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Can using point of care blood tests help inform decision making in patients over 65 presenting with acute frailty syndrome?

We aim to improve the decision making for common frailty conditions by introducing point of care (POCT) blood tests into the emergency services. We aim to improve patient discharge on scene and re-contact rates as well as increase clinician confidence.

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Summary

The national 'see, treat and discharge' rates for paramedics has increased however, despite this increased demand on paramedic decision making there have been limited improvements to pre-hospital diagnostics. Patients over the age of 65 years presenting with acute frailty syndromes are a notably complex clinical patient group for which informed risk stratification in clinical reasoning is paramount.

This was a single site quality improvement project using Point of Care blood testing to help inform decision making for patients >65 presenting with acute frailty syndromes.

Results from this quality improvement project into the use of Point of Care testing (POCT) showed a self-reported improved confidence in clinician decision-making and patient disposition. This confidence was validated by improved discharge on scene and re-contact rates. An unintended outcome of the project was the accumulation of practical knowledge on the use of POCT in the pre-hospital arena. These results show promise for the on going use of POCT in the pre-hospital environment, however are not without limitations. Pre hospital services wishing to implement POCT should focus on correct demographic identification and training and interpretation of results.

- Point of care testing is an emergent theme for emergency services but to date there is limited published evidence on its use within this environment.
- Patients presenting with acute frailty syndromes can present clinically complex decisions regarding onward care and referral.
- This Quality improvement project aimed to improve clinician confidence and decision making for patients presenting with acute frailty syndromes.
- During its implementation many lessons were learnt regarding the use of POCT in the pre hospital emergency care environment that may be useful for other services considering POCT.
- The results of the project showed promise for the on going use of POCT and the field of frailty.
- The overall result of the roll out scenario is a net saving of £50,159. With 696 patients treated over this period, this gives a net saving per patient of £72 and gives a ROI for this scenario of: 4.6.

Introduction

Point of care blood testing (POCT) is an expanding worldwide market[13] that has become an established part of service improvement proposals within the NHS to reduce Emergency Department (ED) times, length of hospital stay and improve illness prevention schemes[14]. In the United Kingdom (UK), Point of care International Normalised Ratio (INR) testing in primary care has been a topic of research since the early 1990's[11] and point of care lactate monitors are being trialled for early sepsis guided therapy[15]. UK ambulance services have been identified as a service that would benefit from POCT to guide patient management and care pathways [9.10,13] however there is little published evidence on the uses, benefits and health economics of POCT in the pre-hospital environment. This paper will discuss a quality improvement project utilising POCT to aid decision-making in patients over the age of 65 presenting to South Central Ambulance service with acute frailty syndromes.

The national 'see, treat and discharge' rates for paramedics has increased since the 'Taking healthcare to the patient' report in 2005[8] with discharge on scene rates rising by 4% over the last 6 years[18]. However, despite this increased demand on paramedic decision-making there have been limited improvements to pre-hospital diagnostics. The committee on diagnostic error in healthcare[6] identify diagnostic testing as an integral part of the diagnostic pathway and note that a clinician's ability to risk stratify can be affected by access to results.

Patients over the age of 65 years living with frailty are a notably complex clinical patient group[3] for which informed risk stratification in clinical reasoning is paramount. This patient group can present to the ambulance service with acute frailty syndromes that require careful assessment and management to avoid loss of independence, function and medical deterioration[16]. The combination of reduced diagnostic aids and clinical complexities in this patient group has potential to increase the risk of poor decision-making and negative patient outcomes[6]. In the ambulance service this may translate into unnecessary admissions to the Emergency department (ED) or deterioration after discharge on scene. Point of care blood testing is a natural addition to the diagnostic repertoire of a paramedic due to its common use within standard referral sites such as emergency departments and primary care services.

Acute frailty syndromes are defined as seemingly benign symptoms that can mask serious underlying illness. These are identified as falls, immobility, confusion/delirium, incontinence and susceptibility to side effects of medications[3].

Falls are the most commonly encountered acute frailty symptom within the ambulance service[7]. In the older person, falls are typically multifactorial and consideration should be given to environmental causes, underlying illness, polypharmacy, neurological impairments, gait and balance decline and visual impairments[16]. Whilst the comprehensive geriatric assessment and falls risks assessments can be carried out in the absence of laboratory results[4], it is important to identify health problems that may increase the risk of falling[16]. Altered or deranged laboratory results may indicate medications side effects or underlying illness[2].

Observation from practice identifies that patients with frailty in the emergency department are commonly investigated with basic blood tests, ECGs, observations and physical examination. In the absence of blood tests in the

pre hospital environment staff may be susceptible to over sensitive triage of this patient group, which in turn can contribute to inappropriate admission[21]. Admission to hospital results in poor functional outcomes for patients living with frailty[4] thus increasing the need to avoid unnecessary admission from the pre-hospital environment. This knowledge provided the basis for formulation of this quality improvement project.

Horizon Scanning

Results of a preliminary literature search revealed that there is a paucity of evidence documenting the use of point of care blood testing devices in the out of hospital environment[9,10,13]. The most notable use of pre-hospital point of care testing is the Labkit® Near Patient Diagnostics service tested with Surrey pathology services and South East Coast ambulance service. This project involved a three-phase trial that researched effective functionality, pre-hospital suitability and impact on patient management[20], the outcomes of which are unclear. To date, there have been no peer-reviewed publications of this project to guide the use of POCbT in future projects.

Di serio et al [9,10] conducted two separate trials into the use of POCbT in pre hospital services in Germany. The first using i-STAT troponin I to facilitate the early identification of Non ST Segment Elevation Myocardial Infarction (NSTEMI) and the second to monitor critical care patients during Helicopter Emergency Medical Services (HEMS) transfer to hospital. The troponin study found the POCT results to be accurate but not diagnostic due to the common requirement for serial troponin monitoring in hospital[9]. The second study into use of POCT on HEMS inter hospital transfers identified a need for transfer of real time results to achieve patient benefit[10]. Both studies lack transferability to the UK pre-hospital see and treat model due to their focus on critically ill patients whose trajectory of care is pre-determined by their potential or realised illness.

Current projects using POCT include the Oxford Academic Health Science Network (AHSN) collaboration with Oxford Health NHS Foundation Trust using POCT in the out of hours primary care environment, ambulatory units and emergency medical units[14]. And numerous other pre hospital services who anecdotally report using POCT throughout the UK but have not published evidence on their experiences or findings for wider learning.

Evaluation of i-STAT Alinity device

Oxford AHSN provided the devices and cartridges for the evaluation. We assessed the impact on safer discharges, earlier disease management and increased clinician confidence.

Only trained operators used the Abbott iStat for patients over 65 presenting with a complaint of falls or immobility or confusion and had an uncertain disposition post standard examination.

The project aimed to improve pre-hospital diagnostics for patients presenting to the ambulance service with acute frailty syndromes. It was hypothesized that access to certain blood results would increase the ability to make safe and confident discharges while also ensuring that altered biochemistry could be investigated appropriately either by primary care providers or emergency physicians.

The main objectives were:

- Safer discharges (measured by re-contact rates and results affecting decision-making)
- Earlier disease management (measured by onward referrals and hospital length of stay)
- Increased clinician confidence (measured by self report in response to qualitative questions)

This was a single site quality improvement project implemented from September 2017 to March 2018 within an NHS ambulance service. Four specialist paramedics and four frailty paramedics were trained in the use of the Abbot *i-STAT Alinity* with CRG4+ and CHEM8 cartridges providing Venous blood gas (VBG), Urea and Electrolytes (U&Es), lactate, Haemoglobin and Haematocrit.

Patients were eligible for inclusion if they were >65 years old with a presenting complaint of Falls OR immobility OR confusion and had an uncertain disposition post standard examination. Patients were excluded from POCT if their care pathway was clear from standard examination or in cases where POCT would not make a difference to onward care or decision-making.

Trained staff could use POCT during their normal duties for any patient that met the inclusion criteria or could receive referrals. In addition to use on day to day SP rotas the *i-STAT Alinity* was used weekly on a falls and frailty response service due to its ability to attract the required demographic and increase the impact of the QIP.

Staff were trained in the use and interpretation of results from the device. Reference ranges compatible with local pathology services were programmed to the *i-STAT Alinity* with abnormal and critical results differentiated. Abnormal ranges automatically highlighted amber whilst critical results were highlighted red. In recognition of normally abnormal biochemistry and haematology in this patient group, access to the Berkshire Integrated Clinical Environment (ICE) portal was obtained to compare pre-existing results. Access to GP advice provided a safety net to the learning process of results interpretation and staff were encouraged to use this. Results were recorded on ambulance service electronic patients records (EPR) with verbal handover to hospital or primary care clinicians.

Staff completed an online survey after each use of POCT answering the following questions: *1 - Patent gender, 2 - Presenting complaint, 3 - Was there uncertainty about patient disposition prior to POCT? if not why were bloods done? 4 - Did POCT assist decision-making? If No, why not? 5 - Where any laboratories abnormalities discovered? If yes, did these require action? If yes, what action was taken? 6 - Patient disposition? Home/ED/GP referral and home/GP referral and ED, 7 - Overall to you feel that access to POCT results improved your (or your colleagues) confidence in disposition?*

Prior to the pilot/evaluation start date, laboratory staff at the John Radcliffe Hospital validated and set up the device carried out the installation with connectivity to LIMS & EPR; full documentation was written including standard operating procedures, and training and establishment of staff competency.

Results

The quality improvement project recruited 78 patients aged 65 years to 97 years (Average 85 years old). Gender was female 51.3% (n=40) and male 48.7% (n=38) with 79.5% (n=62) of presenting complaints being attributed to falls. Clinicians reported uncertainty in disposition 85.6% (n=67) of the time prior to POCT with decision-making being improved in 84.6% (n=66) of cases and improved confidence in disposition reported in 75.6% (n.59) of cases.

Results outside of reference ranges were found in 55.1% (n=43) of the cases with 53.5% (n=23) of these requiring clinical referral or action, of which 60% (n=14) required transportation to the emergency department with the remainder receiving a primary care or outpatient frailty specific referral. Outpatient frailty referrals were to a falls clinic, Parkinson's specialist team or a rapid access clinic for the older person. Patients admitted to the ED were all subsequently admitted under specialty into hospital with a mean length of stay of 4.4 days (range 1-29days) whilst those discharged on scene had a 5.1% (n.4) rec-ontact rate within 48 hours, a 11.5% re-contact rate within 7 days. Discharge on scene and re-contact rates from the 2016 falls and frailty response project without POCT were on average 49.7% for discharge on scene with a 7 day re-contact rate of 14.7% [5].

Outcomes

Results from this quality improvement project showed a self-reported improved confidence in clinician decision-making and patient disposition. This confidence was validated by improved discharge on scene and re-contact rates, and by patient onward management post referral. These results show promise for the on going use of POCT in the pre-hospital environment however are not without limitations and should not be interpreted at face value.

CASE 1

An 84-year-old female with learning difficulties, HTN and osteoporosis presenting with an explained fall in the early hours of the morning*. On initial assessment the patient was uninjured, fully mobile, alert and orientated with a slightly raised respiratory rate and SP02 OF 88%. Initial thought was given to providing oral antibiotics and discharging on scene however POCT results when compared with results taken 10 days earlier (via the ICE portal) revealed a Na lowered to 122 from 136, a Hb lowered from 128 to 82 and respiratory acidosis with metabolic compromise. With these new findings it was deemed necessary to admit the patient to the emergency department to investigate the underlying cause of these acute findings. The patient was subsequently admitted to the medical team from ED who provided positive feedback regarding use of POCT on this job.*

The results yielded a high percentage of reported increased confidence and improved decision-making throughout the project. The yes/no format to measurement of confidence may overstate the overall improvement however only limited cases reported no increase in confidence. Results may also have been affected by trained staff becoming acclimatised to the use POCT and therefore become reliant on results to maintain the same threshold of confidence in discharge.

CASE 2

A 92-year-old female presented to the ambulance service after a non-injury fall. *She was seen by an ambulance crew who referred to the falls car as the patient was a regular faller and did not appear to have had any input from the falls team and did not have any package of care. The crew had discovered a BP of 218/98 however the patient had refused admission. On examination her BP remained elevated, but the patient was asymptomatic and POCT discovered a Hb of 84. The patient was reporting some fatigue but no heart failure symptoms and had not had a full blood count since 2015. A referral was made back to her GP who advised an increase in BP medication and booked a review of Hb. We saw this lady again a few months later due to another fall, her BP was now managed within normal limits and her Hb had improved.*

A significant number of tests returned results outside of reference ranges but not all required clinical action or referral. Those that did not require action were results that could be confirmed as normally abnormal or could be explained by previous medical history and comorbidities. Interpretation of results required complex clinical decision-making and should be the focus of any further projects utilising point of care bloods in the pre-hospital environment. For example, identification of a respiratory acidosis may be attributed to a chronic condition such as COPD or may be attributable to a severe pneumonia[10] each requiring a different pathway of care.

Whilst there is a perceived improvement on discharge on scene and re-contact rates when POCT was utilised it would be difficult to determine causation due to cofounding variables such as targeted patient selection, partnership with the falls and frailty response scheme and advanced assessment and clinical reasoning of the specialist paramedic role.

CASE 3

An 87-year-old female presenting with her second fall within a week. *Her observations and physical examination were within normal limits however family were concerned about her recent increase in falls. Point of care bloods revealed a metabolic alkalosis with mild hyponatraemia secondary to indapamide use for hypertension. This patients GP was contacted and the patients indapamide stopped for a short period of time with repeat bloods in the community scheduled. In addition, the patients' blood pressure would be reviewed whilst stopping the indapamide. This patient did not contact the ambulance service within the next month.*

Anecdotally, cases that showed the most benefit from the use of POCT were those that involved patients with significant cognitive impairment or those that were uncooperative to thorough physical exam or history taking. Clinicians reported that the combination of biochemical and haematological markers with history, observations, ECG and physical exam more accurately identified patient acuity thus assisting decision-making. Cases that did not benefit from use of POCT were those that required assessment of infection and the identification of sepsis. Due to the lack of inflammatory markers (White Cell Count (WCC) and C-Reactive Protein (CRP)) in the *i-STAT Alinity* assays these cases often returned normal results yet had a high re-contact rate. Lactate in these instances was not useful due to its indication of hypo perfusion instead of inflammation and as such was only raised in septic shock[1]. Due to this recurrent theme staff were advised not to utilise POCT to assist decision-making in these cases.

CASE 4

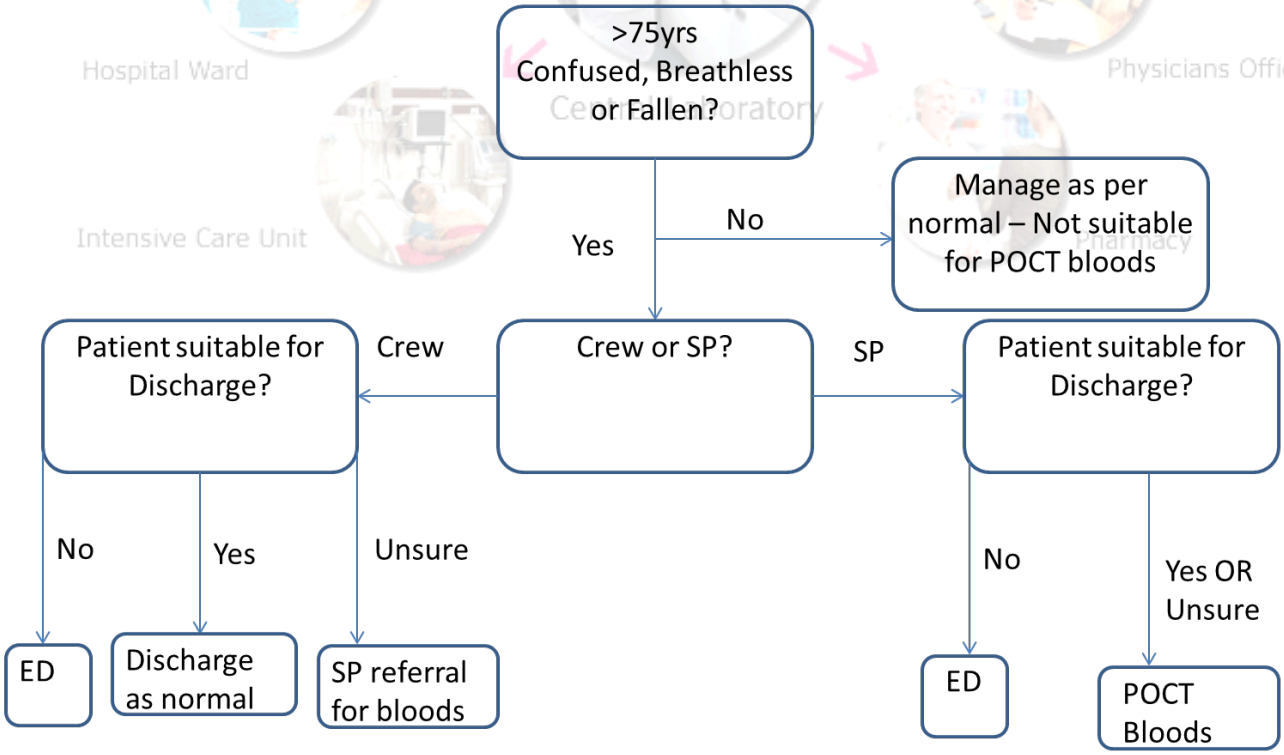
Crew referral for point of care blood tests and 'falls and frailty car'. *This 94 year-old female patient with dementia had an unknown length of time on the floor after being found by carers on the floor in the morning. Due to known vascular dementia the patient had no recollection of the fall but was uninjured, mobilising as normal and had no clinical signs, symptoms or history making her high risk for collapse of unknown cause. Carers stated that patient has previously not had good experiences with admission. Under normal conditions in the absence of point of care blood testing this patient would need conveying for CK levels to exclude acute kidney injury secondary to rhabdomyolysis from the long lie. Point of care bloods enabled us to compare Creatinine levels with a recent result (1 week earlier) and apply the RIFLE criteria for acute kidney injury. As there was no acute rise in creatinine a GP referral was made to do a repeat set of renal function bloods to ensure no changes to this.*

Considerations

An unintended outcome of the project was the accumulation of practical knowledge on the use of POCT in the pre-hospital environment for dissemination to other services wishing to implement similar projects. Specific areas that should be considered by these services are the initial set up, maintenance of the device and cartridges, correct demographic identification and training and interpretation of results.

Initial set up should ensure that action ranges are consistent with local hospitals and pathology laboratories to avoid inappropriate referrals. Highlighted action ranges are recommended as they assist in quick interpretation and reduction of human factors errors. For the benefit of data gathering and avoidance of duplication of investigations the *i-STAT Alinity* should have access to a network when docked for charging with results transmitted to a local pathology.

During project development, the target demographic should be carefully considered to maximise health economics. This project aimed to facilitate discharge on scene and/or earlier disease recognition to reduce the overall cost of care. With the initial financial outlay of device cost and the on going costs of cartridges it is unlikely that the addition of any POCT device to all ambulance vehicles without targeted demographics will be a realistic future aim. The use of specialist services such as specialist paramedics, team leaders, clinical mentors or critical care paramedics may target its use sufficiently without defining the patient demographic too closely.



Maintenance of the device, cartridges and project pose logistical challenges for pre-hospital services. The *i-STAT Alinity* requires a device temperature of >15 degrees Celsius to operate which can cause some delays on scene during the winter months. In addition, cartridges must be kept strictly between 2-8 degrees Celsius for storage and,

once warmed to room temperature prior to use, have a reduced expiry time (CRG4=2 months, CHEM8+= 14 days) and cannot be returned to cold storage. This could pose problems for ambulance stations who may not have a secure temperature monitored fridge that could be used.

Finally, appropriate training and interpretation of results significantly affects the outcomes of patients and the project. Access to pre-existing results is invaluable to the adequate interpretation of patients results and clinicians should have access to senior medical advice during the use of POCT.

Economic analysis

York Health Economics Consortium (YHEC) carried out an economic analysis of this pilot. The aim of this evaluation is to inform a business case to demonstrate the value of POCT to the local Clinical Commissioning Groups (CCGs). The evaluation is a cost-consequences analysis with results expressed as cost savings per patient. A return on investment was also calculated, based upon the incremental costs of the intervention.

Methods

The Specialist Paramedic Practitioner (SPPs) participating in the POCT pilot filled in a data capture form for each patient. This form was designed by SCAS to provide data for the evaluation of the pilot, including the economic evaluation.

The key measures that indicate a benefit from the use of POCT were defined as:

- Hospital avoidance – measured as the number of times POCT confirmed discharge when clinicians were unsure in prior assessment;
- Safer discharge – measured as reduction in re-contact rates (48 hours and 30 days) and reduction in hospital stays;
- Earlier disease management – measured as the number of detected abnormalities requiring correction (presumed to be missed in the absence of POCT);
- Clinician confidence – measured as improved reported confidence levels when using the iSTAT device.

On completion of the pilot, the full data were provided to YHEC who have undertaken an analysis to identify the impact on these indicators and to assign appropriate economic values to them. The economic values were taken from recognised sources, such as the national Payment by Results tariffs for ED attendances and hospital admissions and staff costs reported by the PSSRU Unit Costs of Health and Social Care.

In the case of hospital avoidance, it is assumed that this includes avoidance of ED attendance and avoidance of hospital admissions that may result from ED attendance. In the case of safer discharge, re-contacts were recorded during the pilot as occurring within 48 hours and 1 week, as opposed to 48 hours and 30 days, as specified in the original statement of indicators, cited above. For comparison with standard practice, data were provided by SCAS from the Reading, Newbury & Bracknell area, on patients who presented with falls, from December 2016 and February 2018. These data include categorisation of the number of patients treated on scene and the number conveyed. For the same period, the number of patients who re-contacted the service are also included. To avoid the potential bias from including two winter periods, one year of data was used in the analyses (February 2017 to February 2018). Data was also provided by SCAS on a Falls and Frailty Response pilot, which involved SPPs and an Occupational Therapist and which targeted patients over 65 who had had falls. The data on this pilot were reported in August 2016. Data on the costs of running the pilot, including the costs of the POCT device and the cartridges, were obtained from SCAS.

Costs

A total of eight SPPs were trained in the use of the iSTAT device. Formal training is estimated to take about half a day. SCAS provided a cost of £18 per hour for SPPs. However, as staff on Band 6 of the Agenda for Change pay scales, the full cost, including salary on costs and overheads, is given elsewhere as £43 per hour. Other costs for the pilot are: the iSTAT device; the two types of cartridge; and a fridge. The cartridges are purchased in batches of 25, but the cost per cartridge does not change with the number of batches purchased. These costs are incorporated in the table 1, showing the full estimated costs of the pilot.

Table 1. Costs of the POCT pilot

	Unit cost (£)	No. of units	Total (£)
iSTAT device	6,500.00	1	6,500.00
Fridge	100.00	1	100.00
Chem8 Cartridges	5.48	77	421.96
CRG4+ Cartridges	3.32	77	255.64
Sub-total device costs			*7,277.60*
Training 8 SPPs [a]			1,204.00
Total cost of pilot			***8,481.60***

This gives a cost per eligible patient seen in the pilot of £110.15. It is assumed that all of these patients were tested using POCT, despite seven cases where it is stated that there was no uncertainty about patient disposition prior to testing.

Outcomes

Economic costs and benefits for increasing numbers of SPPs:

This pilot was carried out by three SPPs, whereas eight had been trained, indicating that a larger scale roll out of the programme would be sought in future. Using the costs and benefits identified in this pilot, it is possible to calculate what the results would be of a pilot with larger numbers of SPPs, but with all other elements the same.

The benefits from greater scale can be expected to increase in linear fashion, with a stable benefit per SPP. The costs, on the other hand, will not all vary in the same way. Running costs (such as Chem8 and CRG4+ cartridges) will increase in a linear fashion, but the set-up costs (the iSTAT device, the fridge and the training) will not. The Project Lead in SCAS has indicated that one iSTAT device can be used by 4-6 SPPs. Assuming an average of five SPPs can use each device, a new one will have to be purchased for each sixth user. The iSTAT device is the highest cost item in the project set-up resulting in a marked stepped cost profile as the pilot increases in size. As the iSTAT device is shared by more SPPs, the cost per use decreases to the point that break-even is just about reached, before a new device has to be purchased to continue increasing the size of the pilot.

Economic costs and benefits for increasing pilot length:

The pilot ran from 25/09/2017 to 06/03/2018, which means that the start-up costs were apportioned over a period of just under six months. If the pilot were extended over a longer time period, the apportioning of these costs would result in a lower cost per case. This indicates that, with the same resources used in the pilot, the result would become a net saving, once it had been underway for around eleven months. This is due entirely to apportioning the start-up costs over a longer period and, consequently, a greater number of patients.

Economic costs and benefits for increasing patient contacts:

The average number of patients seen per SPP per week in this pilot was 1.12. This may be lower than the number of relevant patients that a SPP would typically see for a number of reasons. Pilots often take time to bed in and work at the level they would when a programme is fully rolled out and established. This indicates that the pilot would have produced a net saving from a patient contact level of 2.3 patients per SPP per week, on average. In other words, if a total of 159 patients had been seen in the pilot.

Impact of different percentages of admissions that are emergency impatient admissions:

The cost of admissions from ED attendances used was £617, based on 'non-elective short stay'. In general, avoidable admissions are likely to be short stay, but in the case of older people, even a relatively minor cause for admission can

result in a longer stay in hospital. As a result, a proportion of these admissions are likely to have a higher cost. To test the impact of this, a percentage of admissions from ED are assumed to be 'emergency inpatient admissions', which have a cost per case of £3,058. This figure indicates that the pilot would produce a net saving if just under 25% of admissions from ED were emergency impatient admissions, with the remainder being non-elective short stay admissions.

Net Economic Impact of a Roll-out Scenario:

To assess the combined impact of the parameters that have been tested above, a scenario has been created to understand the combined impact on costs and benefits. This simulates what the roll out of the programme might look like, using what we believe to be realistic, but conservative, values for each of these four parameters, while maintaining all other characteristics stable. Using these values, the roll out scenario would result in a total of 696 relevant patients being seen over the year.

Parameter	Value used in the scenario	Rationale
Size of the programme	8 SPPs	The original intention of the pilot was to use 8 SPPs
Length of the programme	1 year	A conservative time period over which budget savings may be sought
Patient contacts per SPP per week	1.5 patients	A conservative increment on the number in the pilot
Percent of admissions from ED that are 'emergency'	15%	A conservative estimate given that patients are elderly

The same costs and benefits analysis has been undertaken on this scenario as was done for the pilot. The overall result of this scenario is a net saving of £50,159. With 696 patients treated over this period, this gives a net saving per patient of £72. Using the costs and savings above, this gives a ROI for this scenario of: 4.6.

Savings from avoided ED attendances	£77,265
Savings from safer discharge [a]	-£13,174
Total savings	£64,091
Total cost of the scenario	£13,932
Net result	***£50,159***

The results from the pilot of the POCT used by SPPs show a moderate improvement in the avoidance ED visits. There is a moderate decrease in safer discharge, although there is less certainty about the robustness of this. Combining these with the costs of the pilot results in a small net cost, with a ROI of 0.54.

Modifying some of the parameters in the pilot, to a conservative estimation of what would happen if the programme was rolled-out, results in a net saving and a ROI of 4.6. The results would most likely show a net economic benefit with reasonable increases on any one of three out of the four parameters tested: the duration of the pilot; the level of patient contacts; and the proportion of hospital admissions that would be emergencies. The impact of changing the fourth parameter (the size of the pilot) varies according to the exact value of the parameter, but does not show an overall improvement or worsening over the long term.

It has not been possible to calculate the economic benefits of earlier disease management. Physician confidence has clearly increased, but there is no, immediate, economic benefit to this.
The scenario for roll out was designed to be plausible. However, the high level of attrition of SPPs may make this uncertain. At the least, there may be higher training costs than used here to account for attrition. These are modest, however, and would not change the overall net benefit of this scenario.

The biggest uncertainties, which may have a significant impact on the result, are the percentage of ED visits that result in admissions and the percentage of these admissions that are emergencies rather than simpler, short stay admissions. For the latter, a conservative estimate has been used for the roll out scenario, so the results may well under-estimate the net benefit of rolling the programme out.

The costs of SPP time have not been included in the calculations. This is because the evaluation is based on a cost-consequences analysis, comparing the pilot to 'standard care'. It is assumed, therefore, that the SPPs would be employed by SCAS in any case, with the same employment costs.

The iSTAT device is the biggest single cost item by far. In the analyses presented here, purchasing more units will result in big step changes in total costs if the scale of the pilot is increased. If there is any way in which a single device could be used by more SPPs, or if there were a possibility of agreeing discounts for multiple purchases with the provider, then a better cost profile could be achieved for an expanded programme.

The increase in re-contacts in the pilot is of some concern. It is not entirely clear from the data if some of these have been double-counted in the analysis. By the same token, some of the reported re-contacts may have been for unrelated episodes and therefore do not reflect unsafe discharge.

Conclusion

Patients >65 presenting with acute frailty syndromes (confusion, immobility and falls) can be a clinically challenging cohort of patients and as such might be transported to hospital for further assessment and monitoring. The British Geriatric Society notes that frailty syndromes can mask serious underlying illness and as such these patients require comprehensive investigation. The investigation of patients with frailty in the emergency department typically involves blood testing, thus creating an inequality of care between in hospital and pre hospital patients.

In conclusion, this quality improvement project showed POCT to have a positive impact on appropriate patient disposition, clinician confidence and earlier disease management. The projects results, whilst taken from a small sample size and show promise for the on going implementation of POCT in both the pre-hospital environment and in the field of frailty. Dissemination of these learnings aims to lead to on going and improved use of POCT within other pre-hospital services ultimately leading to better patient care and outcomes, improved referrals and greater cost benefit to the services using them.

- 78 patients aged 65 years to 97 years (Average 85 years old)
- Gender was 51.3% (n=40) female and 48.7% (n=38) male
- 79.5% (n=62) of presenting complaints being attributed to falls
- Clinicians reported uncertainty in disposition 85.6% (n=67) of the time prior to POCT
- With decision-making being improved in 84.6% (n=66) of cases and improved confidence in disposition reported in 75.6% (n.59) of cases
- Results outside of reference ranges were found in 55.1% (n=43) of the cases with 53.5% (n=23) of these requiring clinical referral or action
- 60% (n=14) required transportation to the emergency department with the remainder receiving a primary care or outpatient frailty specific referral
- Frails & Fragility Response Scheme (Sept 16 – Feb 17)
    - Discharge on scene = 49.7% and 14.67% re-contact within 7 days
- POCT QIP (Sept 17 – Feb 18)
    - Discharge on scene = 82.1% and 11.5% re-contact within 7 days
- The overall result of the roll out scenario is a net saving of £50,159. With 696 patients treated over this period, this gives a net saving per patient of £72 and gives a ROI for this scenario of: 4.6.

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