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Our cover photo this issue features a selection of equipment from a National Ambulance Service vehicle. Photo courtesy Kieran Minihane, IJP Photographer.

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EDITORIAL

MOVING TOWARDS THE NEXT LEVEL...

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Introduction

Since the turn of the century, significant progressive changes have taken place in the provision of prehospital emergency care in Ireland. Few would have dared to imagine the scale of advancement both in terms of education and scope of practice that has taken place since the bells tolled to herald the arrival of the new millennium. Academically, paramedics in Ireland who for over 20 years have been qualified at diploma level now have the opportunity to qualify with an honours bachelor of science degree, and the possibility of progression to masters and doctoral degrees should they feel so inclined. From a clinical perspective, the Advanced Life Support service that is available nationwide today has evolved from an emergency service provided by EMTs just a few short years ago.

In order to make the step up to the next level in our development as a bona fide recognised profession, it is essential that we embark on the journey of the development of our own body of knowledge in relation to our education, our practice and our profession as a whole. The development of research capacity within the paramedic profession is a subject which will be addressed by Alan Batt, Vice-President of the Irish College of Paramedics (ICoP), at the upcoming ICoP Scientific Symposium. There is little doubt that the development of a substantial cohort of doctoral level researchers within our profession will certainly take time, not to mention a significant change in organisational culture, and practitioners on the ground may legitimately ask, ‘what can I do about it?’, or ‘what has this got to do with me?’. I propose that a very good place for practitioners with an interest in developing research skills to start is to become researchers in their own practice by becoming reflective practitioners. I realise that until relatively recently very few pre-hospital practitioners in Ireland would have considered themselves in the role of ‘the researcher’, traditionally it simply has not been part of our culture. However, with a little guidance and by using a structured reflective model such as Gibbs Reflective Cycle (1) getting started as a reflective practitioner is not as daunting as it first appears, and now more than ever there are an increasing number of opportunities to share the fruits of your research at events such as the ICoP Scientific Symposium and CPC Study Days or at the EMS Gathering, or by publication in a journal such as this.

The term ‘reflective practice’ is one of those concepts that appears to have been around forever. However, it has only been as recently as the mid 1980’s that reflective practice has been formally acknowledged and adopted, particularly in nursing education, as a key strategy for learning. Influenced by the work of Schön, who identified reflective practice as one of the main ways in which professionals learn, it has become one of the cornerstones of medical education for nurses, doctors, and many of the other allied healthcare professions. Schön (2, p. 49-50) describes how the everyday life of the professional practitioner is dependent upon tacit knowledge which may be described as ‘expertise, know-how, and information that employees have developed through experience’ (3). This tacit knowledge, which has been accumulated through experience and reflection-on-action, enables the practitioner to think about their actions and if necessary adjust their performance, often while they are in the middle of performing complex tasks. Schön describes this ability as reflection-in-action, and goes on to defend the legitimacy and the value of the knowledge generated by reflective practitioners:

When someone reflects-in-action, he becomes a researcher in the practice context. He is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case. (2, p. 68).
Garavan et al. (3) further emphasise the value of tacit knowledge in an organisational context when they argue that for an organisation to maintain a competitive edge it must fully utilise the tacit knowledge possessed by its employees. They suggest that this may be best achieved in a supportive working environment with a high level of organisational trust, good working relationships, and a good learning environment.

In the area of pre-hospital emergency care in Ireland, it is only in the last decade that the notion of reflective practice has been tentatively approached. Indeed, until recently it has largely been ignored as practitioners and educators alike have been slow to engage with this new strategy for learning. Now however, regulatory bodies such as the Pre-Hospital Emergency Care Council (PHECC) in Ireland (4, 5), and the Health & Care Professions Council (HCPC) in the UK (6), have begun to offer Continuous Professional Competency (CPC) education points for case studies, reflections and reflective journals and consequently this validation by the main statutory regulators has ignited interest and curiosity around the process of learning through reflective practice.

A key element of the reflective practice concept is that of reflective learning. Bulman (7, p. 4) emphasises that learning is the central purpose of reflection and reflective practice. He describes it as ‘the exploration of experience, the analysis of feelings as well as oneself to inform learning’.

While there is no doubting the popularity of reflective practice among students, practitioners and educators alike it is not without its detractors. While many are convinced of its value, ‘others see it as self-indulgent naval gazing’ (8, p. 2). Sceptics, mainly from an empirical epistemological perspective, include Clinton (9) who seriously questions the value of reflective practice as a learning method and Newell (10) who argues that reflection may be fundamentally flawed due to issues surrounding the accuracy of the reflection and the bias of the practitioner. Newell (11) also laments that the lack of clarity of the process of assessment and evaluation of reflection may be viewed as an obstacle to its promotion. However, Jasper points to the value of the new knowledge generated when put into practice, she writes:

‘Reflective practice builds on the notions of reflection and reflective learning by adding some sort of action into the equation, thus: Experience + reflection + learning → change in behaviour or action’ (12, p.43).

From my own engagement with practitioners and educators over the course of a recent research project there is little doubt that the idea of being a reflective practitioner is seen as desirable. However, it is also clear that quite a lot of confusion exists among practitioners and educators about what it actually means to be a reflective practitioner. In an online questionnaire survey of practitioners representing the full spectrum of Irish EMS contexts and all three clinical levels of practitioner, 65.6% of respondents indicated that they considered themselves to be reflective practitioners, while 7% said that they did not. The remaining 27.4% indicating that they were unsure. Of the 65.6% (122 practitioners) who indicated that they considered themselves to be reflective practitioners, only 13 indicated that when reflecting on their practice they used a structured model of reflection.

Many practitioners described various informal strategies for reflection either collaboratively or alone, citing methodologies such as case debriefing, conversations and discussions with colleagues ‘over a cup of tea’, reading journals, research, attend clinical audit meetings, online education programmes, and general personal reflections. While all of these strategies are helpful and beneficial, and I would not question the sincerity or the motivation of the respondents, educators who participated in the process were unanimous in their preference for the use of a structured model of reflection as they felt it added rigour and credibility to the process.

Interestingly, in the organisational context, there appears to be a clear distinction between voluntary organisations and state-funded ambulance services in terms of their encouragement of reflective practice among their practitioners. 70% of practitioners from the voluntary organisations felt that reflective practice was encouraged by their respective organisations, compared with only 42% of practitioners who identified themselves as being employed in a state-funded ambulance service. It is difficult to explain why there should be such a difference, however one possible explanation is the fact that the statutory ambulance services have evolved from a relatively small
population where there hasn’t been a tradition, or a culture of reflection. By way of contrast the voluntary organisations are typically made up of people from a more diverse population, and a wide variety of professional backgrounds. It is possible that the volunteers have been engaged with reflection in their full-time careers and are more comfortable with both the concept and the process. Whatever the reason may be, I feel that this is a significant issue that requires further exploration.

In order to begin the process of growing the next generation of reflective practitioners and prehospital emergency care researchers, I believe it is critical that these essential skills relating to research methods and reflective practice be prominently emphasised in the education and training standards for practitioners at all levels (13), as it appears that their absence has resulted in their importance being omitted from most accredited EMS education programmes in Ireland, or at best been seen as an ‘optional extra’. Education will also be required for existing practitioners and educators alike who, with their collective experience and wisdom, have much to offer in terms of the development of our profession.

As I mentioned at the outset, the development of our own body of knowledge in relation to our education, our practice and our profession as a whole represents the next challenge in the evolution of our profession. The question is: are we ready?

References
PHYSICAL FITNESS OF PARAMEDIC STUDENTS DURING VOCATIONAL TRAINING – A FOLLOW-UP STUDY

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Abstract

Background

Paramedics’ work includes periods of physically light activity, but also involves short periods of relatively intense physical activity. Even during their studies paramedic students’ days involve a lot of sitting, i.e. physically sedentary behaviour. We initiated a programme to motivate paramedic students to be physically active during their studies. In this study we report physical fitness among paramedic students who for one year participated in brief physical activity counselling consisting of both verbal and a written individually tailored exercise program.

Methods

A total of 40 paramedic students (26 female, 14 male) had participated voluntarily in a physical activity programme alongside their studies. Subjects’ maximal oxygen consumption and muscle strength were measured at baseline and at one-year follow-up. According to the results of the baseline tests all students were given an individual exercise programme, which included aerobic and muscle strength training.

Results

Sixty-five percent (26/40) of the students participated in the follow-up examinations. At baseline male students had higher mean maximal oxygen consumption (VO2Max) and, as expected, greater absolute muscle strength than their female counterparts (all p-values <0.05). During the follow-up females had improved their VO2Max on average by 2.4 ml/kg/min. Furthermore, females on average improved the number of squats by 4.2 [95% Confidence Interval (CI) 0.01 to 8.33] repetitions, and males improved the number of push-ups (mean improvement 4.8, 95% CI 1.93 to 7.57), and left arm grip strength (mean improvement 4.0 kg, 95% CI 1.39 to 6.53).

Conclusions

It seems to be possible to maintain, and even slightly improve paramedic students’ physical fitness with a self-directed, guided, home exercise programme. This approach could enhance prospective paramedics’ willingness to develop the necessary physical qualities long-term throughout their clinical careers.

Keywords: paramedics, physical fitness, physical endurance, employee health, follow-up studies
Introduction

Paramedics are health care workers who respond to all kinds of emergencies. Time pressure, the requirement to provide medical care in life-and-death situations and in often unfavourable conditions under the scrutiny of bystanders and relatives are characteristic of these paramedics’ work.(1) Musculoskeletal injuries are reportedly especially common among emergency medical services (EMS) personnel. These injuries were typically sprains, strains and tears, and anatomically the back was the part of the body most often injured.(2-4) Furthermore, paramedics working in ambulances are reportedly prone to musculoskeletal disorders leading to sick leave and early retirement.(5-7)

Crill and Hostler showed (8) that in spite of the physical nature of paramedics’ profession, EMS providers were significantly overweight and likely to lack sufficient back strength and flexibility to perform their tasks safely. The researchers concluded that this group of professionals could be at risk for occupational injury and targeted interventions were urgently recommended.

Students in general have been found to have at least equivalent health risk factors, such as obesity, to those in general population.(9) Nurses seem to be a high-risk population for back pain. In a study, conducted in Oceania with a population of nurses and midwives (N=7633), 88.4% of the participants had experienced neck, upper back or lower back problems, and 26.3% had experienced problems in all three body regions.(10) It seems reasonable to assume that these findings, albeit made with nursing students, could also occur among paramedic students. Physical activity habits established during vocational education may be of help to keep paramedics-to-be and nurses physically equal to their future physically demanding roles.(9)

Pre-employment physical capacity testing is widely used as a part of the recruitment process of prospective paramedics, indicating the importance of physical fitness for their physical work capacity. The work of paramedics may involve long periods of sedentary behaviour, such as sitting. However, it also involves short periods of relatively intense activity, often above the anaerobic threshold (6,11), and the authors pointed out the need for high standards of physical fitness for ambulance personnel.

In Finland paramedics are trained at eight universities of applied sciences (UAS). At the recruitment stage it is not mandatory to test the applicants’ physical fitness. Despite evidence indicating the need for adequate physical fitness (6) currently only two UASs continue to conduct pre-enrolment testing of applicants’ physical capacity.

Arcada UAS is one of the two UASs in Finland to include such tests in the recruitment process. Paramedic students spent long periods sitting during their days studying. To avoid the adverse events of sedentary behaviour, the paramedic students in Arcada UAS were offered an opportunity to participate in a physical activity programme alongside their studies. The aim of this study is to report the physical fitness of paramedic students who participated in an individually tailored home exercise programme during one-year period.

Materials and methods

As a part of their studies, paramedic students in Arcada UAS in Helsinki Finland have the option to participate in a physical activity programme. The programme includes physical capacity tests in the second semester i.e. at baseline, and follow-up tests one year thereafter. According to the results of the baseline tests, all students were given an individual exercise programme, which included aerobic and muscle strength training. The exercise programme for each individual focused on those results that were at a moderate or low level in the fitness categories of each test. The programmes were based on World Health Organization (WHO) physical activity recommendations (12) and The American College of Sports Medicine (ACSM) general principles of exercise prescription regarding volume, i.e. intensity, frequency, duration of exercise activity.(13)

A total of 57 students were enrolled in the paramedic training program between 2012 and 2014 in Arcada UAS. Forty of these paramedic students participated in the baseline physical tests on a voluntary basis. Before the baseline tests the participants gave written consent to the health and physical activity data collected during the programme being used for scientific purposes. The ethical committee of the Hospital District of Helsinki and Uusimaa (HUS) has approved the study (HUS / 3574 / 2017). Subjects were sent an information letter explaining about the tests, about preparation
before participating, and the test procedure. To enhance safe physical activity testing the
subjects completed a standard pre-test health-screening questionnaire (13) and based on
the results of this questionnaire none of the subjects had to be excluded. Thereafter
the students participated in a physical fitness test protocol composed by the UKK institute
(UKK Institute, Tampere, Finland). (14) Because the requirements of paramedics’
clinical work are equal for both genders, the test criteria for male subjects were applied
for both genders.

The tests were spread over two separate days on each occasion; the first morning
for the body composition measurements and the second day for the physical performance
tests. Basic demographic information about the subjects was recorded (age, gender,
height, weight) at the first test session.

An InBody 720 Body Composition Analyzer (InBody Co., Ltd. Seoul, Korea) was
used for measuring the subjects’ body weight and body composition according to the
manufacturer’s guidelines. The inbuilt software was used to calculate body composition
values such as body fat mass (FM), visceral fat (VF), skeletal muscle mass (SMM),
relative FM of bodyweight, and body mass index (BMI; kg/m2). Bioelectrical
impedance analysis has been proven to be a valid and reliable method for measurement
of the body composition. (15,16)

The physical performance tests were conducted according to the following
standardized procedure. The test session started with the WHO submaximal cycle
ergometer test to estimate the subjects VO2Max, and was followed with a one-hour
pause before the muscle tests. The muscle tests included were core muscle strength and
stability test, push-ups, sit-ups, static back endurance test, isometric arm test, squats with
extra weights, and grip strength. Tests were done in this particular order with a three-
minute rest in between.

The submaximal cycle ergometer test protocol (17) was complemented by the non
-exercise model. (18) The non-exercise model gives a prediction of the aerobic fitness for
each subject, and gives an estimation of the workloads and heart rate levels during
different stages at the test. Electronic ergo bikes (Daum electronic GmbH, Fürth,
Germany) were used as cycle ergometers. The test started with a five-minute warm-up
followed by 3-4 workloads of four minutes starting from a 50% load of VO2Max and
reaching an approximately load level of 80-85% of VO2Max. Pedalling frequency was
kept between 55 and 75 rpm by following the electronic bike’s display, which shows the
cadence continuously. Heart rate was monitored throughout the test with Polar T31 heart
rate sensors (Polar Electro Ltd., Kempele, Finland).

The plank test designed by Brian Mackenzie was used to test global core muscle
endurance. (19) This test consists of eight stages, starting from the plank exercise
position supported by forearms and feet, and during the different stages arms and legs are
raised. The test is timed, with a maximum time of 180 seconds.

Regarding the push-ups, the test was done according to the standard for males as
mentioned in the American College of Sports Medicine (ACSM) exercise testing.(13)
The maximum number of consecutive push-ups, without rest, was counted as the score.

Sit-ups were done in the supine position on a mat with the knees at 90 degrees and
the arms placed with the fingers level with the ears, or interlocked behind the neck, the
elbows touching the knees on rising. When going back down, and before starting a new
sit-up, the shoulder blades must touch the mat. The tester gave light support from the
ankles. The result was the number of sit-ups done in 60 seconds, without rest.

To measure static back muscle endurance, the subject was placed on the
examining table with the lower body fixed to the table at the ankles and the upper body
unsupported in a horizontal prone position. The arms were held alongside the body, but
were not allowed to touch the table. The time, in seconds, in which the subject was able
to keep the upper body straight and horizontal was recorded. The maximum time allowed
for the test was 240 seconds.

An isometric arm test was used to measure the isometric strength and endurance
of the arms and shoulders and the static strength of those body muscles supporting that
movement. The subject stood in an upright position with the legs 15 cm apart. An 8 kg
weight was held in the hands with the arms straight and horizontally level with the
shoulders. The result was the time in seconds for which the subject was able to keep the
weight steady at that horizontal level. The test was done in front of a mirror so that the
subject could control the posture.

Squats with extra weights were used to test the muscular endurance of the legs. The subject stood in an upright posture with the feet 15 cm apart and with the feet slightly turned outward. For the test, the subject wore a vest for the extra weights, which were determined as 14 kg + 1/3 of the subject’s own weight (e.g. if a person’s weight is 72 kg, 1/3 of the weight is 24 kg; the amount of extra weights is 14 kg + 24 kg = 38 kg). The subject had a 10-kg weight in each hand and the rest of the load was evenly distributed in the vest. From the upright starting position, the subject squatted so that the thighs were horizontal with the floor (knees bent at an angle of 90 degrees) and stood up from that position. A chair or step benches were used to mark the horizontal level. A maximum of 50 repetitions was performed.

Grip strength was measured with a hydraulic hand dynamometer (model SH5001, Saehan corporation, South Korea) with the subject seated, shoulder slightly abducted (the elbow is not allowed to touch the torso), elbow flexed to 90 degrees and the forearm in a neutral position. Both arms were tested, with two trials for each arm with a 30 seconds rest between the trials. The best result was noted as the score in kilograms.

Statistical analyses were performed with SPSS (version 24.0; SPSS Inc., Chicago, Illinois, USA). Kolmogorov-Smirnov test was used to test data normality assumption, and variables without a normal distribution were analysed using a non-parametric test. Comparisons between the groups were performed with independent samples t-test, and comparisons within subjects (at follow-up - at baseline) with paired samples t-test (mean and its 95% confidence interval, CI). Effect sizes (ES) were calculated according to Cohen's d method. P<0.05 (two-tailed) was accepted as a statistically significant threshold.

Results
Sixty-five percent (26/40) of the students participated in the one-year follow-up examinations. Of the subjects, 14 were female, and 12 were male. The mean age of female subjects at baseline was 21.5 (standard deviation, SD, 1.8) years, and the corresponding age of males was 22.3 (SD 1.1) years. The mean follow-up time was one year. When the changes in anthropometrics during the follow-up period were analysed with female and male subjects combined, the mean weight and BMI (both p-values <0.05) slightly increased (Table 1). The baseline and follow-up characteristics and anthropometrics of the subjects are presented in Table 1.

At baseline male students had higher mean maximal oxygen consumption (VO2Max) than their female counterparts (mean difference 6.6 ml/kg/min, p<0.019, Table 2). As expected, males had greater absolute muscle strength at baseline than females. On average the result of the core muscle strength and stability test (p=0.017), the push-up test (p<0.01), the isometric arm test (p<0.01), and grip strength of the right (p<0.01) and left hand (p<0.01) were greater in males than in females. Cardiorespiratory fitness and muscle strength results at baseline and at follow-up are presented in Table 2.

Overall, during the one-year follow-up the mean changes in muscle strength of the subjects were few. Females had improved their maximal oxygen consumption (VO2Max) on average by 2.4 ml/kg/min; ES 0.7. Female subjects had also improved their number of squats (ES 0.6), and males the number of push-ups (ES 1.1), and left arm grip strength (ES 1.0) (Table 2).

Discussion
This study reports over a one-year period the physical fitness of paramedic students who had participated in brief physical activity counselling with an individually tailored exercise programme. In some few muscle strength measurements the ESs were from moderate to large. Female students improved their maximal oxygen consumption and number of squats. Males improved number of push-ups, and left arm grip strength.

Fitness, gender, age, equipment, and demographic variables seem to be factors underlying to the high rate of paramedic occupational injuries. However, Jenkins et al. concluded, based on their review, that there is only little evidence available to quantify the relationship between pre-employment physical capacity testing and subsequent musculoskeletal injuries of paramedics. (21) In general, the evidence related to the effectiveness of pre-employment examinations targeted at specific occupational groups...
or health risks in reducing occupational disease, injury or sick leave is inconsistent.(22)

Videman et al. investigated back pain among nursing students with a 7.5-year follow-up. Prevalence of back pain increased sharply during nursing school but thereafter more slowly. Back pain when starting nursing studies was a predictor for back-related pain and disability at follow-up. Self-reported work-related physical workload was associated with back pain and related disability.(23) Furthermore, Lallukka et al. showed that early exposure to heavy physical workload is associated with a high risk of radiating low back pain after a follow-up of 21 years. The risks were particularly pronounced and robust among women. Therefore care should be taken when young people enter the labour market and are exposed to physically loading work (24) as occasionally is the case among paramedics.

One limitation of our study was that we did not systematically evaluate the volume of physical activity during follow-up. However, at the follow-up examination 92% of the subjects reported that they had engaged regularly in leisure-time exercise for one month prior to the follow-up examination.

It seems to be possible to maintain, and even slightly improve the physical condition of paramedic students with a self-directed, guided exercise programme.(25) Educational institutes providing education and training for paramedics need to find new and more effective ways of encouraging students adopt living habits conducive to good physical condition.
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References


PARAMEDIC ASSESSMENT OF FRAILTY: AN EXPLORATORY STUDY OF PERCEPTIONS OF FRAILTY ASSESSMENT TOOLS
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Abstract

Introduction
Frailty is recognised as a significant variable in the health of older adults. Early identification by paramedics of those at risk of frailty may assist in timely entry to an appropriate clinical care pathway. Early referral to such pathways has been shown to improve patient outcomes and quality of life, as well as deliver economic benefits. To date, little research has been completed regarding assessment of frailty by paramedic professionals using validated assessment tools. The objective of this study was to determine paramedicine students' perceptions of screening tools to facilitate assessment and knowledge of frailty of older adults. The Edmonton Frail Scale (EFS) and the Groningen Frailty Index (GFI) were determined suitable for this purpose.

Methods
The research adopted a mixed methods approach using a survey tool developed to gather both qualitative and quantitative data from students at the completion of a structured aged care clinical placement. Thematic analysis of the qualitative data identified key features of the tools, while a Likert-type scale was used to measure perspectives about the suitability of the tools for use in paramedic practice.

Results
Thirty-seven paramedicine students were invited to participate in the study. Thirteen were able to use both tools to conduct frailty assessments and submitted survey responses. Student perspectives indicated both the EFS and GFI are potentially suitable for paramedicine and as clinical learning tools regarding geriatric assessments. Mean time to administer the tools was 13.46 minutes (SD 12.14) for the EFS and 12.19 (SD 9.6) minutes for the GFI.

Conclusions
Paramedicine students support a frailty assessment tool to assist clinical decision making regarding older adults. Further appraisal of validated frailty assessment tools by operational paramedics in a pre-hospital environment is warranted to determine absolute utility for Australian paramedics.

Keywords: Aged; Emergency medical services; Frailty; Paramedic; Primary Health Care
Introduction
Frailty has been described as a ‘geriatric giant’ (1) and is a common syndrome in older adults (2) resulting from age-related decline of multiple physiological systems, with resultant increased vulnerability and decreased reserve to cope with minor health stressors.(3) Predisposition to developing frailty is also associated with socioeconomic status and gender.(3,4) Additionally, frail older adults are at increased risk during extreme weather events which are forecast to become more regular, more intense and longer lasting in coming years.(5)

Not all old people are frail,(6) however, as our ageing population increases, so too will the prevalence of frailty and its associated adverse health outcomes.(7,8) One study identified 39% of males over 85 years were frail, compared to 45% of females.(9) Frailty is recognised as an independent variable with respect to development and progression of several conditions such as cardiovascular disease and immunological decline.(2) In regards to ageing, recognition and risk stratification of older adults by degrees of frailty may prove more beneficial than age as a predictor of adverse outcomes.(2,10,11)

While associated with disability, comorbidity and age, frailty is its own distinct and dynamic clinical entity.(2) Two predominant approaches of identifying frailty have emerged: the frailty phenotype (FP) (12) and the frailty index (FI).(13) Both methods have developed criteria to identify stages or degrees of frailty in older people and the associated risk of adverse clinical outcomes.(14) Early identification of those classified as pre-frail may provoke strategies that delay or reverse the onset of frailty in older adults.(15)

Numerous frailty assessment tools have been developed based on the FP and FI, all of which have varying degrees of complexity, identify frailty via different domains and offer varying operational value. For example, the Cardiovascular Health Study (CHS) index assesses grip strength, the accurate measurement of which requires prior knowledge of normal strength distribution based on gender and the utilisation of a dynamometer.(16) The FRAIL-NH Scale requires the addition of a depression assessment tool,(17) which adds an additional layer of complexity to the frailty assessment process. The Clinical Frailty Scale (CFS) by comparison, was designed to predict functional trajectories while hospitalised and overall hospital length of stay. (18,19) These aforementioned tools are typically associated with a more complex and multi-disciplinary comprehensive geriatric assessment (CGA) (20) and there is scant evidence of their use by paramedics in the out hospital environment.(21)

Over recent years paramedics’ roles have evolved to include primary care and community referral services for older adults including frail older people.(22) To prepare student paramedics to operate in this expanded role, clinical placements in residential aged care facilities have become an important component of their undergraduate degree. These placements have been shown to provide a range of valuable learning experiences, including the use of a range of assessment tools for older people.(23-25) Identification of a frailty assessment tool applicable to the complex prehospital environment in which paramedics work, and recognised by referral agencies may improve identification of frail and pre-frail older adults, reducing acute hospital presentations through community referral, education and management strategies.(10)

The Edmonton Frail Scale (EFS) (26) has been validated by both geriatricians and non-specialist care providers, hence its potential in paramedic assessment of frailty. The EFS samples nine domains representing: cognition, general health, nutrition, independence, social support, medication use, mood, continence and physical functioning. By comparison, the validated Groningen Frailty Index (GFI) (27) assesses: cognition, psychosocial, mobility, vision, hearing, nutrition, co-morbidity and physical functioning, and is mostly regarded as a self-assessment questionnaire.(28) Being a self-assessment questionnaire, the GFI was considered a potentially useful tool for paramedic students to familiarise themselves with the process of frailty assessment. While the EFS (26) and GFI (27) are widely used in geriatric medicine, no such assessment tools have been developed specifically for use by paramedics. The ease of use of both the EFS and GFI, coupled with the aim of increasing paramedicine students’ knowledge and assessment of frail older adults, led to these tools being considered appropriate for inclusion in this exploratory study.

This study sought to ascertain paramedicine students’ perceptions of the potential
utility of the EFS and GFI for future use in paramedic practice as well as future education activities. This has potential for wider adoption of two clinically validated frailty assessment tools that can be quickly and easily administered, thus enhancing clinical decision making in the out-of-hospital, paramedic environment.

Methods

Participants
Students surveyed were from a cohort of second year undergraduate Bachelor of Paramedicine students participating in unique interdisciplinary clinical placements within residential aged care facilities (RACF). Previous evaluations of these placements has found they provide valuable learning opportunities for students in relation to communicating with older residents and performing a range of clinical assessments. Thirty-seven undergraduate paramedicine students undertaking clinical RACF placements were invited to participate in the study, use the EFS and GFI tools and complete a survey of their perceptions of the tools for use in paramedic practice. Students used the frailty assessment tools under clinical supervision of the RACF staff.

Materials
Prior to their clinical placements, students were directed to an online orientation of the assessment tools. This consisted of a self paced learning module covering concepts of frailty and the EFS and GFI assessment tools. Data were not collected to determine how many students accessed this learning module. Participating students were provided with a paper-based version of both the EFS and GFI. Additionally, students were informed of the availability of an electronic version of the EFS for smart phones and tablet devices.

Students were encouraged to use both assessment tools as many times as practicable with different residents in order to gain an appreciation of each tool’s characteristics in a clinical setting. Data were not gathered to determine how many residents’ frailty status was assessed. Ethics approval for this research was gained through the University of Tasmania Health and Medical Human Research Ethics Committee (H0016786).

Research setting
Three RACFs were involved in the study during September and October 2017. Each RACF provides both low care (independent or minimal assistance with activities of daily living) and high care (full assistance with daily living activities) of residents and range in size from 100 to 150 beds. Residents were typical of those living in RACFs.

Data collection and analysis
While on RACF clinical placement, paramedicine students used both the EFS and GFI to assess the frailty status of residents. Students were supervised by the facilities nursing staff, who have experience mentoring healthcare students and familiarity with the residents.

Quantitative data were recorded using a Likert-type scale with scores ranging from 0-10 to determine students’ perceptions of each tool’s: simplicity of use; accuracy in determining frailty; difficulty in learning; relevance to paramedic practice; utility in assessing frailty; and time to administer. Table 1 provides an example of the survey in regards to EFS simplicity of use and accuracy in assessing frailty, (see Appendix A for complete survey) while Table 2 provides the median and interquartile ranges of the quantitative data obtained. Microsoft Excel 2017 was used to provide a descriptive analysis of quantitative data.

<table>
<thead>
<tr>
<th>To what extent was the EFS a simple frailty assessment tool to use?</th>
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<tbody>
<tr>
<td><strong>Very Difficult</strong></td>
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<tr>
<td>How accurate do you believe the EFS was in assessing an old person’s frailty?</td>
</tr>
<tr>
<td><strong>Very Inaccurate</strong></td>
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</table>

Table 1. Likert-type scale example used for quantitative data collection.
Regarding the qualitative data, commonalities and divergences were extracted from six open-ended questions (Text box 1) seeking student’s views on the assessment tools.

Text box 1. Qualitative survey questions.

- What did you like about the GFI (Groningen Frailty Index)?
- What did you dislike about the GFI (Groningen Frailty Index)?
- What did you like about the EFS (Edmonton Frail Scale)?
- What did you dislike about the EFS (Edmonton Frail Scale)?
- Of the two (2) frailty assessment tools which do you consider the most comprehensive for use by paramedics? Please give your reasons.
- Of the two (2) frailty assessment tools which do you consider the most suitable for use by paramedics? Please give your reasons.

Initial coding was undertaken by two of the researchers independently who then convened to compare key themes and reach concordance on these. An open coding process was initially used to identify and map these underlying themes. A more focused thematic coding process was subsequently undertaken to examine these in more detail. Student perspectives on the two tools are reported below.

Results
Quantitative data
Thirteen undergraduate paramedic students (response rate 35%) completed a questionnaire seeking their perceptions of the EFS and GFI assessment tools while on clinical placement in RACFs. Comparison of the EFS and GFI across identified categories indicated little statistical difference. A comparison of both frailty assessment tools based on these criteria is shown in Table 2.

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<tr>
<th></th>
<th>Median</th>
<th>IQR</th>
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<tr>
<td>To what extent was the tool a simple frailty assessment tool to use?</td>
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<td>GFI</td>
<td>7</td>
<td>4.5</td>
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<tr>
<td>EFS</td>
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<td>2</td>
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<tr>
<td>How accurate do you believe the tool was in assessing an old person’s frailty?</td>
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<tr>
<td>GFI</td>
<td>6</td>
<td>3</td>
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<tr>
<td>EFS</td>
<td>6</td>
<td>0.5</td>
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<tr>
<td>How difficult was it to learn to use the tool to assess frailty in old persons?</td>
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<tr>
<td>GFI</td>
<td>2</td>
<td>3.5</td>
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<tr>
<td>EFS</td>
<td>2</td>
<td>3.5</td>
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<tr>
<td>To what extent will the tool be relevant in your future role as a paramedic?</td>
<td></td>
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</tr>
<tr>
<td>GFI</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>EFS</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>Overall, how useful is the tool for assessing frailty in old persons?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFI</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>EFS</td>
<td>6</td>
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</tr>
<tr>
<td>Approximately how long did it take to administer the tool? (minutes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFI</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>EFS</td>
<td>8</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Table 2. Median and interquartile range of quantitative survey data

Administration times for both the EFS and GFI varied significantly, ranging between three and 45 minutes. Median administration times for both tools was eight minutes for the EFS and ten minutes for the GFI. Some students recorded the same administration time for both tools.
Qualitative data
Qualitative data were gathered from six open-ended questions regarding the utility of the EFS and GFI to paramedic practice. Students were asked what they liked and disliked about both tools; which of the tools did they consider more comprehensive in assessing frailty; and which tool they considered the most suitable for use in paramedic practice. Diverse views on both of the tools were recorded and analysed and these are discussed below.

What was liked about both frailty assessment tools?
Common to both tools were the simplicity of use. Regarding the EFS, one student commented that the tool has a “good overall range of questions that are well worded and to the point (BP009)”, while another echoed the sentiment regarding the GFI in that the tool had “easily relatable questions (BP011)”. Another student considered the EFS well suited to the out-of-hospital environment stating it was “very simple, easy to ask and explain to an elderly person. Fast assessment which is what you need in a paramedic setting (BP012)”. Interpretation of the scoring systems of both tools indicated a greater appreciation of the EFS over the GFI, with statements such as “better scoring scale [with] better worded questions (BP006)” and “the scoring system was simple to use compared the GFI (BP001)” emerging as a common theme. Students made positive commentary about the cognitive and psychosocial aspects of both the EFS and GFI, however, the EFS appeared to be more valued due to its less intrusive nature. Comments such as a “good overall range of questions that are well worded and to the point (BP009)” and psychosocial questions are “less triggering (BP011)”, indicate students considered the EFS contained less emotionally challenging questions for the resident/patient assessment than the GFI. One student noted a strength of the EFS was “cognitive testing asks patient’s perspective on their own condition (BP008)”.

While the EFS garnered positive comments regarding functional performance indicators, the GFI received similar positive commentary regarding the activities of daily living. Both these aspects seem to be appreciated by the students as important criteria to assess regarding frailty. One student considered “only having to ask the patient questions, not asking for the completion of a task (BP001)” a particular strength of the GFI. On the other hand, one student considered the EFS “clock thing was cool (BP005)” indicating contrasting perspectives on this aspect of the two tools.

What was disliked about the tools?
Students appeared to dislike similar aspects of both tools. Contradicting the positive cognitive and psychosocial comments above, some disliked the GFI due to the perceived difficulties asking psychosocial questions. One student reported “the psychosocial questions are poorly phrased and don’t really have relevance without more context (BP008).” Another student expressed concerns about the GFI stating “the psychosocial section was difficult to ask about in regards to making the patient upset (BP001)” while one reported they “sometimes felt awkward asking psychosocial questions (BP011)”. One considered the GFI contained some sections that were “hard to apply to an elderly person experiencing dementia or any other neurological disorder (BP012)”. Some considered the EFS not detailed enough regarding psychosocial aspects “mood questioning was rather narrow [with] no indication of agitation or levels of anxiety (BP008)”. Another considered some of the questions in the EFS to be an issue stating “patients may be unsure of the relevance of some questions (BP011)”. Some students found the EFS to be more demanding of patients with one finding the tool “very time consuming and constantly had to re-ask and re-phrase questions to the patient (BP007)”. These sentiments were echoed by another who considered the EFS to be “time consuming and quite demanding of residents (BP006)”.

The lack of a definitive score for the GFI elicited negative comments from several respondents with one stating “it generated a number, but unsure what that number indicated (BP008)”. Similarly, another reported “it gave a score but no rating to indicate what this meant (BP013)”. This aspect added to the complexity of the GFI tool over the EFS for the purposes of conducting a paramedic assessment.
Which tool was considered the most comprehensive?

Students provided mixed responses regarding each tool’s comprehensiveness, however, the GFI garnered more positive comments. The greater number of questions associated with the GFI created a perception this tool was more comprehensive, with comments such as “[GFI] more comprehensive because it delves deeper and gains a larger picture (BP004)”. Additionally, students considered inclusion of questions about activities of daily living meant “the Groningen was the most comprehensive in the way it covered a large amount of ‘day to day’ information (BP002)”. One student qualified their perspective on this stating “but [GFI] would only be good with cognitively intact residents willing to cooperate (BP006)”.

Responses from students who considered the EFS more comprehensive included, that it “gave an overall idea of frailty in a concise manner with well worded questions (BP009)”. Another felt it provided “more relevant information and actually displayed that they can complete tasks (BP011)”. One student considered the EFS more comprehensive as it demonstrated “the results obtained matched the patient assessed (BP001)”.

Which tool was considered most suitable to paramedic practice?

Whilst the GFI was considered the most comprehensive tool, its perceived intrusiveness and lack of a definitive frailty score in favour of an interpretive scale resulted in students considering it less suitable for use by paramedics than the EFS. Students appreciated the “concise and not vague (BP009)” wording of the EFS and suggested it was “relaxed and conversational, prompting, rather than intrusive (BP006)”. One student considered the EFS “wording is better and can be easily worked into a normal history taking (BP009)”.

Discussion

Results from this study demonstrate there is an appreciation of, and capacity for a validated tool that assesses frailty by paramedicine students and such a tool would add value to paramedics’ clinical decision making.

Increasing population growth and ageing will necessitate paramedics assess and manage frail older patients in both RACF and private residential environments.(22) In contemporary Australia 80% of older Australians choose to remain in their private residence, with the remainder opting for various levels of assisted living.(30) Adults admitted to a RACF are now 83 years old on average, reside there for two to three years and present with more complex healthcare needs.(30)

Research into previous student placement experiences has highlighted the need for paramedicine students to have access to a range of assessment tools to facilitate engagement in interdisciplinary learning activities.(24) These structured learning activities include assessment of various aspects of individual resident’s health and wellbeing, in addition to the development of paramedicine students’ clinical skills in the RACF environment.(31)

This study sought to ascertain paramedicine students’ perceptions of the potential utility of the EFS and GFI, rather than seeking to clinically revalidate either tool. This study demonstrated frailty assessment tools can be utilised by paramedicine students. It illustrated that with minimal orientation and education, the EFS and GFI can be applied by paramedicine students to assist and reinforce clinical decision making regarding patient frailty status. In addition, it provoked a conversation about the merits of using an existing health workforce in a new way to support the older adult to safely age in place.

Paramedics are less confident and less familiar with assessment of low acuity patients compared to those presenting critically ill or injured.(32) Additionally, current work practices, guidelines and protocols are biased towards assessment and management of critically ill or injured patients,(32) and currently offer little direction in assessment of frailty as part of routine clinical assessment.(10) Consequently, there is a risk that paramedics’ clinical decision making relating to a frail older adult, regardless of their living environment, is based on little objective data and insufficient practice guidelines. (10)

Integration into current systems and ease of application of any tool in the clinical environment is an important consideration in paramedic practice.(33) The EFS is available as a smart phone/tablet application and could be incorporated into current
paramedic electronic case records. Additionally, the absolute scoring ability of the EFS compared to the GFI, which requires interpretation of the calculated score, may have contributed to the perception of greater suitability of the EFS over the GFI among the student cohort.

The snapshot view of life paramedics observe during a patient encounter may not be a true indicator of a patient’s day to day existence. Thus, the EFS and GFI were selected as they explore characteristics of frailty across multiple domains that provide objective clinical data without the need for a multidisciplinary team based CGA.(20) Recognising frailty is a dynamic condition and more likely to be determined over time and via a multidisciplinary team,(20) early paramedic identification of frailty may be the catalyst for entry to an appropriate clinical referral pathway.

Considering the nature of paramedic work, of particular interest was the time taken to administer each tool. The succinctness of the EFS suggests that an administration time of five minutes may be achievable with this tool.(3,26) Limited data were found regarding optimal administration time for the GFI, however a similar timeframe could be anticipated. Two key variables may have determined each assessment tool’s administration time: student factors such as experience and orientation to each tool, and patient/resident factors such as communication difficulties and cognitive status. Administration time was retrospectively self-reported. A stronger commentary on the administration time of both tools could be made with independent timing and observation of the students completing the EFS and GFI.

Both tools have potential benefit to paramedic clinical decision making. While this cohort demonstrated median administration times of eight and ten minutes for the EFS and GFI respectively, consideration needs to be given that the cohort consisted of second year students with minimal orientation to the tools prior to use. Implementation of an appropriate education program could see the tools’ administration time approach five minutes (3,26) for both students and practicing paramedics. The EFS and GFI are tools that can be utilised independently of a patient’s medical records.(26,28) Given paramedics rarely have access to such records, utilisation of such an assessment tool can provide valuable insight into a patient’s clinical status that can inform continuing and proactive care strategies.

Limitations
Comments were made by students who perceived a difference in both tools based not only on the quality of the tools’ questions, but the amount of questions. More questions associated with the GFI does not necessarily indicate greater depth, but a different design structure. Student responses regarding this may point to a lack of awareness of both tools’ construction. A more detailed orientation to the tools prior to use may have better informed the students understanding of each tool’s structure.

Data were not documented concerning the number of patients assessed with each tool due to the structure of the clinical environment, workload and availability of suitable clinical supervisors. As such, students’ perceptions of the frailty tools, based on their interaction with defined residents, was established by use of each tool on the same resident or a different tool on each resident. Students filled out one survey instrument at the completion of the clinical placement. More contemporaneous data would be received if students completed a survey each time they assessed a patient/resident’s frailty status.

The timeframe for implementation of the study was quite short. Consequently, only a brief online orientation to the frailty tools was produced, however it is not known how many students availed themselves of this. A more intensive orientation to the tools may have produced different perceptions of each tools characteristics and utility. The small number of paramedicine students who participated in the study is a significant limitation. More definitive data analysis could be undertaken with a larger cohort.

Conclusion
The EFS is available as a smart phone/tablet application. This may have particular resonance with paramedic service providers, given that electronic case reports are becoming standard practice. As the EFS has been validated for use in the non-specialist environment, this tool may offer a viable option in the assessment of frail, older adults in the prehospital environment.
While results are somewhat mixed regarding which frailty assessment tool is preferred, greater clarity would be forthcoming in a larger cohort. This study demonstrated a validated frailty assessment tool can be utilised by paramedicine students to improve their decision making during clinical placement caring for older adults in a RACF environment. Further appraisal and validation of frailty assessment tools by paramedics in a clinical environment is warranted to determine absolute utility for paramedics.

Acknowledgments
The authors which to acknowledge the support of the RACF staff in which the clinical placements were conducted for their assistance in this research project.

References


To what extent was the EFS a simple frailty assessment tool to use?

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<th>Very Difficult</th>
<th>Very Simple</th>
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How accurate do you believe the EFS was in assessing an old person’s frailty?

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How difficult was it to learn to use the EFS to assess frailty in old persons?

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<th>Very Easy</th>
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To what extent will the EFS be relevant in your future role as a paramedic?

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Overall, how useful is the EFS for assessing frailty in old persons?

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Approximately how long did it take to administer the EFS? __________ minutes

To what extent was the GFI a simple frailty assessment tool to use?

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Approximately how long did it take to administer the GFI? __________ minutes
A SCOPING STUDY AND QUALITATIVE ASSESSMENT OF CARE PLANNING AND CASE MANAGEMENT IN COMMUNITY PARAMEDICINE

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Abstract

Introduction

Community paramedicine (CP) establishes an ongoing patient relationship beyond short emergency care episodes. How care planning and case management have been adapted from the isolated incidents of traditional practice is unclear. The objective of this study is to contribute to paramedic practice by examining broad areas of care planning in CP, identifying gaps in the evidence, clarifying key concepts, and reporting on the types of evidence that address and inform practice. A qualitative analysis of included literature outlines program capacities and identifies comprehensive models of care that can inform clinical practice in CP.

Methods

A scoping study was completed that included conducting a systematic search of the literature (in MEDLINE and CINAHL) and selecting relevant studies, followed by data extraction, summarizing, and reporting. The authors of included studies were contacted to confirm the aspects of care planning that were extracted from their respective studies. Aspects of care planning were compared between studies and used to generate a comprehensive list of existing practices.

Results

Ten of 1648 studies met inclusion criteria. Qualitative analysis identified 22 aspects of care planning along four themes; enrollment (n=3), assessment and management (n=6), intervention and care (n=5), and collaboration (n=8). No study included all 22 aspects of care planning. One aspect of care planning was present in all 10 studies; collaboration with primary care providers.

Conclusions

The aspects of care planning identified through this study provide a framework that can guide service providers in the delivery of care and researchers in defined outcome measures to be assessed. Future program development should be guided by the finding that all articles included in this study included collaboration with primary care providers. By summarizing care planning within CP programs, ongoing program development can embrace collaboration with other care providers to help insure that patients receive the appropriate care.

Keywords: Emergency Medical Services, Extended Care Paramedic, Community Paramedic, Care planning, scoping study
Introduction
Paramedic services deliver care within an operational context that often considers the use of emergency services to be based on singular incidents (1,2). Singular short interactions involving transition to care in emergency departments (EDs) (3,4) have limited the basis for care planning and case management by paramedics. Studies on patient outcomes following ED visits indicate that many patients are discharged without subsequent referral (5,6) or after receiving only minor treatment or care (7,8). This can also mean that patients are repeatedly seen by paramedics (9,10). Such patients may represent individuals who would benefit from treatment and care offered through alternative models that have been developed in response to new patterns of use. Two examples of paramedics acting in new roles have been called community paramedics (11) and paramedic practitioners (12). How care planning and case management have been adapted by paramedics acting in these roles from the traditional practices in isolated incidents is unclear.

Community paramedics have been used to address preventable 9-1-1 emergency calls through improved collaboration with local community health care partners (13). Municipal or regional administration of services in many jurisdictions means that delivery of care by community paramedics is often initiated in direct response to a perceived community level need (14,15). The regional heterogeneity of program development has led to vastly different practices between different jurisdictions and, in turn, difficulty in assessing the clinical benefits of these initiatives (14–16). Despite these limitations, programs using community paramedics have demonstrated the potential to reduce emergency departments (ED) visits (17–19), improve patient satisfaction (17,20,21), and improve system performance (16,22).

Paramedic practitioners share some similarities with community paramedics. The rationale for the paramedic practitioner model (also called an extended care paramedic model) (12,23,24), included a hypothesis that not all patients seen by paramedics required transport to an ED. The practitioner model required a significant adjustment in service delivery, up to and including redefining what constitutes emergency care for service providers and what alternatives to an emergency department may be feasible (12,23,25,26). Extended care paramedics (ECPs) may be assigned to calls through new approaches to dispatching and use an extended scope of practice when treating patients (12,26). Legislation and policies governing service provision often mean that ECP programs function separately from traditional emergency response (9,15,16,19,27,28), thus reinforcing heterogeneity in service delivery between different jurisdictions.

Objectives
Herein, models of care that utilize either community paramedics or paramedic practitioners in non-emergency situations are referred to using the term community paramedicine. Despite heterogeneity in program structure, it is expected that common roles and approaches are occurring with respect to the clinical management of cases through community paramedicine. Previous reviews (13–16,22,29) evaluating community paramedicine have presented some information about how paramedic services adapt their service delivery model overall, but concepts of care planning and case management involving community paramedics or paramedic practitioners beyond singular encounters have not been summarized. This study addresses this void by examining broad areas of care planning in community paramedicine, identifying gaps in the evidence, clarifying key concepts, and reporting on the types of evidence that address and inform practice in paramedicine. We include a qualitative assessment of care planning and case management in community paramedicine programs to analyze the core operational components and outcome measures of the described clinical interventions within each of the studies. We define program capacities and identify comprehensive models of care that can inform evidence-based practice within paramedicine.

Methods
A scoping study was conducted using the standard framework developed by Arksey and O’Malley (30). The study process included conducting a systematic search of the literature and selecting relevant studies, followed by data extraction, summarizing, and reporting. Arksey and O’Malley suggest that a consultation exercise may enhance the
review process (30). In this study, the authors of included studies were contacted to confirm the components of care planning that were extracted from their respective studies.

**Systematic search**

A systematic search of the literature was conducted between September 12, 2016 and October 15, 2016. Determining the appropriate search strategy for identifying articles about a sub-specialty of paramedic work required several iterations and adjustments. Search terms were selected to describe the care provider as opposed to the program delivering care because various terms may be used to describe community paramedicine programs. The term “community paramedic” can be interchanged with other terms such as “extended care paramedic,” “paramedic consultant,” or “paramedic practitioner.” These terms have been adopted to varying degrees and have different meanings in different jurisdictions. Combinations of keywords (with wildcard enabled suffixes) and main subject headings were used to reflect these terms. Searches were replicated for MEDLINE and CINAHL. The search was restricted to literature published in the past 15 years (dating to 2001) in order to capture the emergence of community paramedicine service delivery models (11,12). Systematic search details are provided in the supplemental file associated with this article.

**Study selection**

Citations were screened—first by title, then by abstract, and finally by full-text—to confirm that they met inclusion criteria. Two reviewers (BM & ML) completed screening separately to ensure the inclusion of all relevant articles and the reduction of bias. To meet the inclusion criteria, abstracts needed to indicate paramedics were practicing in expanded roles or with extended scope and describe care planning or case management as an aspect of the study. Studies were excluded if they described care planning or case management within a hospital setting or as part of traditional emergency ambulance transportation. However, studies that investigated emergency response with subsequent non-emergency department destinations were included as these were considered to be non-life-threatening situations (for which the traditional service delivery model was designed). ‘Care planning’ and ‘case management’ were defined by two basic components. First, some form of program enrolment or referral was required to connect the patient with a community paramedic or ECP, to assess eligibility or suitability for subsequent clinical care and intervention. Second, within the program components, some form of care plan was required wherein patients received care or treatment. Described programs also had to include criteria for discharge from care, which may or may not have included a period of follow-up. Following full-text review, any disagreement between reviewers was resolved during an in-person meeting. Title screening the references of the included articles was completed to identify any articles that were not found through the systematic search strategy.

**Data extraction**

Data was extracted according to the Arksey and O’Malley framework (30). Country of origin and study design provided information on where community paramedics were practicing and the level of research being completed. Information about the model of care provided details about the role of the paramedic, the services they were providing, the timing and location of service provision, and the stated rationale. Details on operational characteristics were collected and provided information about program leadership, patient enrolment, types of assessments, program collaborators, and program evaluation. Components of care planning and case management were synthesized based on the extracted data to generate a comprehensive list of care planning characteristics that was used for author consultation.

**Qualitative analysis**

Each community paramedicine program described in the articles that were reviewed served as a case for a qualitative assessment of commonly appearing characteristics of models of care. The corresponding author for each of the included articles was contacted by e-mail and asked to provide information about the aspects of care planning that were
included in the respective programs. Authors were provided with a table that detailed all aspects of care planning that had been identified in all included articles. The components that were described in their study were indicated. They were asked to confirm findings or indicate other aspects of the program that were either included or not included and to describe any other aspects of care planning that were not included in the table.

**Results**

*Literature included*

After removing duplicates, a total of 1648 titles were screened (Figure 1) from MEDLINE and CINAHL. Reference-screening of the included articles yielded one further study that was considered for subsequent abstract screening. A total of 10 articles (Table 1) met the criteria for full-text review. Study protocols, economic analysis, patient satisfaction, or other sub-analyses related to the programs described in these studies were further detailed in another 16 articles. These related articles were reviewed for any further details related to care planning or case management during the qualitative analysis.

![Flow chart illustrating article selection process](image)

Figure 1: Flow chart illustrating article selection process

The included articles demonstrated a variety of different research designs and resulted in differing levels of evidence; methods used were RCTs (one RCT and two RCT protocols), one quasi-experimental trial, two retrospective studies, one pre/post study, one cross-sectional, and two pilot project reports. The objectives of the studies varied from exploring feasibility of paramedics acting in new roles to rates of hospitalization or repeated emergency calls. Programs were designed for a number of different patient populations including community dwelling older adults, individuals recently discharged from hospital, residents of long-term care, patients with a specific disease diagnosis, and frequent emergency callers. Where outcome comparators were included, these were either based on pre/post analysis or arm of a trial (either cluster-randomized or quasi-
<table>
<thead>
<tr>
<th>Lead Author, Year, Reference, Country</th>
<th>Study Design, Sample Size</th>
<th>Study Population</th>
<th>Exclusions</th>
<th>Study Objective</th>
<th>Intervention &amp; Care Planning</th>
<th>Study Outcome Measure(s) &amp; Results</th>
<th>Study Implications &amp; Findings</th>
<th>Other Related Articles</th>
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</thead>
<tbody>
<tr>
<td>Abrashkin, 2016, (31), USA</td>
<td>Cross-sectional, 1602</td>
<td>Participants enrolled in “Advanced Illness Management” program. Median age, 83, 67.4% female.</td>
<td>NA</td>
<td>Explore feasibility of CP, evaluate response and hospitalization rates.</td>
<td>Program utilized paramedics as “physician extenders” to provide on-demand urgent in-home care.</td>
<td>Patients seen by CPs remained at home 78% of the time and had a higher hospitalization rate if they were transported than those seen by traditional paramedics.</td>
<td>CP-Physician teams can identify patients needing hospital admission. In a fee-for-service model, non-transport can be a barrier to program implementation despite positive feedback from individuals and carers.</td>
<td>(31)</td>
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<tr>
<td>Agarwal, 2015, (32), CAN</td>
<td>Protocol – Randomized Control Trial (RCT)</td>
<td>Residents of a subsidized seniors housing building.</td>
<td>Less than 3 months of residency.</td>
<td>Evaluation of community paramedicine health assessment program.</td>
<td>Paramedics assess, treat and refer patients who voluntarily attend sessions offered within common areas of residential setting.</td>
<td>Comparison with control arm of rate of 9-1-1 use, and changes in blood pressure, CANRISK score, and health behaviour.</td>
<td>Program is expected to reduce emergency calls and improve health behaviour.</td>
<td>(32)</td>
</tr>
<tr>
<td>Crockett, 2016, (33), USA</td>
<td>Pilot cases-series, 6</td>
<td>Patients identified as being at risk for hospital readmission with diagnoses of heart failure.</td>
<td>None (at outset, later revised)</td>
<td>Decrease hospital readmission for patients with heart failure.</td>
<td>Post-discharge home visits with focus on education pertaining to medications and chronic disease management.</td>
<td>Number of medication related problems addressed and number of readmissions after 3 months.</td>
<td>Pilot project was found to positively received by patients and team members. Revisions to exclusion criteria and program design can be implemented moving forward</td>
<td>(33)</td>
</tr>
<tr>
<td>Drennan, 2014, (34), CAN</td>
<td>Protocol – RCT</td>
<td>Family health team patients diagnosed with either chronic obstructive pulmonary disease, heart failure, or diabetes.</td>
<td>Residents of long-term care (LTC) or having cognitive or communication barriers.</td>
<td>Facilitate assessment and treatment and reduce hospitalization rate for patients in chronic disease management program.</td>
<td>Paramedics conduct home visits at 3 month intervals to assess, treat, and educate patients. Findings will be shared with family health care team and care will be provided in coordination with other care providers.</td>
<td>Comparison with control arm of patients receiving standard level of care.</td>
<td>Program is expected to reduce hospitalizations.</td>
<td>(34)</td>
</tr>
</tbody>
</table>

Table 1: Summary of reviewed articles
<table>
<thead>
<tr>
<th>Lead Author, Year, Reference, Country</th>
<th>Study Design, Sample Size</th>
<th>Study Population</th>
<th>Exclusions</th>
<th>Study Objective</th>
<th>Intervention &amp; Care Planning</th>
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<th>Study Implications &amp; Findings</th>
<th>Other Related Articles</th>
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</thead>
<tbody>
<tr>
<td>Edwards, 2013, (36), UK</td>
<td>Pre/post case-series, 110</td>
<td>Participants were frequent callers (defined as more than 10 calls per month for 3 consecutive months) or other high utilization patients. Mean age 57.6 (± 21.4), 55% female.</td>
<td>NA</td>
<td>Assess whether program addressed frequent caller behaviour.</td>
<td>Paramedics developed individualized dispatch protocols (ISP) or patient specific protocols (PSP) in collaboration with other care providers.</td>
<td>Comparison with patients call history for preceding 3 months showed a decrease in emergency calls.</td>
<td>Intensive case management through ISP or PSP in high frequency callers appears to be effective in a heterogeneous group of patients.</td>
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<tr>
<td>Jensen, 2016, (37), CAN</td>
<td>Retrospective cohort, 360</td>
<td>Participants were residents of “Care by Design” LTC facilities. Two cohorts with median ages of 84 and 86 years, and 59.4% and 80.1% female. Based on constraints of query, such as duplicate records, unable to link records, or patient was not resident of facility.</td>
<td></td>
<td>Assess differences in delivery of care between patients seen by ECPs or emergency paramedics.</td>
<td>ECPs provided assessment and treatment above advanced care paramedic (ACP) scope of practice and followed different dispatch protocol to coordinate care with interdisciplinary team.</td>
<td>After implementation, there was a decrease in transport and hospitalization rates.</td>
<td>ECPs were shown to facilitate care in-place without increased risk to patient safety.</td>
<td>(38–40)</td>
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<tr>
<td>Mason, 2007, (41), UK</td>
<td>Cluster RCT, 3018</td>
<td>Patients &gt;60 years old who called for an ambulance with a minor complaint. Mean age 82.6 (± 8.3), 72.6% female. Post-hoc exclusion based on cognitive impairment or language barrier.</td>
<td></td>
<td>Evaluate effectiveness and safety of paramedic practitioner service.</td>
<td>Paramedic practitioners provided practical and special skills and had additional options for referrals to patients meeting defined presenting complaint criteria.</td>
<td>Cluster randomization was between weeks where service was available or not. Primary outcome of ED attendance or hospital admission in 28 days following call was less likely in the intervention group.</td>
<td>ECPs provide effective alternate care plans for elderly patients with minor complaints</td>
<td>(17, 19, 41–43)</td>
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Table 1: Summary of reviewed articles (cont.)
<table>
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<th>Lead Author, Year, Reference, Country</th>
<th>Study Design, Sample Size</th>
<th>Study Population</th>
<th>Exclusions</th>
<th>Study Objective</th>
<th>Intervention &amp; Care Planning</th>
<th>Study Outcome Measure(s) &amp; Results</th>
<th>Study Implications &amp; Findings</th>
<th>Other Related Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mason, 2012, (45), UK</td>
<td>Quasi-experimental trial, 5525</td>
<td>Patients presenting to five different intervention services using ECPs. Mean age in control arm 42.7 (± 29.4), 51.5% female. Mean age in intervention arm; 49.4 (± 30.8), 58.4% female.</td>
<td>Missing information.</td>
<td>Compare patient disposal pathway of different settings.</td>
<td>Various settings established treatment and referral pathways that could be enacted by emergency care practitioners (including ECPs) leading to various patient dispositions.</td>
<td>Two general headings were evaluated: referral or discharge. In the ambulance setting, practitioners were more likely to discharge patients and more likely to make non-urgent referrals (and less likely to make urgent referrals).</td>
<td>Emergency care practitioners have different impacts in different settings. They appear to be most beneficial when utilized in a mobile setting and where they extend on a pre-existing skillset.</td>
<td>(20,46)</td>
</tr>
<tr>
<td>Ruest, 2012, (47), CAN</td>
<td>Retrospective Case-series, 27</td>
<td>Patients enrolled in “Aging at Home” program. Median age 87, 54% female.</td>
<td>NA</td>
<td>Evaluate program impact on emergency calls by participants.</td>
<td>Paramedics provided immediate response to call-bell system for patients waiting placement in LTC.</td>
<td>Level of call-bell system use and number of emergency calls and associated outcomes were described.</td>
<td>Program appeared to reduce number of emergency calls due to complaints being addressed through call-bell system.</td>
<td>(28,48)</td>
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<tr>
<td>Swain, 2012, (26), NZ</td>
<td>Pilot project report, 583</td>
<td>Patients identified at time of dispatch as being suitable for ECP response. 49% of patients were older than 75.</td>
<td>NA</td>
<td>Provide descriptive statistics of pilot program.</td>
<td>ECPs collaborated with other care providers to assess and treat patients in their homes, avoid unnecessary trips to hospital, and reduce demand on emergency services.</td>
<td>38% of patients seen by ECPs were transported.</td>
<td>ECPs provided safe care and improved collaboration with other care providers.</td>
<td>(21,25)</td>
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</table>

Table 1: Summary of reviewed articles (cont.)
The aspects of care planning that were identified in these 10 articles are described and detailed in Table 2. Eight of 10 authors provided confirmation or clarification regarding aspects of care planning or case management. The feedback received from respondents indicated a high level of agreement with the aspects of care planning as we described them. In some circumstances, authors elaborated on aspects of care planning that had not been included in the published articles.

**Aspects of care planning**

Three program enrolment structures were identified in the 10 articles: program initiated, voluntary/recruited participation, and patient initiated. Program initiated enrolment followed a case management approach designed for frequent paramedic service callers or patients deemed eligible for enrolment through other disease management programs. In total, eight community paramedicine programs described this type of enrolment; in four programs this was the only means of enrolment (31,33,34,36,37,41,45,47). Most programs included more than one means of enrolment (see Table 2). Four programs employed a model of care similar to the ECP model (26,37,41,45) where care was available at a patient’s time of need with a focus on care provision “in-place.”

Three program enrolment structures were identified in the 10 articles: program initiated, voluntary/recruited participation, and patient initiated. Program initiated enrolment followed a case management approach designed for frequent paramedic service callers or patients deemed eligible for enrolment through other disease management programs. In total, eight community paramedicine programs described this type of enrolment; in four programs this was the only means of enrolment (31,33,34,36,37,41,45,47). Most programs included more than one means of enrolment (see Table 2). Four programs employed a model of care similar to the ECP model (26,37,41,45) where care was available at a patient’s time of need with a focus on care provision “in-place.” These programs, along with two other programs (32,34) were classified as having patient initiated enrolment. Three of the four programs that identified themselves as ECP models also indicated that the service could initiate contact with identified individuals (37,41,45) while the fourth indicated that the service also actively recruited participants (26). Two programs described patient recruitment or voluntary enrolment. One followed an ECP model of care (26) while the other described a clinical setting established in public housing apartment buildings where patients could attend voluntarily (32).

The characteristics of care planning that were found can be described within three categories; assessment, intervention, and collaboration. All but one of the programs described paramedics completing a functional assessment or other program-specific assessment (26,31–34,37,41,45,47). The other program described case reviews to facilitate development of individualized dispatch protocols (36). Assessment could also be integrated with chronic disease management activities, found in six programs (26,31–34,47), or advanced care planning, found in three programs (31,37,47). Advances in mobile technologies were found to enhance assessment with all but two programs including some aspect of point-of-care testing (26,31,32,34,37,41,45,47).

Providing care “in-place” is cited as one of the motivations behind these new service delivery models (26,31,37,47) while other programs were interested in decreasing use of emergency services more generally (32,34,36,41,45). All of these programs included an aspect of care planning that included either emergency department avoidance or an individualized dispatch protocol (26,31,32,34,36,37,41,45,47). The one exception to these motivations was a program initiated at hospital discharge with an objective of preventing re-admission (33).

The care provided through these programs could involve both the administration of medication and other non-pharmacological care (26,31,32,34,37,41,45,47). Antibiotics and analgesia were examples of pharmacologic care (26,37,41,45). Wound care was a common example of non-pharmacological care (26,34,37,41,45,47). The exact intervention provided was dependent on level of certification and autonomy of paramedics. Additionally, half of the programs indicated that health promotion or disease prevention were included as aspects of care planning (26,32–34,47).

Collaboration with other care providers was present in all included studies (26,31–34,36,37,41,45,47). One article described pharmacist and paramedic collaboration in a home visit program with a focus on medication adherence (33). While this article provided extensive details on a collaborative approach to medication management, this aspect of care planning was present in five other programs (26,32,34,37,47) but only two of these included collaboration with a pharmacist (26,47). Paramedics often practice with medical oversight provided by emergency care physicians. We found that in community paramedicine programs, medical oversight from emergency care was present in seven of the programs (26,31,34,37,41,45,47). This same level of collaboration existed with specialized care (26,33,34,37,41,45,47) and with social workers (26,33,36,37,41,45,47). Fewer programs included collaboration with mental health care (26,36,47), home care
All programs had care plans that included collaboration with primary care providers or family doctors (26,31–34,36,37,41,45,47).

<table>
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<tr>
<th>Definition</th>
<th>Amberl E.</th>
<th>Aguilera</th>
<th>Connell</th>
<th>Donnell</th>
<th>Edwards</th>
<th>Irwin</th>
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Table 2. Summary of aspects of care planning as described in included articles. (* denotes findings not confirmed by lead author)
Discussion

The findings of this study provide guidance about comprehensive community paramedicine program models of care and can be used to inform future research that will build an evidence base for community paramedicine practice. Ten articles that met the inclusion criteria defined aspects of care planning and identified program components that were part of care planning and case management processes. The articles utilized differing research designs, served differing populations, and evaluated different outcome measures. The aspects of care planning and case management detailed through case study analysis illustrate the emergence of the paramedic as a health care provider that can establish on-going patient-clinician relationships and collaboration with other care providers.

Synthesizing the aspects of care planning and case management from the 10 articles resulted in 22 individual components that could be part of a community paramedicine program. The components were grouped into four themes; enrolment, assessment and management, intervention and care, and collaboration. A high level of response from corresponding authors confirmed the presence or absence of components as defined. To the best of our knowledge, no other summary of community paramedicine program care planning components exists.

Due to the heterogeneity of research design and the fact that no single program included all 22 aspects of care planning, we cannot infer that any one aspect was a direct contributor to programs reaching or failing to reach their intended objectives. Furthermore, we cannot determine whether other aspects of care planning were missed or may be required. For example, we identified seven specific care partners that community paramedics collaborated with but it is expected that more than seven care partners could be involved in providing care—depending on the context of the program capacity or objective.

Paramedic involvement in care planning and case management builds on past reviews about community paramedicine and extended care paramedics (14–16,22). For example, one scoping study indicated that published literature on community paramedicine often focused on referral pathways (15). We decided to exclude articles focusing on referral pathways to focus on paramedics who were acting with expanded roles or extended scope in the process of developing care plans. The same study also excluded ECPs due to the responsive domains where they are often deployed (15). We decided to include these studies for two reasons. First, although these articles described paramedics practicing with expanded roles, their responsive nature was determined not to be to “emergency” situations. By this, we defined an emergency as an immediate threat to life or limb. Second, the role of ECPs has been adopted such that these practitioners are being utilized in non-ambulance settings within the UK (45).

Integration with the broader health care sector represents an important aspect for community paramedicine that aligns with the other studies that met the inclusion criteria. These roles represent a differentiated practice for paramedics from their traditional role as emergency responders to incidents that are theoretically isolated events (in spite of potential repeated use). The issue of repeated use and calls for issues that are not isolated events relates to another study that considered alternatives to traditional EMS dispatch and transport (16). Alternative to dispatch or transport is expected to be predicated on the absence of an immediate threat to life or limb (the same definition that we used for inclusion of ECP models of care). However, Jensen et al. identified the expanded paramedic role as one of a number of different interventions that have been evaluated as alternatives to transport (16).

Our findings provide guidance for future research by delineating the necessary assessments, interventions, and collaborations for alternative models of care. A previous systematic review and meta-analysis on the ECP model indicated that paramedics acting in ECP roles reduced transportation rate to the ED and increased discharge rates on scene but it was unclear whether this model reduced subsequent ED use (22). Patient safety and adverse events are often raised as concerns about alternate paramedic service delivery models (16) indicating the importance of care planning. In the case of care planning by ECPs, we found that this was addressed through a variety of collaborative relationships with other care providers. Primarily, the care planning conducted by ECPs appears to facilitate improved primary care just as much as providing ED avoidance. Our analysis...
showed that having on-call primary care physician conferencing available (31,34,37,47) was more common than having an on-call emergency physician available (21,41,45), which is the traditional medical oversight option for paramedics.

Clinical implications
Aspects of care planning that involved assessment and intervention varied between studies. This is not unexpected as paramedic education and certification varies between jurisdictions. However, considering the additional education that was provided to paramedics to allow them to practice in these expanded roles, the educational focus was placed on assessment of specific disease management and the treatments that would be provided. In some cases, this did not require any additional training beyond orientation to the purpose of the interventions being performed (32). Three articles described enhanced education that ranged from one to ten weeks with the upper level resulting in paramedics receiving a new designation of practice (31,41,45). Future work should consider scope of assessment, process for re-assessment, and process for physician consultation that guide paramedics practicing within new models of service delivery. Opportunity exists to draw on the aspects of care planning we have described to develop a standardized assessment for community paramedicine that captures the full breadth of paramedic observations, not limited to one specific disease management process.

In a previous scoping study of community paramedicine, O’Meara indicated that one of the weaknesses of the published literature was ambiguity towards “the theoretical underpinnings of the community paramedicine model” and uncertainty as to how community paramedicine “fits into the wider health care system.”(15) By investigating the aspects of care planning and by identifying collaborative roles, our findings can be used to reduce this ambiguity in future community paramedicine programs. The aspects of care planning described in Table 2 can serve as a framework for service providers to describe how future community paramedicine programs may be integrated within the broader health care system.

Limitations
Past reviews have pointed to the small number of published studies regarding community paramedicine (14,15,22). Although these reviews have indicated a favorable trend towards implementation of this service delivery model, the diversity of approaches taken and a lack of RCTs has led to difficulty in determining the strength of the evidence (14,22). This trend is continued here where only two trials and protocols for another two RCTs were included. The remainder of articles were either cross-sectional or retrospective cohort studies. While this may pose a limitation to developing the evidence base, the approach taken here can provide guidance to future research with respect to the factors that may be included in development of a service delivery model and the outcomes associated with the care provided therein. It is also noteworthy that RCTs may not serve as the most appropriate study design given the difficulties that would be encountered in processes of recruitment, randomization, and blinding.

The aspects of care planning included in Table 2 were not mutually exclusive, meaning that a community paramedicine program could incorporate all aspects of care planning that we described. We would not suggest that this should be considered as an indicator of program quality but that it could be an indicator of program comprehensiveness. In that regard, the most comprehensive program included 19 aspects (26) followed by another highly comprehensive program that had 18 aspects (47). Future work should compare program comprehensiveness and quality of care. The ability to standardize aspects of care planning in community paramedicine can facilitate this research by clarifying interventions and outcomes.

Qualitative and descriptive articles that were not included in this study may have implications with respect to the findings described. Other aspects of care planning were potentially described in these articles. Strategies for their evaluation could be adapted as they may offer valuable insight with respect to these practices that should not be discounted.
Conclusion

One definition of community paramedicine has referred to paramedics practicing with expanded roles or extended scope in non-traditional settings (15). Based on these findings, it may be necessary to consider a revised definition including patient enrolment, assessment, intervention, and collaboration that are included in these programs. New standards for community paramedicine define it as a model of care whereby paramedics can apply their education to provide immediate or scheduled primary, urgent and/or specialized healthcare to vulnerable patient populations by focusing on improving equity in healthcare access across the continuum of care (49).

The findings of this scoping study enabled 22 aspects of care planning in community paramedicine to be described. This provides a structured framework that can guide both service providers in the delivery of their care and researchers in defined outcome measures to be assessed. The findings show a continued evolution of community paramedic service delivery models. Subtle differences exist between ECP and community paramedicine models of care but our findings show that a great deal of common aspects of care planning exist between these two models. Most notably, all articles included collaboration with primary care providers. This presents an important avenue for future program development and research. It also implies that community paramedicine is aligned with the domain of primary care, as opposed to emergency medicine. By summarizing care planning within community paramedicine programs, ongoing program development can embrace collaboration with other care providers to help insure that patients receive the appropriate care.

Acknowledgments

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Supplemental File: Final search strategies for MEDLINE and CINAHL

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completed October 15, 2016
THE ELEPHANT IN THE ROOM

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Introduction

Packaging is an important part of transfer medicine.(1) Appropriate packaging in a “layered” manner is widely accepted as a safer way to move patients who may have various cables or tubes attached.(2)

In our practise we use modified ventilator airway tubing, approximately 0.5 metres in length with a slit down the longitudinal axis to contain these cables and/or tubes (Figure 1).

This tubing has become colloquially known as “Elephant tubing”. This tubing is typically used to contain ECG wires and medication giving sets.

The oxygen saturation probe wires and one intravenous access is typically left out during the transfer process in order to be able to access same (Figure 2).
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The authors would like to thank Ms. Anna Marie Murphy, National Adult Retrieval Coordinator, Mobile Intensive Care Ambulance Service, National Transport Medicine Program, and Dr. Jason van der Velde, Emergency and Prehospital clinician, Clinical Lead MEDICO, for their work as authors of MICAS/NTMP Standard Operating Procedure ‘Packaging the critically ill Patient’ and education programme for ‘Inter hospital retrieval / transfer’.

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