

## RESEARCH ARTICLE

# 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).<sup>(29)</sup> 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.<sup>(23-25)</sup> 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.

To what extent was the EFS a <b>simple</b> frailty assessment tool to use?		
<b>Very Difficult</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Simple</b>
How <b>accurate</b> do you believe the EFS was in assessing an old person's frailty?		
<b>Very Inaccurate</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Accurate</b>

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.

- 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.

Text box 1. Qualitative survey questions.

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.

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

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.

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**Appendix A**

To what extent was the EFS a <b>simple</b> frailty assessment tool to use?		
<b>Very Difficult</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Simple</b>
How <b>accurate</b> do you believe the EFS was in assessing an old person's frailty?		
<b>Very Inaccurate</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Accurate</b>
How <b>difficult</b> was it to learn to use the EFS to assess frailty in old persons?		
<b>Very Easy</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Difficult</b>
To what extent will the EFS be <b>relevant</b> in your future role as a paramedic?		
<b>Totally Irrelevant</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Totally Relevant</b>
Overall, how <b>useful</b> is the EFS for assessing frailty in old persons?		
<b>Useless</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Useful</b>
Approximately <b>how long</b> did it take to administer the EFS? _____ <b>minutes</b>		

To what extent was the GFI a <b>simple</b> frailty assessment tool to use?		
<b>Very Difficult</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Simple</b>
How <b>accurate</b> do you believe the GFI was in assessing an old person's frailty?		
<b>Very Inaccurate</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Accurate</b>
How <b>difficult</b> was it to learn to use the GFI to assess frailty in old persons?		
<b>Very Easy</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Difficult</b>
To what extent will the GFI be <b>relevant</b> in your future role as a paramedic?		
<b>Totally Irrelevant</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Totally Relevant</b>
Overall, how <b>useful</b> is the GFI for assessing frailty in old persons?		
<b>Useless</b>	<b>0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10</b>	<b>Very Useful</b>
Approximately <b>how long</b> did it take to administer the GFI? _____ <b>minutes</b>		