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A pilot study to identify elderly patients with cognitive impairment for clinical pharmacist polypharmacy review in General Practice

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ABSTRACT

Background: Polypharmacy in elderly patients is common with potential for harm. Cognitive impairment is postulated as the biggest contributor to poor medication management with increased risk of hospital admission. There is limited information about approaches to identify high risk patients for polypharmacy review.

Objective: Pilot study to determine if a new patient prioritisation tool would identify appropriate patients for pharmacist polypharmacy review.

Method: Prioritisation tool developed to rank community-dwelling elderly patients prescribed 10 or more medications with cognitive impairment for pharmacist polypharmacy review. Tool used General Practice (GP) appointments, Emergency Department attendances, repeat medications and cognitive impairment to create a score to prioritise review invitations. Reviews were completed by GP clinical pharmacists who recorded interventions and measured outcome assessments using the adapted RiO scoring tool.

Results: Polypharmacy reviews completed for 34 patients from three GP practices. Demographic results were 62% female ($n = 21$), median 78 years [IQR 72–80], median 3 comorbidities [IQR 2–4] with most reviews conducted face-to-face ($n = 29$; 85%). Pharmaceutical care interventions were hospital admission possible or likely prevention for the majority of patients (85%, $n = 29$) which contrasts with the historical level of 33% ($n = 228$) patients with traditional processes.

Conclusion: Pilot study demonstrated that the new tool identified appropriate patients for review prioritisation as patients had complex pharmaceutical care needs.

1. Introduction

Polypharmacy is common in older community-dwelling patients, with a reported prevalence ranging from 10% to 90% as described in a systematic review by Khezrian et al. (2020).¹ The Kings Fund defined polypharmacy in 2013 as taking 10 or more medications which may be appropriate or inappropriate.² Polypharmacy contributes to challenges in managing medication safely and potential or actual harm may be experienced.^{1,2} Recoche et al. (2016) demonstrated a high incidence of inappropriate prescribing in frail elderly patients and regular polypharmacy reviews were recommended to overcome this issue.³ Rolland et al. (2014) state that “polypharmacy is related to cognitive decline and delirium and patients with cognitive decline have decreased self-management skills”.⁴ Reducing inappropriate polypharmacy may increase adherence.⁵ A national Australian study (2016) reviewed patients aged over 70 and when stratified according to frailty, demonstrated delirium as the only adverse outcome associated with polypharmacy.⁵ However, increased frailty was associated with adverse outcomes. Wauters et al. (2016) reviewed 503 older patients

aged 80 and over and found a correlation between medications underuse (using computerised STOPP-START criteria) being associated with increased mortality and hospitalisation.⁶ Polypharmacy reviews should consider both inappropriate medication prescribing and appropriate medications that may not be prescribed, defined as underuse.⁶ The Scottish Government's polypharmacy guidance defines polypharmacy review priority patients as aged 50 years or older and living in a care home, approaching the end of their lives, prescribed 10 or more medications, and on high risk medications irrespective of the overall number of medications.⁷

A common assumption is that the number of prescribed medications or the medication regimen complexity is the main determinant of the patient's ability to comply with their intended schedule. The Medication Regimen Complexity Index (MRCI) is a validated tool to quantify medication regimen complexity which is postulated to be associated with unscheduled hospital readmissions in elderly patients.⁸ Schoonever et al. reported MRCI usage did not correlate with hospital admission prevention.⁹ This conclusion was supported by a systematic review published in 2017 which reported equivocal findings,¹⁰ however a systematic review published in

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2018 by Alves-Conceição¹¹ refuted these findings. Back in 1999, Edleberg et al. in a United States of America study, reported cognitive function decline resulted in the loss of independence with medication taking.¹² Furthermore, Advinha et al. (2016) completed a systematic review which confirmed that, with increasing cognitive impairment, there is an associated reduction in ability to self-manage medications.¹³

Thus, patients with cognitive impairment may find managing medication an increasingly difficult task.¹⁴ Failure to manage medication is thought to be the most important indicator for inability to cope at home leading to hospital admission.¹⁵ Pharmaceutical care service provision to elderly patients is often constrained by limited staff resource as the number of patients who might benefit exceeds clinical pharmacy staff capacity. Therefore, it is important that pharmaceutical care provision targets patients appropriately.

Patient prioritisation tools (PPT) have evolved for use in a variety of healthcare settings. A systematic review by Dery et al. published in 2019, identified a lack of clarity in PPT development, validation and implementation but nevertheless demonstrated multiple uses.¹⁶

A survey in 2020 of United Kingdom hospital pharmacy services by Abuzour et al. indicated more than half of surveyed hospitals used PPT to prioritise clinical pharmacy services.¹⁷

General practice electronic health records contain clinical and medication information relating to individual patients. A PPT, the Enhanced Medication Summary (EMS), is used to identify patients for polypharmacy review based on several criteria including number of prescribed medications, risks associated with individual medication, and blood result. The EMS tool was developed in NHS Ayrshire and Arran in collaboration with the University of Dundee. A limitation of the EMS tool was the lack of information about the patient's cognitive function and frequency of recent healthcare access.

Therefore, the development of a new PPT, called the APACE tool (Ayrshire Polypharmacy Attendance and Cognition Evaluation) which included not only polypharmacy and cognitive function but also recent attendances at GP practices and Emergency Departments would in theory identify a cohort of patients with unmet healthcare needs. Accessing and collating pertinent information to produce a score would enable patients to be ranked in priority order for polypharmacy review.

The aim of this pilot study was to determine if a newly developed APACE PPT would aid patient prioritisation for pharmacist polypharmacy review by identifying patients with complex pharmaceutical care needs due to a combination of polypharmacy and cognitive impairment.

2. Methods

2.1. Design and setting

The pilot study used an experimental design and was set in a Scottish Health Board Area which serves a population of 367,000 and is provided health care by 53 GP practices. Each GP practice has an associated General Practice clinical pharmacist (GPCP). The GPCP delivers pharmacotherapy services which includes polypharmacy reviews for patients registered to the GP practice. The targeted population was community dwelling older patients with concomitant cognitive impairment. The study was conducted during June 2018 to March 2019. The APACE PPT was developed collaboratively between the primary investigator and the Health Board Primary Care Information Manager. The tool incorporated four patient criteria: their number of GP attendances in the last 12 months; their number of Emergency Department attendances in the last 12 months; their polypharmacy [10 or more active repeat medications] and their documented cognitive impairment. Patients with cognitive impairment were identified using standard diagnostic codes documented in the patients' general practice record; dementia, cognitive decline, impaired cognition and/or delirium.

The information manager ran the tool for the specified GP practices. The tool provides a list of patients for an individual GP practice in ranked priority order in accordance with the four outlined criteria; the patient with the

highest cumulative score at the top of the list. Additionally, the list documents the date of any previous polypharmacy review, number of comorbidities and the patient's frailty score.

The primary care Lead Pharmacist was asked by the principal investigator to identify three GPCPs to participate in the study. The list generated by the APACE PPT was tested at 1GP practice by 1 GPCP before being used at the other two pilot sites.

The information manager emailed the list of patients produced by the tool to the GPCP, who used the list to prioritise patients for formal polypharmacy review. No additional training was required by the GPCP. Any patient who was eligible for a face-to-face polypharmacy review was eligible for study inclusion.

The identified patients were invited by the GPCP to participate in the project and were informed that participation was voluntary and that they could withdraw at any time without impacting on their existing care provision. Polypharmacy reviews are part of routine care at GP practices so the patients did not require to complete a consent form.

The GPCP completed a formal polypharmacy review in accordance with the Scottish Government 7 step plan and provided pharmaceutical care with signposting to other services, as required.⁷ A copy of the 7 step plan is provided in Table 1.

The existing polypharmacy digital tool (EMS) was used, where available, to complete the polypharmacy review, otherwise a handwritten form was completed. The patients were requested to attend with a family member or carer due to cognitive impairment. Medications were amended as appropriate using a person-centred shared decision making approach. Patients and/or their carers were provided with aids to improve medication adherence in response to identified issues. Pharmaceutical care was provided in single or multiple appointments dependent on individual needs.

There is limited published evidence to enable the measurement of patient outcomes directly attributable to pharmaceutical care interventions.¹⁸ The adapted RiO scoring tool has been used in several studies.^{19,20} This is, as yet, a non-validated health intervention outcome scoring tool which requires a qualitative assessment of each intervention and allocation of a score to determine the possible outcomes of the intervention on either hospital or care home admissions. Analysis of pharmacy interventions on likely hospital or care home avoidance was assessed using the adapted RiO scoring system (Table 2).²⁰ After completion of the study, GPCPs were asked to provide informal feedback regarding the patients identified by the APACE PPT to confirm or refute patient suitability, obtain any patient/carer feedback provided during or after review, and their opinion about new review process.

2.2. Data collection and analysis

The data collection process is provided in Fig. 1. Each pharmacist documented the information on an Excel spreadsheet. Recorded data included patient demographic information (age, sex, comorbidities), review type (face-to-face or telephone), the number of medications before and after review, EMS tool availability, summary of interventions and likely outcome of interventions using the RiO adapted scoring tool. Quantitative data analysis was completed using descriptive statistics in Excel.

Table 1
The Scottish polypharmacy guidance seven steps medication review process.

Explanation
Step 1 (Aim) What matters to the patient?
Step 2 (Need) Identify essential drug therapy.
Step 3 (Need) Does the patient take any unnecessary drug therapy?
Step 4 (Effectiveness) Are therapeutic objectives being achieved?
Step 5 (Safety) Is the patient at risk of ADRs* or suffers actual ADRs?
Step 6 (Efficiency) Is drug therapy cost-effective?
Step 7 (Patient-Centred) Is patient willing and able to take drug therapy as intended?

* ADR = Adverse Drug Reaction.

Table 2

Adapted RiO Scoring Tool.

Level 1
Lifestyle advice
Pill bob provision to aid medicine removal from blister pack
Stopping of unnecessary food supplements or herbal medicines
Level 2
Bisphosphonate started for patient on long term steroids
Spacer device provided for asthma patient with poor inhaler technique
Inappropriate crushing of modified release tablets stopped
Level 3
Insulin instructions changed (insulin continued despite low blood glucose levels)
Gastroprotection prescribed for an elderly patient co-prescribed aspirin and SSRI
Diazepam rectal prescribed for patient with poorly controlled epilepsy
Identification of poor adherence to antihypertensives- review of medicines referred to GP or resolved by pharmacist independent prescriber
Organisation of ordering/collection/ delivery of medicines in patients with history of running out of medicines which include high risk medicine

Scoring categories for hospital admission prevention are outlined below.

Level 1 = no likelihood Level 2 = possible Level 3 = likely

The scoring is dependent on the intervention type, medicine involved and the comorbidities of the patient. The table above provides examples for every category.

2.3. Ethical approval

The study obtained ethical approval from the School of Pharmacy and Life Sciences of Robert Gordon University, UK. NHS Ethical approval was not required as the project was considered to be service evaluation.

3. Results

The study included 34 patients, with pharmacists completing 20, 9 and 5 reviews respectively.

The patients were mostly female (62%, $n = 21$), with a mean and median age of 78 years (age range from 61 to 95 years). Patients had a mean and median number of comorbidities of 3 [median IQR 2–4] (range from 0 to 7). Patients had a range of frailty scores: 3 fit; 18 mild frailty; 12 moderate frailty; and 1 severe frailty.

A summary of the results is provided in Table 3. Additionally, historical EMS tool results are provided to illustrate outcome differences. Due to the difference in sample sizes between the groups, statistical significance testing was not undertaken.

The majority of reviews were face-to-face (85%, $n = 29$), although by necessity a minority were completed by telephone (15%, $n = 5$). Before review, patients were taking a mean of 16 medications and median of 15 medications ($n = 29$; $n = 5$ missing data) with a range from 9 to 31. After review, the mean number of medications reduced to 15 and the median reduced to 14 medications ($n = 29$; $n = 5$ missing data) with a range from 9 to 30. In addition, there were multiple alterations of dosages. The likely impact of interventions on patients' hospital admission demonstrated that the majority of patients (85%, $n = 29$) were either possibly or likely prevented from hospital admission, with the remaining 5 as unlikely to impact on hospital admission prevention. Comparison with historical EMS data shows that only 33% ($n = 228$) of interventions resulted in either possibly or likely prevented hospital admission.

3.1. Pharmacists' feedback

Informal feedback from the pharmacists who participated in the pilot study was that the APACE tool identified complex patients with multiple mental health and social care issues. Most patients required more than one appointment owing to the issues' complexity which had time implications for GPCPs. As patients had significant cognitive impairment, it was imperative that a family member or carer was present which required coordination when scheduling. Positive feedback was reported; especially highlighted was the time to discuss medication issues and to provide medication related education. Furthermore, it was identified to be optimal

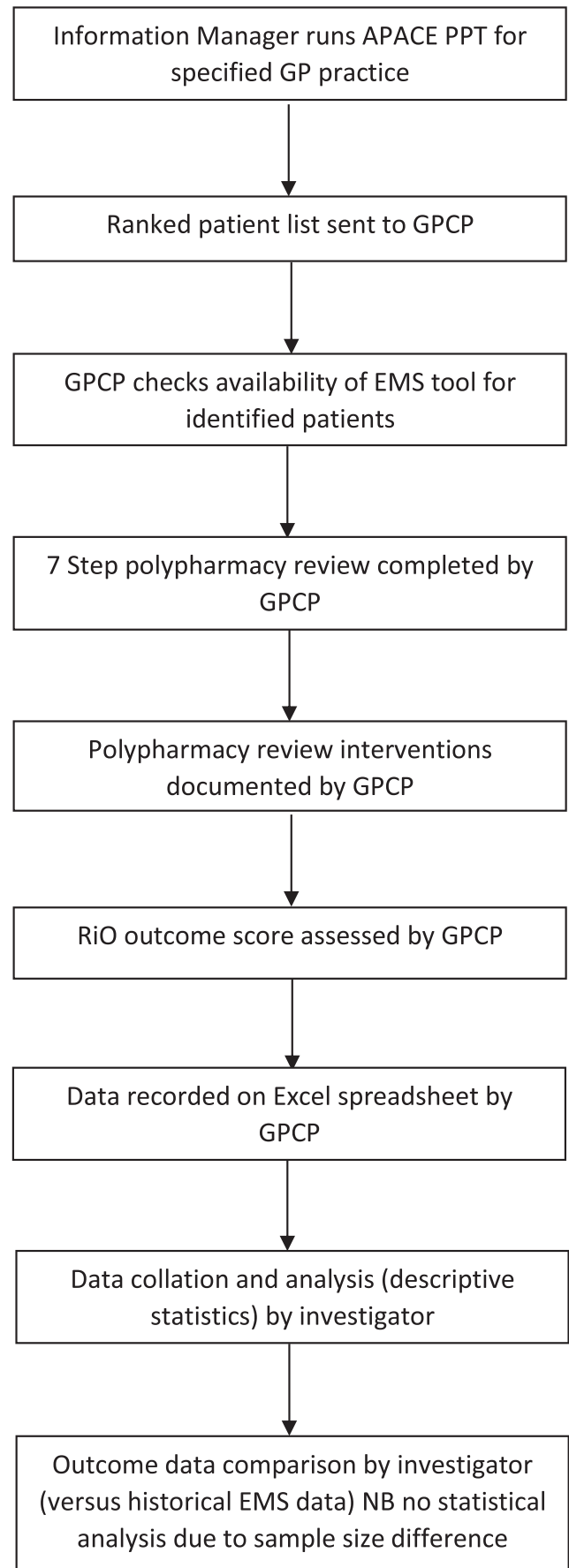


Fig. 1. Flow chart of method, data collection and analysis.

Table 3
APACE Results with EMS simple comparison.

	APACE		EMS	
n (%)	34		691	
Female	21	62%	469	67.9%
Mean age in years	78		78	
Mean number of co-morbidities	3		–	
EMS tool used	16**	47.1%	691	100%
EMS tool not available/not used	4**	11.8%	–	–
Face-to-face consultations	29	85.3%	–	–
RiO outcome 3	13	38.2%	34	4.9%
RiO outcome 2	16	47.1%	194	28.1%
RiO outcome 1	5	14.7%	463	66.0%

** Missing data

when the newly developed APACE tool could be used to identify patients for priority review which could be completed using the existing EMS PPT paperwork.

4. Discussion

To our knowledge, this is the first study to assess a PPT to aid pharmacist polypharmacy review for community-dwelling older people with cognitive impairment. Studies have investigated outcome prioritisation desired by older people after medication review²¹ and PPTs are frequently used by hospital clinical pharmacy services to prioritise their workload,^{22,23} although it was reported in 2019 that none had specifically been designed to prioritise care for elderly patients.²⁴ Furthermore, it was recommended that the impact of hospital PPT on patient outcomes should be determined.²⁴

The EMS PPT was introduced in 2016 to aid patient prioritisation for polypharmacy review in general practice in accordance with Scottish polypharmacy guidance criteria.⁷ The tool automatically checks if an eligible patient triggers any of 100 prescribing indicators including high risk prescribing, potential overtreatment, monitoring required or potential under-treatment. However, the EMS tool has limitations: it is not compatible with all GP information technology systems, it does not differentiate between acute and repeat medication and it does not consider patient's cognitive function or their frequency of seeking medical care. Therefore, the APACE tool was developed to aid identification of patients who may be at the cusp of no longer being able to manage their medications independently and consequently at risk of hospital admission. The tool identified some patients already flagged by the EMS tool but also others who would not have been identified. The pharmacists described having to deal with complex patients during face-to-face consultations. The results demonstrate that the outcome measure of hospital admission prevention showed a high likelihood of the interventions either possibly or likely preventing hospital admission. Unpublished outcome data from the same health board for patients reviewed using EMS tool alone ($n = 691$) had 66% interventions ($n = 463$) of having no impact on hospital admission prevention. In contrast, only 14.5% ($n = 5$) of APACE patients had same outcome. It should be acknowledged that APACE group is very small in comparison to the EMS only group but the results show a striking difference in the recorded outcome in relation to admission prevention. This resonates with the description of these patients as having more complex needs.

This study has limitations. Reviews were completed by three different pharmacists which potentially impacted review consistency; this should be mitigated by use of a standardised process. An embargo on home visits due to unmet safety concerns caused a temporary project halt, resulting in low patient numbers. Time and accommodation constraints to complete reviews in GP practices were identified. The APACE patients had multiple complex problems often with significant mental health problems. The GPCPs acknowledged that further education and support from an experienced mental health pharmacist/practitioner would be invaluable. Frequently, patients required to be signposted or referred to other multidisciplinary team members. Since project completion, psychiatric

link work support has been provided which would facilitate pharmacist support for these complex patients.

5. Conclusion

This pilot study demonstrated that the APACE tool could identify a different subset of polypharmacy patients for priority review compared to the existing EMS polypharmacy tool. Furthermore, the outcome of the reviews demonstrated a greater likelihood of possible or likely prevention of hospital admission in comparison to the existing tool. The new patient cohort tended to have multiple mental health issues and frequently required more support. The EMS tool could be used to aid completion of the polypharmacy review dependent on availability. Thus the combination of both tools is postulated to be optimal.

Future research should focus on the use of the APACE tool in additional patients and GP practices without any changes to the described method. The future research would add to the current evidence base and confirm or refute these initial findings.

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Brief Description of all contributions to the manuscript

PM devised the study, analysed and interpreted the data and prepared the manuscript.

KM contributed to study design, data analysis and interpretation and reviewed the manuscript.

Declaration of Competing Interest

The authors report no conflicts of interest.

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