systems have been implemented internationally. These are collectively referred to as rapid response systems (RRS) and are now a recognized part of hospital-wide surveillance systems targeting and intervening to help physiologically unstable patients in acute care wards (Jones *et al.*, 2011).

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MODELS OF RAPID RESPONSE SYSTEMS

RRS are designed to improve the safety of deteriorating hospital patients through recognition of high-risk patients, early notification and review by a response team, and ongoing evaluation of the system's performance (Howell and Stevens, 2013). RRS has two key features: an afferent limb (to detect patient deterioration and trigger a response) often through use of Early Warning Scores (EWS), and an efferent limb

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(the escalation responders). Several terms are in use to describe response systems in the efferent limb. These include Rapid Response Teams (RRT) (DeVita *et al.*, 2006), Critical Care Outreach (CCO) (Donohue and Endacott, 2010), Medical Emergency Teams (METs) (Hillman *et al.*, 2001), and in recent years the Intensive Care Unit Liaison Nurse (ICULN) (Eliott *et al.*, 2012). With such a proliferation of approaches within the efferent limb, there is often crossover of how RRT and CCO are used.

RRTs have been described as clinical teams that are activated to respond to the acutely unwell ward patient (Pringle *et al.*, 2011). RRTs respond to deteriorating ward patients, expedite early intervention and prevent progression to requiring a cardiac arrest team, who traditionally only intervene once patients develop respiratory or cardiac arrest (Howell and Stevens, 2013). RRTs are predominantly nurse-led although variations are described including physician-led models (Resuscitation Central, 2013); other interdisciplinary models also described (Howell and Stevens, 2013). MET are physician-led teams that can initiate intensive care level support at the patient's bedside, often through advanced airway and vasoactive support (Pringle *et al.*, 2011). CCO teams are nurse-led and share similarities with many aspects of RRT. CCO also focus on providing education and training to ward staff and support patients and their families immediately after discharge from a critical care area (Salt, 2013). Such proliferation in service models has resulted from high-level international health policies supporting initiatives for the unwell ward patient (Department of Heath (DoH), 2005; Australian Commission on Safety and Quality in Health Care (ACSQHC), 2011).

The worldwide concern in addressing the needs of deteriorating ward patients is clear (Buist *et al.*, 2007), however, demonstrating the effectiveness of RRS has been more problematic (Jones *et al.*, 2011). For example, a complex and detailed evaluation of all CCO in England by the Intensive Care and National Audit and Research Centre (ICNARC) found a range of CCO models had developed in response to local need (Rowan *et al.*, 2008). Within the ICNARC evaluation a systematic review of 23 studies exploring impact of CCO activity concluded that even though there was some evidence of improved patient outcomes, this was not robust (Esmonde *et al.*, 2006). This study supported previous findings on the absence of mortality and morbidity effect data (Chan *et al.*, 2010; Winters *et al.*, 2007).

Some empirical evidence, however, demonstrates an effect of CCO. Esmonde *et al.* (2006) noted a significant decrease in cardio-pulmonary resuscitation rates preceding ICU admission and a reduction in after-hours admissions to ICU after the introduction of CCO. A second systematic review of 34 studies conducted in the USA (18 considered high-quality) evaluated the effectiveness and implementation of RRS in acute care settings (Winters *et al.*, 2013). This review concluded that RRS were associated with reduced rates of cardio-respiratory arrest outside of intensive care units and reduced hospital mortality. Similarly, single centre studies in Australia have demonstrated that MET calls reduce patient mortality, reduce ICU readmission rates and decrease the incidence of cardiac arrests (Bellomo *et al.*, 2003; Jones *et al.*, 2005; Buist *et al.*, 2007).

Whilst such diverse models of RRS have developed internationally from the late 1990s, most RRS initiatives in NZ were developed much later. Similar to other countries, the NZ response came after an independent advisory body advised hospitals to implement a system of care to identify and respond early to physiologically unstable patients following an investigation into the death of a patient in a large tertiary hospital (Health and Disability Commissioner (HDC), 2007). The literature specific to the NZ setting appears to demonstrate a preference for the CCO model (Pirret, 2008; Salt, 2013). Therefore for the purposes of this paper, CCO will be used to describe the rapid response model used in the NZ context.

Whilst there is a growing body of international literature describing and evaluating CCO, there is little NZ data published. This study seeks to address this gap through describing the characteristics and service provision of CCO in NZ.

METHODS

Aim

This study was conducted to explore current models and activities of CCO within acute care public hospitals in NZ. It was undertaken in two stages using a cross-sectional survey design and content analysis of clinical data reports from each CCO team. Stage 1 consisted of a descriptive online survey adapted from an existing survey instrument previously used to describe the provision of CCO in England (McDonnell *et al.*, 2007). In Stage 2, documentation including daily handover sheets, snapshots of clinical databases, and activity reports for hospital service managers were obtained, collated and analysed.

Sampling

Non-probability sampling was undertaken. All the clinical nurse managers of intensive care and known CCO representatives from each public hospital were identified through existing professional networks. The sample consisted of tertiary, metropolitan and regional acute care public hospitals ($n = 20$) from all

District Health Boards (DHB) in NZ. The 18 rural hospitals in the DHBs were not included in the sample as these did not support CCO in NZ. Initial contact with potential hospital sites was undertaken verbally with subsequent email confirmation. In hospitals where it was unclear whether a CCO existed, the Charge Nurse Manager of each ICU or High Dependency Unit (HDU) was contacted by telephone and subsequent email and invited to participate in the study.

Data collection tool

The survey tool, adapted for this study, was originally used to describe the development, introduction, implementation and models of English CCO (McDonnell *et al.*, 2007). Permission was gained from the author of the original English survey tool for its adaptation and use in NZ (personal correspondence). It was adapted to elicit the number, structure, function and activity of all CCO in NZ (Table 1).

The tool was assessed for NZ context with a pilot group of CCO nurses ($n = 15$). It was then examined for face and content validity (Rattray, 2007). The group reviewed the draft survey questions and commented on the survey's ability to meet the study aim, the comprehensiveness of the survey questions, and any potential difficulties in respondents completing the survey tool. In total, four sections from the original English survey were excluded from the NZ survey. Of these, two contained questions specific to the English National Health Service (NHS) system, and were therefore not applicable to a NZ context. Two others were specific to the type of 'track and trigger' systems used, which has already been reported in another NZ study (Psirides *et al.*, 2013). Fourteen sections of the original survey were left unchanged. One question was added to determine the nature of any patient safety-related initiatives that CCO were involved with. The survey questions used in the final NZ tool were predominantly closed questions, with optional free text boxes to capture any additional qualitative comments. Topics covered in the survey are presented in Table 1.

Table 1 Overview of topics included in the survey

Demographic information about each hospital
Clinical delivery of care (activities and interventions)
Documentation
Staffing and workforce of each CCO
Medical support for CCO
Data collection
Process improvement initiatives

Data collection

Data collection occurred in two stages over a 7-month period (September 2012 to March 2013).

Stage 1

ICUs and contacts were identified as described above. An initial email was sent to the identified contacts at all acute care public hospitals ($n = 20$) explaining the study aims and inviting them to participate in the national census via an online survey tool (SurveyMonkey). Whilst individual respondents were anonymous, sites were identifiable due to the small sample size. If a CCO was not established, responders to the initial contact email were asked to send a reply clearly indicating that the hospital did not have a CCO. Two email reminders were sent out to the sample over a six week period.

Stage 2

The second stage of the data collection was initiated through subsequent email requests to all participating hospitals with CCO requesting electronic or hard copies of CCO documentation including daily handover sheet, snapshot of clinical databases, and activity reports for hospital service managers. This was to identify the type of data collected, how this data was collated and the type and service activity of the CCO.

Data analysis

Discrete data analysis strategies were used for the two stages. Owing to the small sample size, survey data was manually processed and analysed. Descriptive statistical techniques were used to summarize and describe characteristics of the data by measuring variability, mean and percentages. Data from free text responses were collated and analysed. The clinical documents obtained in Stage 2 were analysed to understand what CCO data was collected, how this data was collected and who it was being reported to in the hospital. A content analysis approach was undertaken for data analysis with results organized into categories (Elo and Kyngäs, 2008) to describe and quantify CCO activities and reporting. In this way, the documents gave context to the environment that CCO operated in, provided supplementary research data, and acted as a source of data triangulation (Bowen, 2009).

Ethical considerations

Information about the study and the reporting and dissemination of findings were supplied in the contact email. Respondents were told that consent was implied by return of the completed census. All returned survey responses, and the resultant data were stored securely and only accessible by the study investigators.

The main ethical challenge related to the small number of public hospitals in NZ. Ethical advice was sought from the Health and Disability Ethics Committee (HDEC) in NZ. After full submission and consideration, reply was received that formal ethical approval was not required (Reference: 12/CEN/14). To minimize the risk of identification and maintain anonymity, no patient or site-specific identifiers were reported on and only aggregated data was used for analysis.

RESULTS

There was 100% response rate from all 20 acute care public hospitals to the initial request for information. Nine sites reported having a CCO and were therefore eligible to complete the online survey, eight of which subsequently provided evidence of the types of data their CCO collected. The results of the survey are presented under five sections: CCO and hospital characteristics, roles and functions of CCO, staffing and workforce, clinical delivery of care and data collected by CCO. Twenty comments were received as free text responses. The majority of these comments helped to contextualize the responses made in the survey.

CCO and hospital characteristics

Table 2 describes the hospital and CCO characteristics. Less than half ($n = 9$) of the respondents reported that their hospital had a CCO. Of the 11 sites (55%) without CCO, 5 reported limited financial resources that impacted on the setting up of CCO with four hospitals not perceiving the need for CCO. Of the nine hospitals with CCO, eight (89%) of these hospitals had general ICUs combined with a number of funded HDU beds.

Results from the survey demonstrated that NZ's first CCO was established in 1995, with an increased growth in CCO in the late 2000's as illustrated in Figure 1. As demonstrated the peak year for establishment of RRS was 2008.

Roles and functions of CCO

There was a significant variation in service configuration and therefore roles of the CCO. A range of titles were held by practitioners in each CCO, such as Clinical Nurse Advisor, Clinical Resource Nurse, Patient at Risk Nurse ($n = 2$), ICU Outreach Nurse ($n = 2$), RRT and CCO Nurse.

One of the larger tertiary hospitals had three components of CCO: a critical care nurse-led service that followed-up ICU discharges, a second team (non-ICU) that attended clinical emergencies and a third team, located in the national paediatric hospital site, that followed up paediatric emergencies and referrals only.

Two hospitals had an MET linked with the CCO and an EWS escalation pathway. MET calls accounted for 16–22% of referral calls to CCO in these sites. Five hospitals had an EWS in place and encouraged clinical emergency calls to be made to CCO if ward staff were concerned about the status of a deteriorating patient. The remaining hospitals had an EWS and CCO in place. For the seven hospitals that did not have a formalized MET system, the mean percentage of clinical emergencies calls was 4.2% (range: 1–18%) of referrals to CCO.

As demonstrated in Figure 2, the types of referral to CCO varied in each hospital.

One CCO predominantly offered ICU follow-up review, with 95% of referrals reported as this referral type. Another CCO received most referrals from ward requests (80%) and had few ICU follow-up reviews (2%). In all other hospitals the largest proportion of CCO referrals was ward requests for review of acutely unwell patients (mean: 53%, range: 27–70%). ICU follow-up reviews accounted for a mean value of 35.5% of CCO referral type (range: 23–57%).

Six hospitals provided a training course specific to the recognition and response to deteriorating ward patients; only one was led by CCO. Five hospitals ran nationally/internationally recognized short courses on managing the deteriorating ward patient. All these were delivered by professional development departments and not by CCO. A further hospital had developed a training course locally; this course was designed and delivered by CCO.

Two of the eleven hospitals without CCO provided further commentary describing clinical resource roles that provided support to deteriorating ward patients. One role focused on supplying medication and equipment to wards, the other reported a clinical role for one nurse who was responsible for promoting EWS compliance, providing cannulation and venepuncture services, clinical guidance after-hours and policy development.

Staffing and workforce

There was further variability described in the staffing, workforce and hours of CCO operations. Four

Table 2 Hospital eligibility for data collection

Hospital type	No. of eligible sites	No. of sites with CCO (Stage 1)	No. of CCO that provided clinical documents (Stage 2)
Tertiary	5	4	4
Metropolitan and regional	15	5	4
Total	20	9	8

CCO, critical care outreach.

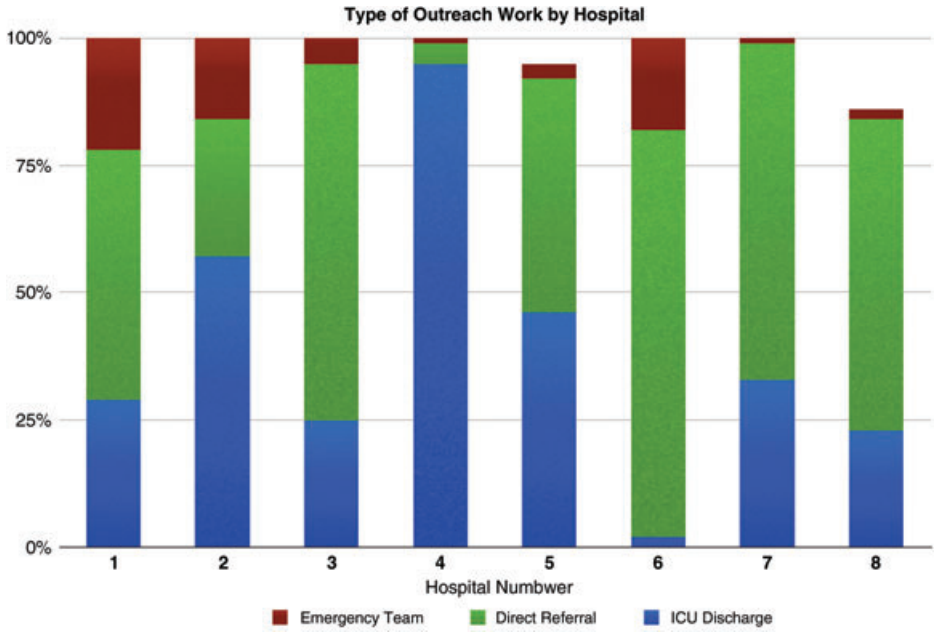

Figure 1 Cumulative number of hospitals with outreach services by year.

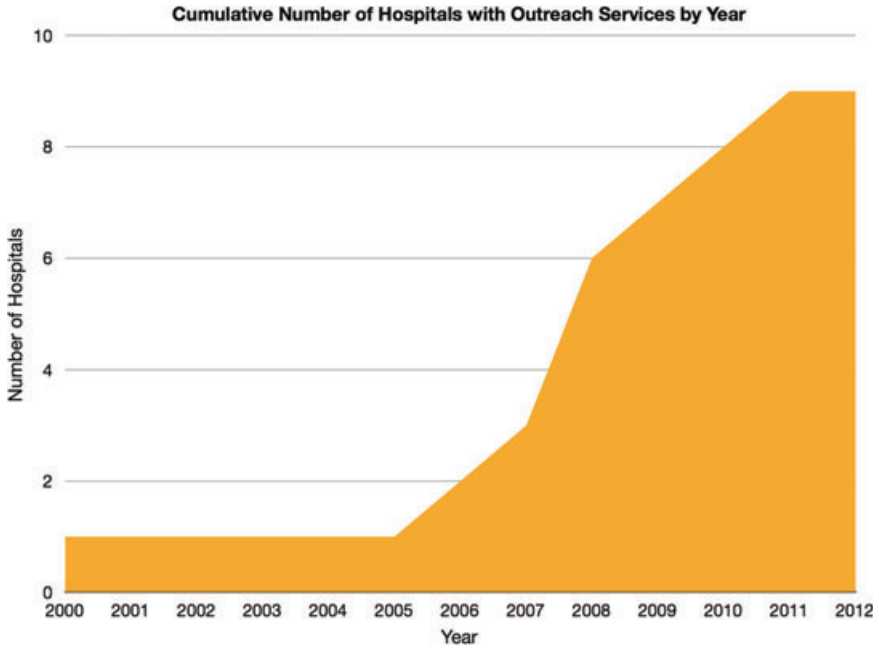

Figure 2 Type of outreach work by hospital.

hospitals provided a fully staffed CCO 24 h-a-day, 7 days-a-week. These teams were operated with 4.2–12 full time equivalent (FTE) nurses. Three CCO services provided limited cover 7 days per week: mornings only, afternoons only, and afternoons and evenings using 1.4–2.5 FTE. Two CCO were run from an ICU with no formal CCO establishment, staffed on an ad-hoc basis.

Four CCO were classified as senior nurse roles only, and five CCO had a senior nurse run the service, with the remaining staff at non-senior level. In addition, one CCO offered opportunity for Nurse Practitioner internship within the team. In terms of ICU experience, five CCO reported that every member of staff had ICU experience, three reported most of their staff had ICU experience and one CCO reported less than half

Table 3 Most frequently performed clinical activities of CCO

Activity of CCO	Number of CCO performing activity
Support to ward staff	8 (88.9%)
Physical assessment	7 (77.8%)
Clinical support to patients	7 (77.8%)
Advice and intervention in support of primary team	7 (77.8%)
Advice only	5 (55.6%)
Support to patient/family	3 (33.3%)
Informal bedside teaching	3 (33.3%)
Formal educational courses	1 (11.1%)
Tracheostomy review	1 (11.1%)
Referral to another service/therapist	1 (11.1%)
Locating and/or problem-solving equipment	1 (11.1%)
Telephone advice	1 (11.1%)

CCO, critical care outreach.

Table 4 Most frequently performed clinical interventions of CCO

Intervention of CCO	Number of CCO performing intervention
Changes in oxygen therapy*	9 (100%)
Adjust frequency of vital signs	7 (77.8%)
Changes in patient position	6 (66.7%)
Changes in fluid management*	6 (66.7%)
Investigations	6 (66.7%)
Insertion of intravenous access	4 (44.4%)
Adjustment to medications, e.g. diuretics*	3 (33.3%)
Transfer of patients within hospital	2 (22.2%)
Initiation of non-invasive ventilation (CPAP, BiPAP)*	1 (11.1%)
Insertion of urinary catheter	1 (11.1%)

CCO, critical care outreach.
*Advice to medical staff on prescription changes.

Table 5 Data routinely collected by CCO

Data collected	Number of CCO collecting data
Clinical activities of outreach service	8 (88.9%)
Number of cardiac arrests	7 (77.8%)
Number of medical emergency team calls	6 (66.7%)
Early Warning Score chart compliance	5 (55.6%)
Patient outcomes	3 (33.3%)
Number of unplanned ICU admissions	3 (33.3%)
Number of missed MET calls	1 (11.1%)
Educational	1 (11.1%)

CCO, critical care outreach.

their staff as having this. For CCO staff without ICU experience, their critical care expertise came from working in Emergency Departments, Coronary Care Units, HDUs and acute care wards. Every CCO was funded through the ICU staffing budget.

The CCO were all nurse-led with professional leadership from senior clinical nurses and managers. Medical support was reported as accessible in over 66% of CCO services with ICU registrars conducting patient reviews, attending clinical emergencies and included in the EWS escalation process. In all these sites, there was an identified ICU Consultant/Specialist acting as medical liaison for CCO.

Clinical delivery of care by CCO staff

In the survey, delivery of care was categorised into clinical activities and clinical interventions with CCO staff involved in a range of both. The most frequently reported clinical activities were ward staff support and patient physical assessment. Some of the least performed activities were those specific to CCO that held a specific function within the hospital, e.g. one service provided tracheostomy support for all patients discharged from ICU (Table 3).

All nine CCO titrated oxygen therapy and 78% CCO adjusted the frequency of vital signs (Table 4). Notably some of the interventions were related to giving advice to medical staff on changes to medication prescribing so providing an indication of how CCO also work to support local medical teams.

Data collection by CCO

Every CCO routinely collected a range of data (Table 5) through both paper and electronic records.

All CCO recorded the date, time, location, referral type and patient details of each visit. Most (89%) documented the EWS, CCO nurse activities and patient outcome, e.g. death, transfer to ICU. Less than half of CCO monitored EWS compliance, unplanned ICU admissions or readmission rates. One hospital had integrated CCO data entry into their hospital-wide clinical database, thereby connecting patient reviews with other patient clinical information (laboratory and radiology data, clinical discharge summaries and outpatient clinic letters). All other CCO recorded information about individual patient visits. All nine CCO provided data reports to their local team or ward and hospital committees. There were no reports of data dissemination between CCO and other hospitals. Three CCO had disseminated data at conferences with one reporting in a Journal publication.

DISCUSSION

In reporting on findings from the NZ census of CCO, distinct similarities and differences were revealed in comparison with the international literature. The discussion explores three key areas: adoption of CCO, CCO clinical models and CCO clinical activities.

Adoption of CCO

The finding that only 45% of acute care public hospitals in NZ have a CCO contrasts with the higher incidence (73%) of CCO reported in the survey of 191 hospitals in England (McDonnell *et al.*, 2007). The first CCO in England was launched in 1996 with wider uptake of CCO within acute care hospitals from 2000 to 2002 (McDonnell *et al.*, 2007). A similar Australian study of 113 hospitals reported ICULN operated in 27% of surveyed hospitals (Eliott *et al.*, 2012). ICULN roles were first commenced in 1991 with steady uptake until 2004 ($n = 6$) and a more rapid launch of services from 2005 to 2010. (Chaboyer *et al.*, 2004; Eliott *et al.*, 2012).

The reason for decreased CCO uptake in NZ public hospitals is unclear and this trend contrasts with the more steady growth of services in Australia. With the small number of public hospitals in NZ, a smaller number of CCO is expected. Of note, most CCO in NZ were established after publication of an investigation into the death of a patient which commented on the need to improve ward-based systems for the detection of deterioration (HDC, 2007). This reactive response to sentinel events is reflective of CCO development in other countries. With increasing life expectancy, patient co-morbidities and more complex health care interventions, this is likely to increase demand for critical care and RRT services (Quach *et al.*, 2008). Given this, it is concerning that there has been little recent investment in CCO in NZ. It may be that such demand is being met through the provision of alternate clinical support services and education programmes; this requires further exploration.

CCO clinical models

Comparison of the CCO models and activities described in the survey revealed similarities and differences with those described internationally. All CCO in NZ were nurse-led and this is in keeping with the English CCO model (McDonnell *et al.*, 2007). Furthermore, most CCO ($n = 7$) reviewed patients transferred from ICU to the wards, sharing another key feature of the CCO model. There was Intensive Care Specialist and ICU Registrar level support across all CCO in NZ. This collaborative working is similar to how Australian ICULN work (Eliott *et al.*, 2012). These interdisciplinary Australasian models are different to reported unidisciplinary models of CCO in England (Rowan *et al.*, 2008) and thus may be more reflective of the collaborative multidisciplinary Australasian health care culture.

There was considerable variation in the size of workforce in each CCO in NZ with only four hospitals operating a dedicated CCO 24 h each day. From the free text responses it was reported that each CCO was resourced to meet the needs of each hospital within the finances available. Such variation in CCO staffing and hours of operation is similar to findings in previous English and Australian studies (McDonnell *et al.*, 2007; Eliott *et al.*, 2012). As previously commented (Bersten *et al.*, 2009), it would appear that staffing of RRT was hospital site-dependent relying on local champions rather than a minimum standard to ensure patient safety and, in the NZ context, meeting the recommendations of an independent health body (HDC, 2007).

Discussion in the literature supports standardization of the afferent arm of RRS (Patterson *et al.*, 2011; Prytherch *et al.*, 2010, Howell and Stevens, 2013). However, with regard to the efferent response, the international literature reveals greater diversity of the models and services put in place. It is clear that RRS are tailored to the structure, size and demands of individual hospitals. However, given the diversity in models of CCO throughout NZ, there is need to explore the core structures, resourcing and quality processes that inform CCO service provision.

CCO clinical activities

In line with findings from Australian and English studies (McDonnell *et al.*, 2007; Green and Edmonds, 2004), NZ CCO delivered a wide range of activities and interventions targeting two main groups of ward patients – acutely unwell or deteriorating ward patients and those discharged following an intensive care admission. The most frequent clinical interventions described by NZ CCO were similar to findings in previous work (McDonnell *et al.*, 2007; Pringle *et al.*, 2011). This NZ study demonstrated limited RRT involvement in prescribing, although this has received some exploration in the literature (Pirret, 2008). From this, it can be deduced that CCO nurses undertake similar roles and clinical functions internationally.

Findings from this NZ survey demonstrate that whilst NZ CCO predominantly focuses on direct clinical interventions and providing support, there is little involvement in formal education. Higher numbers of CCO in England are engaged in formal education (82.4%) and informal bedside teaching (77.4%)(McDonnell *et al.*, 2007). In Australia, the role of CCO has improved the liaison between wards and ICU and provided support to ward nurses with education about complex interventions (Chaboyer *et al.*, 2005; Athifa *et al.*, 2011). This has enhanced ward-based nursing knowledge and skills and facilitated discharges from ICU (Green and Edmonds, 2004; Williams *et al.*, 2010). With only one NZ CCO reporting involvement in formal education, this raises concerns as to how junior ward-based staff are supported to

develop acute care skills. This identifies need for a review of how the educational needs of doctors and nurses in this area are being met.

Despite a range of clinical data collected by each CCO in this study, there was no consensus at to where this data was reported or how this data was used at a corporate or organizational level. The reliance on paper records and local databases to record CCO data reflected a lack of local infrastructure and resourcing that might otherwise allow for sharing and processing of CCO data sets. Internationally it is recognized that there is difficulty in knowing what data RRS should collect with no agreed international minimum data set (DeVita *et al.*, 2006). Comparison of CCO activation, CCO performance and adverse patient outcomes across hospitals using core data elements recommended in the ILCOR Consensus Statement could lead to clinical outcome improvements (Peberdy *et al.*, 2013) and be used as guidance for all NZ hospitals to improve their systems.

The importance of CCO informing hospital processes and improve patient outcome has been well recognized. With high profile policy reports (Keogh, 2013) and bodies across UK and Australia (National Institute for Health and Clinical Excellence, 2007; ACSQHC, 2011) recommending use of RRS models, this raises questions regarding the absence of national clinical governance for Outreach within NZ.

Limitations of study

Key limitations of this survey relate to the sample size and the maintenance of anonymity. Non-probability sampling was undertaken in approaching all acute care hospitals in the 20 DHBs in NZ. Rural hospitals were not approached and this is a potential limitation. Only 9 of the 20 public hospitals across NZ had CCO, thereby further decreasing an already small sample size. Even with the 100% response rate yielded, this population sample is small compared with sample populations in similar English (139 CCO in 191 hospital sites) and Australian (31 RRS in 113 hospital sites) studies (McDonnell *et al.*, 2007; Eliott *et al.*, 2012). However, results from this study give a clear description of the current knowledge about CCO provision in NZ. With such a small sample, careful attention to maintaining anonymity in the reporting of findings was necessary.

CONCLUSION

This study describes the scope and function of CCO in acute care public NZ hospitals. Over half of DHBs within NZ are without an established CCO, despite an advisory health report recommending all hospitals implement a system of care to identify and respond early to deteriorating patients (HDC, 2007). The minority of hospitals that operate a CCO have adapted established international CCO models to fit each local hospital, with minimal regional integration.

Our findings indicate that many remaining NZ hospitals may not currently be able to implement the independent organization's recommendations due to limited resources or lack of perceived need. The resultant wide variation in CCO services, practice and data collection requires a national level response. In recognizing the importance that other countries have placed on supporting the acuity agenda, this raises questions as to whether a more proactive response in New Zealand is required. It is hoped that the findings from this study, the first to describe Outreach services within NZ, will inform the international literature in this area and raise the profile for future development and evaluation of CCO on patient outcomes within NZ hospitals.

WHAT IS KNOWN ABOUT THIS TOPIC

- Critical care outreach (CCO) have been introduced internationally, to recognize and respond to acutely unwell ward patients.
- There are several models of CCO yet no evidence to support which model is most effective.

WHAT THE PAPER ADDS

- Greater knowledge and understanding of New Zealand CCO models.
- Adds to international understanding of the similarities and challenges in providing CCO in acute care public hospitals.

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