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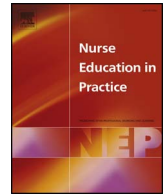
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Original research

Remote clinical decision making: Evaluation of a new education module

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1. Introduction

This paper reports on the outcomes and resulting recommendations for the Remote Clinical Decision Making (RCDM) education module developed by a collaboration between the University of the West of England (UWE) and the South Western Ambulance Service NHS Foundation Trust (SWASFT).

The education module was delivered at UWE and comprised a number of sessions delivered over eight full teaching days, several days apart. Participants provided a subjective evaluation through self-completion forms and pre-/post-module questionnaires assessing confidence in various aspects of RCDM.

1.1. Background

Remote Clinical Decision Making (RCDM) otherwise also known as telephone triage or telehealth, is increasingly being used internationally to manage the demand for various healthcare services; including primary care, emergency and unscheduled care, and even in some tertiary level care settings. Healthcare providers across the world are continually challenged to provide high-quality, cost-effective care to a rising and increasingly aged and chronically suffering population. Telephone triage is a well-recognised and an increasingly used method of managing and reducing this demand; with caller compliance and satisfaction often being high (Howell, 2016). Many countries worldwide use RCDM, such as Australia, the United States, Canada, New Zealand, the United Kingdom (UK), and other European countries, with assessments often being undertaken by experienced nurses and paramedics (Tran et al., 2017). In addition to being a strategy to managing increasing demand, it is also a strategy to manage geographical and topographical challenges in rural and remote settings where access to face-to-face healthcare is sparse and unnecessary extrication is expensive. This is especially important for emergency care services and ensuring that the limited ambulance resources are available to attend the most serious cases. The use of RCDM in UK ambulance services is a well-recognised strategy for managing rising demand and decreasing resources over recent years (Urgent and Emergency Care Review

Programme Team, 2015); however, there remains a lack of formalised RCDM education within these settings.

Currently, clinical decision-support software (CDSS) plays a major role in mitigating some of the risks associated with RCDM; including a lack of internationally formalised education. CDSS helps to structure a remote clinical assessment and is used to reduce the risks associated with working differently from the face-to-face practice many HCPs will be used to (Murdoch et al., 2015). Whilst exploring the effectiveness of existing telephone triage systems, a recent study identified that despite using generic CDSS packages many centres dealing with remote clinical triage recognised that some staff were more effective than others in recommended appropriate patient dispositions (Turnbull et al., 2014). Those with high closure or referral rates often attributed their success to the confidence and competence gained through years of direct face-to-face patient contact; something that not all RCDM clinicians will have. The use of CDSS should support existing practice knowledge and should not be mistaken for Clinical Decision -Making Software used by non-clinicians. Over-reliance on such systems may lead to unnecessary hospital admissions and inappropriate patient dispositions (Turnbull et al., 2012). The increased use of telephone triage across many healthcare settings has seen a general increase in workforce demand. Intrinsic to meeting this demand, however, is an acceptance that not all clinicians working within remote clinical triage have an extensive experience base from which they can draw and therefore they need to be developed in the post to achieve the best outcomes for their patients and employers.

A recent systematic review of the literature by Edirippulige and Armfield (2017) found a small amount of evidence of education and training in telehealth being provided at both university level and as vocational courses. These examples from five countries used conventional classroom-based delivery methods as-well-as e-learning. Edirippulige and Armfield (2017) concluded however that published evidence in the peer-reviewed literature on telehealth education and training is limited and the availability and nature of telehealth-related education and training for practitioners is not well understood. Rutledge et al. (2017) comment on a similarly small amount of data related to training and educational programmes for practitioners

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working in RCDM, and a need to provide specific training and education. It is increasingly recognised that specialised competencies are needed among RCDM HCPs to provide safe and effective services and to increase user confidence (Guise and Wiig, 2017). The training and education to support these competencies is however limited.

In response to this and the growing need to develop clinicians working remotely in areas such as 999 clinical hubs, GP out-of-hours or NHS 111 services, UWE and SWASFT collaborated to design a higher education module. This module was designed to give clinicians new to this area of practice the insight and confidence to practice, and to allow those existing RCDM clinicians the opportunity to consolidate and critically question their current practice. Historically nurses have predominantly undertaken RCDM in countries such as America, Australia, Sweden, and the UK in NHS Direct, NHS 111, and NHS 24 (Höglund et al., 2016). Over the last decade, however, other HCPs such as midwives, paramedics, and pharmacists have started to work in this way (Brady and Northstone, 2017); arguably making this module and the findings from this research applicable to a wide range of professionals and providers.

The overall aims of the module were to enable practitioners to be able to demonstrate an in-depth understanding of clinical decision support software (CDSS) and to be able to critically evaluate evidence-based best practice models and system-based approaches used in conjunction with such software. Furthermore, the module aimed to enable practitioners to demonstrate competence in clinical reasoning skills and to explore and critically appraise the legal and ethical principles that underpin the decisions they make. This could only be achieved through a critical evaluation of the roles and responsibilities of a remote clinical advisor and an in-depth understanding of the communication skills needed for remote clinical triage. These aims were explored through the following subjects (please see [Supplementary Figure 1](#) for the detailed syllabus):

- Decision-making and triage tools
- Medicolegal issues
- Communication Skills
- High-risk cases
- Complaints & Quality
- Managing falls
- Mental Health Crises
- Complex social cases remotely

The first five subject areas are outlined in the aims and objectives of the module; chiefly to explore and critically evaluate remote clinical practice. One such example ubiquitous to all RCDM practice is that of communication skills. The communicative demands in RCDM are high, and HCPs working in this area require high patient centred communicative competence and ability to listen, as their assessments and advice are based solely on verbal communication, and they cannot see the caller (Ernesäter et al., 2016). The communication skills element enabled clinicians to be able to adapt their current skills to working remotely, or to newly learn the communication skills required for safe practice. The subject areas of falls and mental health crises management however were included given that these conditions have historically resulted in calls to 999 services which do not result in transport to emergency departments (Marks, 2002); and thus may have been better managed remotely. More recent data from the South West of England specifically, highlights that falls among older people is by far the most significant contributor to demand for ambulances. Furthermore, it is estimated that the increased predisposition of those with mental health problems to access ambulance services is significantly influencing demand for ambulances also (Chalk et al., 2016). By better understanding the causes for rising demand for emergency services, such as falls and mental health issues, which can be caused by complex social situations, commissioners can employ strategies to better manage their limited resources. By specifically looking at the resending conditions remote

clinicians will most likely be assessing, services can better manage risk and effectively employ best practice models.

Edirippulige and Armfield (2017) and Rutledge et al. (2017) highlight a range of topics included on some of the identified training and education programmes. These topics included: defining telehealth, communication skills, CDSS, regulations, reimbursement, the security/Health Insurance Portability and Accountability Act, ethical practice, and user safety and satisfaction. Some of the topics described by Rutledge et al. (2017) are not applicable to some Western-based operating models and others, like the RCDM module, can be adapted to suit the service provider's needs. Subjects such as clinical decision-making, CDSS, medicolegal issues, communication skills, and quality, however, are synonymous to all areas of international practice; making this research valid to various health and educational providers.

The module consists of 6 taught days at university, one structured oral practical exam (SOPE) and one reflective assignment. The total notional study time for the module was calculated to be 200 h, divided between independent student time (152 h) and student/lecturer interaction time (48 h). The module was delivered using a blended learning methodology; incorporating technology-enhanced learning material, online web content, video presentations, lectures and seminars. The scheduled learning included lectures; case-based learning including small group work and seminar discussion. While the independent learning included essential reading, assignment and presentation preparation and completion.

1.2. Aims and objectives

The study had the aim of assessing the impact of the RCDM module. It had the following objectives:

1. To determine whether the module is successful in improving confidence in remote clinical decision making for HCPs.
2. To assess the perceived impact of the module on patient care.

2. Methods

2.1. Study design

2.1.1. Cohort study

2.1.1.1. Study subjects. The first cohort comprised thirteen students who were paramedics, nurses or midwives (not all of whom worked within SWASFT). This pilot ran from November 2015 to January 2016. The second cohort comprised thirty Specialist Paramedics in Urgent Care and ran from January to March 2016. All participants from both cohorts were invited to be interviewed. Only four participants agreed to be interviewed about their experience of the module and how it might have impacted on their clinical practice.

2.1.1.2. Data collection. Each participant was provided with an information sheet regarding the evaluation, making clear that the course was a pilot and was to be evaluated. Participants were asked to complete a consent form. A self-completion questionnaire was administered to all participants at the start of the module and was completed in person. Baseline information was collected on background demographic information, clinical practise experience and measures of confidence in the use of triage and making remote decisions. The confidence measures were collected again at the end of the module (in person on the day). Evaluation forms for each session were completed at the end of that session (collected in person by the relevant tutor). All forms were developed in-house. Anonymised, completed questionnaires and evaluation forms were keyed electronically by JJ. The evaluation form included five free text questions ([Box 1](#)), responses were analysed thematically and summarised.

Four semi-structured interviews were undertaken with willing students one month after module completion to explore experiences of

Box 1

Free text questions included in the evaluation questionnaire

1. What were your expectations prior to attending this part of the module?
2. What was the most valuable learning you will take away from this session and why?
3. What is the main thing you will do differently in your work practice as a result of this session?
4. Which of your expectations were not met? What learning did you not gain from the session?
5. What changes, if any, would you like to see made to the session delivered?

learning and perceptions of how the learning might have been transferred into practice. Interviews were undertaken by MB, recorded and transcribed and thematically analysed both by hand and using NVivo Data Analysis Software.

2.1.1.3. Ethical considerations. Ethical approval was obtained from the Faculty Research Ethics Committee, Faculty of Health and Applied Sciences at UWE.

2.1.1.4. Quantitative analysis. Any differences in background demographic information and clinical expertise between the two cohorts were tested using Fisher's exact tests. Paired t-tests were then used to determine any improvement in confidence before and after the module for each of the sessions; means (SDs) are presented for each question before and after the module for each pilot cohort. A total confidence score was calculated for each person by summing the ratings from the twelve individual questions. Overall evaluation of the module is summarised (mean (sd)) and a total score calculated for each cohort.

2.1.1.5. Qualitative analysis. Interviews with participants were structured around five questions (Box 2); additional questions were asked if the responses prompted so. These questions were not exhaustive and a semi-structured approach to how the questions were asked and in what order was employed. These questions were formed deductively and based on the premise that the educational intervention needed both validating and possibly improving. Conclusions to this were deducted from the analysis of participant response. Thematic analysis was used to explore the responses obtained from the interview. The framework devised by Braun and Clarke (2006) was followed to ensure a valid and rigorous approach to the analysis. This involved gaining familiarisation with the transcribed data, generating codes of emergent themes and reviewing the themes for further themes. The NVivo Data Analysis Software was also used to identify any themes possibly missed by manual analysis. No further themes were identified.

3. Results**3.1. Quantitative analysis****3.1.1. Cohort description**

All participants in both cohorts consented to take part in the evaluation, and all completed the baseline questionnaire. Participants were told that they did not have to take part in this research. However, all understood the importance to future practice and agreed. The high response rate may also have been due to the face-to-face nature of the

Box 2

Structured questions used for interviews with participants

1. What did you find most useful within the program and why?
2. What did you find least useful and why & can you suggest any changes to be made to the program?
3. How would you apply the knowledge gained from the RDCM to your practice now and in the future?
4. Do you feel more equipped to access your skills in remote clinical decision making as a practitioner?
5. Do you think this can be delivered online or out of a book?

Table 1

Demographic and professional experience of the two pilot cohorts undertaking the RCDM.

Characteristic	First cohort	Second cohort	p-value ^a
Male	4 (30.77%)	18 (60%)	.104
Female	9 (69.23%)	12 (40%)	
Age			
< 30	3 (23.08%)	6 (20%)	.004
30–40	1 (7.69%)	16 (53.33%)	
40–50	4 (30.77%)	7 (23.33%)	
> 50	4 (30.77%)	1 (3.33%)	
Missing	1 (7.69%)		
Role			
Nurse	5 (38.46%)	1 (3.33%)	.002
Paramedic	7 (53.85%)	27 (90%)	
Nurse/paramedic	0 (0%)	2 (6.67%)	
Nurse/midwife	1 (7.69%)	0 (0%)	
Years qualified			
< 5	3 (23.08%)	5 (16.67%)	< .001
5–10	2 (15.38%)	22 (73.33%)	
10–15	2 (15.38%)	0 (0%)	
15+	6 (46.15%)	3 (10.00%)	
Years of RCDM experience			
None	1 (7.69%)	26 (86.67%)	< .001
< 1 year	3 (23.08%)	1 (3.33%)	
1–2 years	2 (15.38%)	1 (3.33%)	
2–3 years	3 (23.08%)	0 (0%)	
3 + years	4 (30.77%)	2 (6.67%)	
Kind of RCDM undertaken			
Emergency calls (999)	3 (23.08%)	1 (3.33%)	.001
Non-emergency (111)	5 (38.46%)	2 (6.67%)	
Both 999 & 111	4 (30.77%)	22 (73.33%)	
Midwifery triage	0 (0%)	0 (0%)	
999, 111 & midwifery triage	1 (7.69%)	0 (0%)	
None	0 (0%)	4 (13.33%)	
Missing		1 (3.33%)	

^a Fisher's exact test to test for difference between cohorts.

request for involvement and the brevity of the data collection tool. The demographic and professional characteristics of the two cohorts are summarised in Table 1. The first pilot group was older on average and had a higher proportion of females. Half the participants in the first pilot were paramedics with the rest being nurses (1 of whom was also a midwife). This compared to the second pilot where all participants were paramedics bar one who was a nurse (although it should be noted that two of the paramedics also reported being a nurse). Participants in the first pilot had been in the job substantially longer and had greater previous experience of RCDM than the second. There were also differences in the types of calls that had been taken by the two cohorts. The second cohort had predominantly dealt with both 999 and 111 calls

Table 2
Differences in confidence before and after the module (mean [sd]).

	Pre-module	Post-module	Mean difference (p value)
Cohort 1			
Ability to make clinical decisions remotely	3.77 [0.93]	4.15 [3.93]	0.38 (0.137)
Ability to make remote clinical decisions safely	3.85 [0.90]	4.23 [0.44]	0.38 (0.175)
Ability to use a triage tools	3.69 [0.75]	4.38 [0.51]	0.69 (0.006)
Ability to work autonomously using a triage system	3.77 [0.73]	4.31 [0.63]	0.54 (0.028)
Ability to manage a call related to acute pain remotely	3.38 [0.51]	4.15 [0.55]	0.77 (0.002)
Skills in communicating with people remotely	4.00 [0.41]	4.38 [0.51]	0.38 (0.054)
Knowledge of the law applied to RCDM	2.77 [0.60]	4.00 [0.58]	1.23 (< 0.001)
Managing a mental health crisis call remotely	3.00 [1.00]	3.69[0.85]	0.69 (0.056)
Managing frequent callers remotely	3.23 [1.01]	4.00 [0.71]	0.77 (0.011)
Managing complex social cases remotely	3.08 [0.76]	4.00 [0.41]	0.92 (0.005)
Managing falls in the elderly remotely	3.69 [0.63]	4.31 [0.48]	0.62 (0.014)
Identifying high risk remote cases	3.46 [0.78]	4.31 [0.48]	0.85 (0.001)
Total score	41.69 [6.36]	49.92 [4.31]	8.23 (0.001)
Cohort 2			
Ability to make clinical decisions remotely	3.14 [0.71]	3.50 [0.69]	0.36 (0.02)
Ability to make remote clinical decisions safely	3.07 [0.77]	3.57 [0.69]	0.50 (0.008)
Ability to use a triage tools	2.82 [1.06]	3.14 [1.04]	0.32 (0.131)
Ability to work autonomously using a triage system	2.93 [0.77]	2.93 [1.02]	0.00 (1.000)
Ability to manage a call related to acute pain remotely	2.79 [0.74]	3.21 [0.79]	0.43 (0.031)
Skills in communicating with people remotely	3.79 [0.74]	3.79 [0.69]	0.00 (1.000)
Knowledge of the law applied to RCDM	2.00 [0.90]	3.36 [0.68]	1.36 (< 0.001)
Managing a mental health crisis call remotely	2.07 [0.77]	2.89 [0.88]	0.82 (0.001)
Managing frequent callers remotely	2.57 [0.84]	3.18 [0.90]	0.61 (0.003)
Managing complex social cases remotely	2.39 [0.92]	3.07 [0.81]	0.68 (0.002)
Managing falls in the elderly remotely	3.04 [0.76]	3.33 [0.68]	0.30 (0.103)
Identifying high risk remote cases	3.04 [0.98]	3.59 [0.69]	0.56 (0.011)
Total score	34.15 [6.41]	39.59 [7.04]	5.44 (0.003)

(73%) whereas 38% of the pilot dealt with 111 calls only. It should be noted that four participants in the second cohort reported never having undertaken any RCDM. Due to the differences in baseline characteristics between the two cohorts all subsequent analyses are stratified by cohort.

3.1.2. Confidence pre and post-module

Results regarding participants' confidence before and after the module in the first pilot cohort are shown in Table 2. The lowest levels of confidence were related to 'knowledge of the law' as applied to RCDM, followed by 'managing specialist calls' (mental health, complex social cases and frequent callers). The highest confidence ratings were seen for participants own 'skills in communicating' with people remotely and in their ability to do so both safely and autonomously. Similar patterns of confidence were evident for the second pilot cohort for both the lowest and highest levels of confidence. However, in this cohort, higher levels of confidence were evident for 'identifying high-risk remote cases' and for dealing with 'falls in the elderly'.

In both cohorts, scores for all items increased post-module except 'skills in communicating with people remotely' which remained the same in the second cohort only. The biggest differences were seen for 'knowledge of the law'. It should also be noted that confidence levels were lower on average both before and after the module for the second cohort (a total average increase of 5.44, compared to 8.23 for the first cohort).

3.1.3. Summary evaluation

The summary results of the overall evaluation of each session in the first and second pilot cohorts are shown in Tables 3a and 3b respectively. The average score for all sessions and all aspects being evaluated was 4.48 and 3.91 (out of a total of 5) for the first and second cohorts respectively. In both cohorts, the highest average scores were obtained for 'the trainer clearly explained' and 'I would recommend the trainer to others'. In the first cohort, the lowest average score was for

'The content was what I expected', while in the second this was for 'I would recommend this programme to others' and 'The programme has been a worthwhile investment of my time'. There were differences between the cohorts in the sessions scoring lowest: For the first cohort 'Research, audit and affecting change' and 'The future of RCDM' were the sessions receiving the lowest scores on average, while 'Complex social cases' scored the lowest in the second cohort.

3.2. Qualitative analysis

3.2.1. Summary evaluation

The analysis of the free text comments relating to 'expectations' showed that for the first cohort, participants stated that there were "no expectations" or "as the title suggested". However, for the second cohort, there was an additional theme running across the sessions: no information had been given before the course (no handbook/timetable/course materials), and so participants did not know what to expect.

For the question regarding 'Most valuable learning,' the majority of participants from the first cohort recorded something constructive for every session (mean number of comments across the sessions = 9.5). This suggests participants had a positive experience overall. For the second cohort, there were varied comments for each session; however many were left blank (mean number of comments across the sessions = 11.7).

The section on what participants would do differently as a result of the module was not completed by as many participants in either cohort (mean number of comments across the sessions = 8 and 8.3 for cohorts one and two respectively); however, varied responses were provided which should be taken on board by the individual lecturers. For the second cohort there were some comments such as "Already received training in this"; "Already have an appreciation of the issues discussed"; "Nothing new".

The first cohort provided few responses across the sessions for the 'Expectations not met' question. In fact, six sessions received no

Table 3a
Summary evaluation for each session - First cohort (mean (sd)).

Session	The trainer(s) clearly explained relevant concepts during the session(s)	The content was what I expected	The session(s) met the objectives set	The materials given were helpful and of a high standard	I feel confident I will be able to use the skills and knowledge gained in the workplace	The programme has been a worthwhile investment of my time	I would recommend this programme to others	I would recommend the trainer(s) to others	TOTAL
<i>Intro and clinical triage tools</i>	4.62 (0.51)	4.31 (0.63)	4.62 (0.51)	4.38 (0.65)	4.54 (0.52)	4.62 (0.51)	4.62 (0.51)	4.69 (0.48)	4.55 (0.46)
<i>Clinical decision making software</i>	4.80 (0.42)	4.40 (0.70)	4.60 (0.52)	4.50 (0.71)	4.80 (0.42)	4.90 (0.32)	4.80 (0.42)	4.90 (0.32)	4.71 (0.31)
<i>Leadership, autonomy & clinical responsibility</i>	4.58 (0.51)	4.17 (1.11)	4.25 (0.75)	4.25 (0.75)	4.67 (0.49)	4.50 (0.52)	4.42 (0.51)	4.67 (0.49)	4.44 (0.48)
<i>Managing acute pain remotely</i>	4.67 (0.49)	4.58 (0.67)	4.75 (0.45)	4.75 (0.45)	4.67 (0.49)	4.75 (0.45)	4.75 (0.45)	4.83 (0.39)	4.72 (0.37)
<i>Communication skills</i>	4.50 (0.67)	4.08 (0.67)	4.50 (0.67)	4.42 (0.90)	4.42 (0.67)	4.25 (0.97)	4.00 (0.95)	4.42 (0.79)	4.32 (0.73)
<i>Mental health crisis calls</i>	4.89 (0.33)	4.89 (0.33)	4.89 (0.33)	4.78 (0.44)	4.67 (0.50)	5.00 (0.00)	5.00 (0.00)	5.00 (0.00)	4.89 (0.17)
<i>Frequent callers</i>	4.30 (0.48)	4.00 (0.47)	4.00 (0.47)	4.20 (0.42)	4.10 (0.74)	4.10 (0.57)	4.20 (0.63)	4.30 (0.67)	4.15 (0.41)
<i>Complex social cases</i>	4.42 (0.51)	3.92 (0.67)	4.33 (0.49)	4.17 (0.72)	4.50 (0.52)	4.17 (0.72)	4.17 (0.72)	4.25 (0.62)	4.24 (0.49)
<i>Falls in the elderly</i>	4.71 (0.49)	4.71 (0.49)	4.86 (0.38)	4.86 (0.38)	4.86 (0.38)	4.86 (0.38)	4.86 (0.38)	4.71 (0.49)	4.80 (0.37)
<i>Complaints</i>	4.82 (0.40)	4.55 (0.52)	4.55 (0.69)	4.64 (0.50)	4.55 (0.52)	4.59 (0.58)	4.64 (0.50)	4.73 (0.47)	4.63 (0.46)
<i>Research, audit and affecting change</i>	4.36 (0.50)	3.91 (0.94)	4.18 (0.87)	4.09 (0.94)	3.91 (1.14)	3.91 (0.94)	3.73 (1.10)	4.27 (0.79)	4.05 (0.80)
TOTAL	4.60 (0.51)	4.29 (0.74)	4.49 (0.62)	4.44 (0.68)	4.50 (0.65)	4.49 (0.68)	4.45 (0.72)	4.61 (0.59)	4.48 (0.54)

Table 3b
Summary evaluation for each session - Second cohort (mean (sd)).

Session	The trainer(s) clearly explained relevant concepts during the session(s)	The content was what I expected	The session(s) met the objectives set	The materials given were helpful and of a high standard	I feel confident I will be able to use the skills and knowledge gained in the workplace	The programme has been a worthwhile investment of my time	I would recommend this programme to others	I would recommend the trainer(s) to others	TOTAL
<i>Intro and clinical triage tools</i>	4.15 (0.54)	3.65 (0.98)	4.23 (0.65)	3.92 (0.93)	3.42 (0.95)	3.38 (1.13)	3.42 (1.06)	4.08 (0.84)	3.78 (0.76)
<i>Clinical decision making software^a</i>	4.27 (0.45)	4.00 (0.63)	4.19 (0.57)	3.77 (0.76)	3.88 (0.77)	3.73 (0.92)	3.65 (0.75)	4.42 (0.50)	3.99 (0.52)
<i>Leadership, autonomy & clinical responsibility</i>	4.57 (0.51)	4.26 (0.81)	4.39 (0.58)	4.35 (0.78)	4.17 (0.78)	4.26 (0.81)	4.22 (0.80)	4.65 (0.57)	4.36 (0.62)
<i>Managing acute pain remotely</i>	4.64 (0.49)	4.18 (0.66)	4.45 (0.60)	4.59 (0.59)	4.41 (0.67)	4.18 (0.91)	4.23 (0.81)	4.64 (0.58)	4.41 (0.56)
<i>Mental health crisis calls</i>	4.09 (0.73)	3.96 (0.77)	4.09 (0.60)	3.57 (0.79)	3.91 (0.79)	3.57 (1.04)	3.43 (1.08)	3.87 (0.76)	3.81 (0.69)
<i>Frequent callers</i>	4.18 (0.59)	4.14 (0.56)	4.23 (0.61)	4.05 (0.72)	4.00 (0.76)	3.73 (1.16)	3.68 (1.17)	4.36 (0.58)	4.05 (0.70)
<i>Complex social cases</i>	3.96 (0.77)	2.69 (0.93)	3.73 (0.67)	2.77 (1.07)	2.81 (1.06)	2.35 (1.02)	2.35 (1.02)	3.65 (0.94)	3.04 (0.71)
<i>Falls in the elderly</i>	3.96 (0.77)	3.70 (0.82)	3.96 (0.71)	3.87 (0.92)	3.96 (0.88)	3.35 (1.23)	3.26 (1.21)	4.13 (0.69)	3.77 (0.76)
<i>Complaints</i>	4.47 (0.52)	4.20 (0.41)	4.27 (0.46)	4.20 (0.68)	4.13 (0.64)	3.87 (1.06)	3.53 (1.19)	4.27 (0.88)	4.12 (0.51)
<i>Research, audit and affecting change</i>	4.43 (0.76)	4.00 (0.96)	4.07 (0.92)	4.29 (0.99)	3.64 (1.15)	3.64 (1.22)	3.64 (1.28)	4.21 (0.97)	3.99 (0.92)
TOTAL	4.25 (0.65)	3.84 (0.90)	4.15 (0.66)	3.89 (0.96)	3.81 (0.95)	3.57 (1.16)	3.52 (1.14)	4.22 (0.79)	3.91 (0.77)

^a Evaluation forms were not collected for this session.

constructive criticism at all; the others received only minor details which could be considered by the individual lecturers. However, the majority of sessions received a handful of constructive comments from the second cohort (except ‘communication skills’ where all comments were positive). ‘Complex social cases’ received some constructive criticisms in particular around the lack of content. Overall, participants made comments around the following themes across the sessions: “I’m an experienced paramedics”, “content was superficial”, “pitched at paramedic level or lower”.

For the question regarding changes to course, the first cohort provided positive feedback on the whole—many left it blank or put “N/A”. The only substantial take-home message from this cohort was for ‘Mental health crisis calls’ where participants felt this session could be made longer. However, the second cohort made a number of suggestions. These focussed around making the course content available online or for the delivery to be undertaken remotely rather than through face to face teaching, which was in contrast to those clinicians already working in RCDM who thought the opposite in interview. These were particularly aimed at “Complex social cases”, where comments also suggested that the content could be condensed.

In summary, the first pilot cohort appeared to be more open to the course, its content and was generally less critical.

3.3. Qualitative interviews

1. What participants found most useful

Over-arching comments were made by participants during the interviews about how the module had increased their confidence. While confidence does not always correlate positively with competence; participants made mention of the supporting evidence and knowledge they had to make them feel and act more confidently. This was also an emerging theme in how the module may have changed their practice.

“I feel more secure in my knowledge which has been supported from the course the other sessions probably help to put the foundations in place for me to be confident in using the new skills ... I really do think it has given me the extra confidence and the knowledge and reasons behind it”. [IP1]

“It helped me to grow more in confidence. I understood my role that little bit more to be honest ... I suppose it is knowledge and confidence really and feeling competent. Being a bit surer of myself again on-going. Just being a bit sure of myself”. [IP2]

Generally, participants voiced agreement that the module as a whole was useful to both current and ongoing practice. Participants made broad statements of satisfaction in terms of usefulness.

“.... I couldn't say that there was a session that you couldn't actually extract something useful from”. [IP2]

“... I did not find anything not useful. It all fed into somewhere and some place that I could actually adapt and use it”. [IP4]

Participants mentioned specific sessions they perceived to be of high value; communication was one of them. Of specific note to one participant was the concept that patients not getting an ambulance was perceived by them as bad news and the clinician having to break it as such

“... one of the things that stuck is that, that is breaking bad news to that patient who are expecting an ambulance I am one of those people that hate getting into that conflict with the patient. You know! That arguments now I have changed my practice, how I deliver it and that is a result of [Lecturers] session”. [IP1]

The ‘Mental Health & Law’ session was also of specific note, with two participants voicing how they found it of great use. It received praise over how it was delivered, being explained in a simpler way than

participants had experienced before. The ‘Falls’ session was also mentioned by participants and was very useful despite being difficult to cover.

Participants perceived the group dynamic as particularly useful to their learning and felt that the mix of nurses and paramedics was a positive aspect, and brought a personal element to the learning experience.

“.... I think it was very interesting to have a mix from different working areas. ... It was also good to have the open forum i.e. about discussing things, different feelings”. [IP1]

“Absolutely. I think there is so much ... you know! With a topic like that. Where you have a different diverse group. Different skills and background I think each individual is able to bring their personal experience and that would be lost if you are studying remotely”. [IP2]

It was clear that participants felt that learning had taken place not only from the tutors but also from their student colleagues and that there was value in this. Participants also placed great value on the face-to-face open discussion element of module delivery.

2. What did participants find least useful?

Two participants stated that the ‘Complex cases’ session needed revision - both regarding content and how it was delivered. One participant commented on the manner in which it was delivered, and the other mentioned not seeing the applicability or relevance of it to their practice. This was disconcerting given the relevance of the subject to practice and the need to ensure that these cases are managed appropriately.

Time was seen as an important consideration; regarding the length of the sessions and how they were spread over many weeks. Two participants felt that some sessions could be shortened. There was mixed opinion over the delivery of the module and running the lecture days consecutively and the benefit of having them spread out over many weeks.

“Personally I like doing courses close up together ... I think it could be done maybe over 2 weeks to do everything ... Certainly I think it could be done consecutively”. [IP1]

“It gave you more time to think about things and digest things. I think I should imagine it is different for different people ... I think if it was day in day out for 5 days. I probably wouldn't have read around it as much”. [IP1]

One participant felt more support was needed in terms of adult learners who had not attended a higher education institute or undertaken a higher education module before. Many RCDM professionals are experienced professionals with long service. It is this tacit knowledge built up over years of practice that makes some professionals more suitable to work in RDCM. However, these are perhaps the professions for whom it has either been a long time since they attended a higher education course or for whom original training was not done at a higher education level. Another participant voiced concern over the level of clarity surrounding module objectives, exams, essays, and reflections.

Other areas of improvement that were discussed in one interview (and did not come out as a theme) included information technology problems and overlapping or repetitious content from some of the lecturers. The participant also suggested that the audit session required more applicable examples.

What is clear is that while much of what was taught was found to be useful, the complex clinical cases lecture required improvement in terms of content and applicability. Furthermore more consideration should be paid to specific audiences of the module and if possible delivery be more tailor-made. For example, if being taught as a standalone module to those already in remote clinical decision making perhaps reviewing what content may need to be removed in comparison if the

module was being delivered to those new to remote clinical decision making.

3. How would participants apply knowledge gained?

One participant described how the module had made them more confident in what was anecdotally already known, and how this had impacted upon their practice and how they were prepared to deviate from triage support software dispositions:

“I think ... it has changed how I deliver the outcomes ... we are all used to knowing that part of our job is finding the most appropriate care. I really do think it has given me the extra confidence and the knowledge and reasons behind it”. [IP1]

“I am much more confident now in changing the outcomes whether that be upgrading or downgrading because I view pathways very differently. That is certainly something different that has changed ... I think one of the things that I am doing more now as well is looking at the pathways (triage tool) in a different light”. [IP1]

Participants also explained how this module has affected their use of alternative care:

“By gaining the insight into how the Ambulance Service works and putting a bit of pressure on them, makes me a lot less inclined to send out an ambulance just because the person thinks they might need it or I think they might need it”. [IP4]

“There are elements of potentially I would not have utilised an alternative pathway before than I do now or vice versa. Some elements are because of the remote clinical decision making module”. [IP3]

4. Discussion

4.1. Discussion

It is clear that the demand for health services internationally is growing, including within the UK this module was designed to provide an underpinning RCDM education as a means to manage this demand and the limited public resource available. The module content was designed for both generic and locally specific needs but was valid for various health professionals. This content bore similarity to other, albeit few, international examples (Edirippulige and Armfield, 2017; Rutledge et al., 2017). The RCDM module has been delivered twice to two very different cohorts. The first cohort comprised staff who were more involved in the triage process and had significantly more experience in remote clinical decision making. The second cohort were predominantly 999 specialist paramedics who spent their working lives on the front line of emergency care; but whom might have to use RCDM increasingly. This approach allowed the aims of the module to be assessed; chiefly, learning outcomes for existing RCDM clinicians and those who were new to this practice.

Learning or validation of current practice appears to have occurred across the sessions that were delivered as indicated by the improvements in confidence reported in both cohorts. The way the questions were framed means that we cannot clearly demonstrate definite learning quantitatively, however, this was explored more qualitatively. Potentially the increases in confidence seen could be attributed to refreshing or affirming knowledge that participants already had as existing RCDM clinicians. This could also be attributed to the new-found ability to link existing knowledge to remote clinical practice; and thus, increase confidence. Both possibilities evidence the achievement of the module learning outcomes. The participants new to RCDM were nevertheless experienced clinicians and arguably utilised the module content to apply their existing experience and knowledge to working remotely; although some found the content not to be challenging enough. One strategy that describes this co-application of knowledge in RCDM is

known as visualisation, and is a way for clinicians to build a picture and visualise the situation, assessment, and patient condition using new information and previous clinical experience (Pettinari and Jessopp, 2001). Given that some participants commented that they already had the knowledge being taught, more emphasis was possibly needed from the teaching staff to link it to remote practice. Guise and Wiig (2017) posit that training creates confidence, which can then lead to quality and safety of RCDM services. Confidence underpins HCPs competence to practice effectively and is an important aspect of professional learning. Confidence does not always correlate with competence and vice versa, and so whilst it might be argued that learning outcomes have been achieved, it is possible that competence remained the same. Indeed it would be reasonable to conclude this without practice emersion for those new to RCDM. Without competency assessments before and then after the educational intervention, this cannot be determined, and the evaluation did not formally assess this metric. The evaluation provided by participants was overall extremely positive for both cohorts from the quantitative analysis; learning was demonstrated across the sessions and ways in which knowledge could be applied to working lives was identified by several participants.

The qualitative aspect of the work noted also that all participants felt they benefited from taking the module; arguably at least partially evidencing the learning outcomes. Benefits included the better understanding of CDSS, which Murdoch et al. (2015) suggest is positive, and a better understanding of alternative care pathways – which may lead to the more appropriate use of limited resources. Specifically, the participants reported that both the ‘falls’ and ‘mental health & law’ sessions were particularly useful to their practice. This is unsurprising given the data showing their prevalence in emergency and unscheduled care settings (Chalk et al., 2016) and positively evidences how modules can be tailored to specific service provisions; as seen internationally (Edirippulige and Armfield, 2017; Rutledge et al., 2017). Communication was also viewed particularly useful by participants which was positive given how important effective communication is in achieving appropriate and safe outcomes with high caller satisfaction (Ernesäter et al., 2016). Some felt that what was taught was no different to their existing practice, suggesting more emphasis was needed to link this communication to remote practice. These sessions contrasted with the ‘complex social cases’ session which was felt to have issues with both content and applicability to remote practice. This element requires review, to incorporate the social elements of practice within specific subject areas; such as social influences on falls, mental health, and communication. Three out of the four participants expressed that they were generally more confident after attending the RCDM module and also reported increased confidence in decision making and the use of CDSS; which as alluded to earlier is positive. The fourth participant did not mention confidence, but it should be noted that they had been working in RCDM the longest time and so confidence may have not increased.

All participants voiced how important the didactic face-to-face peer group dynamic was to their RCDM module experience and did not think that a delivery method absent of this interaction would be efficient or successful. They felt that the group setting delivery of the module was appropriate and that a less face-to-face interactive method of delivery would not be as successful. This is noteworthy, as other identified RCDM training utilised a wider range of learning platforms, including live video conferencing; animation techniques; chat room facilities; and photographic equipment (Edirippulige and Armfield, 2017). More research would be required to determine the efficacy of each learning method. However, participants clearly expressed that having face-to-face discussions with other professionals allowed for consolidation, validation, and critical questioning of their existing practice. Two participants felt that the teaching days had too much time between them and that some of the content was redundant given the audience; which happened to be homogeneous; with a mix of nurses and paramedics only from the urgent and unscheduled care setting. This is

another example of where perhaps modules such as this need adapting for the audience and service operating model to achieve learning outcomes suitable to their practice. Some audiences may also require additional support if they are new to higher education courses; although it is possible to undertake such modules on a vocational basis. This may perhaps mitigate this need, as some nurses and paramedics are still transitioning to higher educational CPD.

4.2. Study limitations

It is recognised by the researchers undertaking the quantitative evaluation that the positive results, represented by increases in confidence can only really demonstrate whether the learning package is associated with some level of improvement nor reaffirming of knowledge. The evaluation itself has not been able to demonstrate that any improvement in subsequent work-based changes are due solely to the RCDM as there is no randomised control group to compare with. Obtaining data on closure and referral rates before and after the module for experienced members of staff was explored with the bioinformatics teams in the relevant centres. This may have been helpful in inferring a more direct effect of the learning process on work-based practice. However, only three members of staff were identified as being appropriate, and the data could not be made available in a timely manner. In addition, data on formal assessments undergone by the participants was not made available to the evaluators. Together this means that the evaluation can only really summarise the self-reporting of the participants themselves immediately after undertaking the module.

There are a number of other limitations to the quantitative evaluation that should be acknowledged. The number of participants were too small to enable an examination of outcomes according to post holder or indeed any other stratification (this may have helped to clarify the needs of the different members of staff). The qualitative evaluation was also limited by the small sample size. Four participants was not enough to form any generalizable results; rather just give an insight into areas which may require more research and/or validation with a larger sample in the future. However, there were common themes noted from the mixed methods, and we detail these below.

In the quantitative analysis, we were only able to provide a rather subjective assessment of confidence post-module compared to pre-module rather than formally assess any gains in knowledge. If the module is to be rolled out further, it will be incredibly useful to formally evaluate any changes in practice or impact on patient benefit if possible. The order of session delivery changed for the second cohort, but we do not believe this would have any impact on the overall evaluation by the participants. A further limitation of this research may be that participants from the first cohort received the module for free while participants from the second cohort were funded by their employer. There may, therefore, have been an element of perceived reciprocity by the participants from the first cohort to apply positive attributes to elements of the research where there were few. However, we find this unlikely as each participant in the qualitative element of the study made mention of various limitations or negative points not just focussing on the positive. It should also be noted that the qualitative researcher a member of the teaching faculty and therefore participants may have felt less able to criticise the lectures ('managing acute pain' & 'safe use of triage tools') that he delivered. It could also be argued that as he was on the faculty, any other criticism from the participants may have been diluted in order not to offend' albeit criticisms were still voiced.

5. Conclusions and recommendations

Demand for health services continues to increase, and remote clinical decision making is a recognised strategy to manage this increasing demand and has been employed by various countries for nearly 20 years. The education and training that underpins this practice is

however sparse and differs greatly. It appears from this relatively small evaluation that the aims of this new RCDM module designed to underpin RCDM practice have been achieved. More rigorous research is required to determine this definitively. Improvements need to be made to the content and delivery of some sessions, and more consistent emphasis is required on the applicability of the content to RCDM practice. The aim of enabling practitioners to be able to demonstrate an in-depth understanding of clinical decision support software (CDSS) and to be able to evaluate evidence-based best practice models critically and system-based approaches used in conjunction with such software is displayed in an increase in participant confidence, as-well-as qualitative feedback. Various learning methods have been utilised but none more so favourably by participants as the facilitated face-to-face sessions with other clinicians, which allowed consolidation, validation, and critical questioning of current practice. More research is required to determine the favorability and efficacy of other methods used in other international examples. It is important to consider both the service operating model and the student audience when delivering this module; which may require adaptation for international audiences also.

Key recommendations following this mixed methods evaluation for future delivery of the module would be to:

- Ensure the **participants are appropriate** (i.e. will benefit directly in their day to day working and will be able to implement what they have learnt).
- Maintain the **face to face element** of the teaching. However, also consider blended learning (e.g. e-learning in addition to face to face groups) for some audiences with the inclusion of real case studies. The qualitative work suggested that participants from **mixed groups of professions** would work well.
- **Provide sufficient information** to participants before the start of the course.
- Consider the possibility that future participants may not have studied at higher education before or for a long time; they may benefit from **additional support**.
- **Revise the 'complex social cases'** session with the inclusion of social determinants of health to ensure students comprehend its applicability to practice.
- **Include more examples of remote clinical decision making** to contextualise the theory to practice. This could be done with high-quality video and audio examples.

For any future evaluation, it may be of interest to identify the **costs** for teaching staff and the costs for releasing staff from their roles to undergo the course and balance this against the potential patient benefit to demonstrate an economic benefit to the Trust for providing such education.

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Conflicts of interest

The authors have no financial conflict of interests to declare. MB is a member of the teaching faculty for the RCDM course.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.nepr.2018.01.002>.

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