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Original Research Paper

The feasibility of implementing a hospital deprescribing behaviour change intervention and undertaking trial processes: A mixed methods evaluation

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ABSTRACT

Background: CompreHensive geriAtRician-led MEdication Review (CHARMER) is a behaviour change intervention designed to address the determinants of geriatricians and pharmacists deprescribing in hospital. CHARMER comprises a deprescribing action plan, deprescribing briefings, videos of successful deprescribing consultations, deprescribing case studies workshop and a deprescribing performance dashboard. This study aimed to evaluate the feasibility of undertaking a CHARMER definitive trial and inform primary outcome measure selection (90-day hospital readmission or patient quality of life (QoL)).

Methods: A two-arm purposive allocation feasibility study was undertaken in four hospitals (three intervention, one control). Intervention fidelity and acceptability, outcome data completeness and quality were evaluated alongside acceptability of data collection methods. The process evaluation explored these via interviews with staff and patients. Data were used to inform primary outcome measure selection.

Results: Eighteen geriatricians and pharmacists received the CHARMER intervention and 318 patients admitted to study wards were enrolled. 90-day hospital readmission data were available for 290 (91.2 %) patients. Sixty-six (20.8 %) were approached for consent to complete QoL measures; 25 (37.9 %) consented and 13 (52 %) completed at baseline and 90-day follow up.

All intervention components were implemented with acceptable fidelity; hospitals were unfamiliar with implementing action plans and unclear who should be involved with implementing the dashboard, leading to delays.

Conclusions: The CHARMER intervention is feasible to implement and given the low patient consent rate, 90-day readmission rate is the most appropriate primary outcome measure. Minor refinements to guidance will facilitate hospitals to undertake activities for implementation that are unfamiliar.

Clinical trial registration: The study was registered on *ISRCTN* (ISRCTN11899506).

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1. Introduction

Over 50 % of people ≥65 years admitted to hospital are prescribed ≥1 medicine with more risk than benefits leading to avoidable morbidity, hospitalisation and mortality.[1] Proactive deprescribing aims to improve patient outcomes through identifying and stopping inappropriate medicines before they cause harm.[2]

Proactive deprescribing is not yet routine[3,4] with <1 % of older people in hospital having a medicine proactively deprescribed.[5] However, proactive deprescribing in hospital is an expectation of older people and carers.[6]

Behavioural science theory underpinned-focus groups with geriatricians and pharmacists prioritised five determinants of increasing proactive deprescribing in hospital along with associated behavioural mechanisms by which each determinant may be addressed.[4] Subsequent co-design workshops with patients, carers, geriatricians, pharmacists, and other relevant stakeholders developed a hospital deprescribing intervention by selecting and characterising behaviour change techniques to address the five determinants.[4,7,8] The resulting 'Compre-Hensive geriAtRician-led MEdication Review' (CHARMER) intervention comprises five components, representing six behaviour change techniques provided in Fig. 1(8).

Prior to conducting a definitive trial, it is essential to establish the feasibility and acceptability of intervention implementation, delivering an appropriately powered trial, identifying approaches to enhance intervention fidelity and testing plans for the eventual process evaluation.[9] This study aimed to evaluate the feasibility of implementing the CHARMER intervention and study processes in hospitals in England.

2. Methods

The CONSORT extension for feasibility studies guided the design, conduct and reporting of this study[10] (checklist provided in supplementary file 1). The methods are comprehensively reported separately[11] and summarised below. The study was registered (ISRCTN11899506) and ethical and governance approvals obtained from the Health and Care Research Wales Research Ethics Committee 1, the Health Research Authority and the Confidentiality Advisory Group (REC reference: 22/WA/0087). The research team comprised Patient and Public Involvement members, behavioural scientists, geriatricians, pharmacists, qualitative researchers, statistician, health economist and a Clinical Trials Unit.

2.1. Patient and Public Involvement

A Patient and Public Involvement group comprising older people with experience of polypharmacy (n = 3) and family members/carers (n = 2) were core members of the research team and are fully described in the protocol.[11]

2.2. Study design

This was a two-arm, open, feasibility study conducted on Older People's Medicine (OPM) wards across four National Health Service (NHS) hospitals in England (three intervention, one control). A four-week intervention implementation phase was followed by a four-week patient enrolment phase. The control hospital provided usual working conditions for geriatricians and pharmacists.

2.3. Study setting and recruitment of hospital research sites

Hospital eligibility.

- OPM service with a throughput of ≥100 patients per month across study ward(s).
- Capability and capacity to implement the CHARMER intervention.
- Geriatricians and pharmacists on study wards willing to receive the intervention and consent to data collection.

Hospitals already participating in studies evaluating deprescribing interventions were ineligible.

We purposively sampled four hospitals from 27 expressions of interest[11]; each nominated a Principal Investigator (PI) to provide local oversight.

2.4. Hospital staff participants

Pharmacists and geriatricians working on study wards were approached by the PI to participate. Geriatricians and pharmacists with ≥30 % full time equivalent of OPM ward clinical time were eligible to receive the intervention and participate. Other staff, including an intervention implementation team, staff involved in study set-up (research and development staff), and delivery (research nurses), were eligible to provide process evaluation data.

2.5. Intervention

The development of the CHARMER intervention is reported elsewhere and summarised in Fig. 1(4,7,8).

We provided intervention hospitals with an implementation handbook (Supplementary file 2). The Template for Intervention Description and Replication (TIDieR) checklist is also provided in Supplementary file 2.

2.6. Patient and consultee participants

The CHARMER intervention targets pharmacists' and geriatricians' deprescribing behaviours. Consequently, all patients under their care were exposed to its effects. To evaluate the intervention's effects on patient outcomes, we obtained Confidentiality Advisory Group approval[12] to enrol all patients on study ward(s) for collecting routinely recorded outcome data, unless they subscribed to the NHS National Data Opt-out.[13]

All enrolled patients with capacity were approached for consent to provide patient-reported outcome and process evaluation data. For patients unable to provide consent, assent was sought from a personal (e.g. relative) or professional (e.g. paid carer) consultee to provide outcome and process evaluation data.

2.7. Outcome data collection and analysis

We collected outcomes specified in the Core Outcome Set for hospital deprescribing trials[14] and additional outcomes specified in the CHARMER intervention logic model (Supplementary file 3). Table 1 specifies the outcomes collected. Routinely collected data were sourced from hospital records except for three outcomes: 'number of stopped medicines that are re-started', 'number of hospital stays' and 'mortality', because they pertain to post-hospital discharge activity. We planned to commission NHS Digital, a national provider of health-related data to link and provide data for these three outcomes. However, we asked hospitals to report the number of enrolled patients readmitted during the study period as a proxy measure for 'number of hospital stays'. This was to safeguard against any delays in receiving data from NHS Digital as it was a potential primary outcome measure (see progression to definitive trial criteria) and thus essential for informing progression to definitive trial.

2.8. Progression to definitive trial criteria

Two criteria for progression to a definitive trial were defined a priori, with 'Red', 'Amber', and 'Green' (RAG) thresholds to assess performance[17].

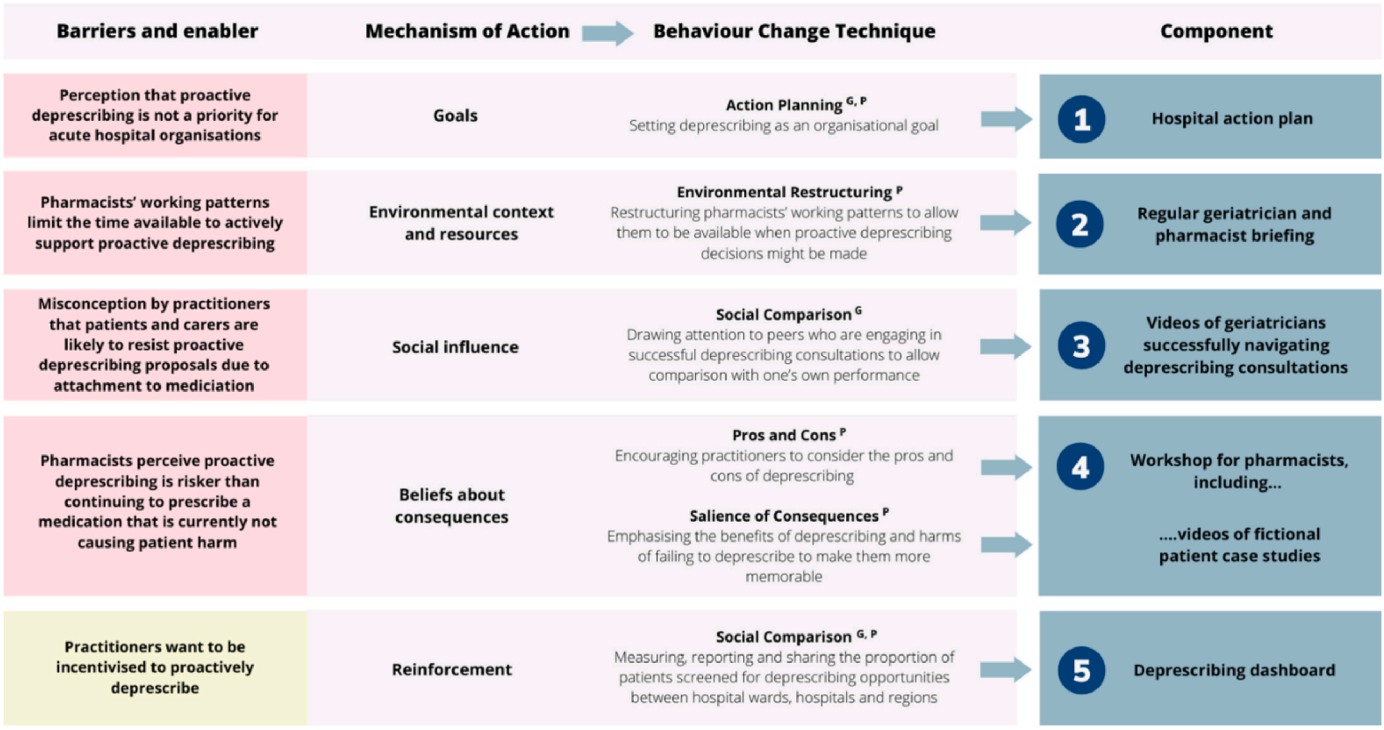

Fig. 1. Overview of the five-component CHARMER intervention
[G] Targeted geriatrician behaviour [P] Targeted pharmacist behaviour.

Table 1
Overview of data collection for enrolled and consented patients.

Routinely reported outcomes collected for all enrolled patients
Number of regularly prescribed medicines on admission The number of medicines that a patient was prescribed for regular use immediately prior to being admitted to hospital
Number of prescribed medicines for when required use on admission The number of medicines that a patient was prescribed for when required use immediately prior to being admitted to hospital
Number of regularly prescribed medicines at discharge The number of medicines that a patient was been prescribed for regular use when discharged from hospital
Number of prescribed medicines for when required use at discharge The number of medicines that a patient has been prescribed for when required use when discharged from hospital
Number of prescribed medicines that are stopped The number of medicines that have been discontinued during study window AND while patient is on study ward
Number of prescribed medicines with dosage reduced The number of medicines which have had the dosage reduced during study window AND while patient is on study ward
Length of hospital stay for index admission The number of days from hospital admission until discharge
Number of stopped medicines that are re-started 12 weeks post-discharge The number of medicines that were discontinued during study window AND while patient is on study ward that are subsequently restarted during follow-up
Number of hospital stays 12 weeks post-discharge[a] The number of planned and unplanned admissions and re-admissions to any hospital for treatment or monitoring health
Mortality 12 weeks post-discharge[a] The death of a patient for any reason
Patient/consultee reported outcomes collected from a subset of enrolled patients who consent
Satisfaction with deprescribing immediately post-discharge i.e. within 4 weeks A 13-item questionnaire measuring patient or consultee satisfaction with the process of having a medicine discontinued by a healthcare professional[a]
Medication related adverse events 12 weeks post-discharge A 19-item questionnaire to capture presence or absence of symptoms in the one month prior to assessment[a]
Health Related Quality of Life at discharge and 12 weeks post-discharge Two questionnaires were used to assess the health aspects of quality of life. These were: EuroQol 5-dimension questionnaire (EQ-5D-5L) and EuroQol visual analogue scale (VAS)[15] and Short Form 36 Health Survey (SF36)[16]

[a] See Supplementary file 4 for satisfaction with deprescribing and medication related adverse events questionnaires.

1. A target sample size of 42 patients/consultees consenting to provide outcome data with >70 % (Green), 50–70 % (Amber) and <50 % (Red).[14] This was based on a one-sample test comparing the 50 % to the 70 % at the one-sided 5 % significance level with 80 % power.
2. An attrition to follow-up of consented patients or consultees criterion was set at <30 % (Green), 30–40 % (Amber), >40 % (Red).

If both criteria were Green, we planned to proceed to a definitive trial. If ≥ 1 criterion was Amber, we planned to proceed if appropriate

solutions were identified. If ≥ 1 criterion was Red, we would not proceed to a definitive trial with the current design.

'Number of hospital stays' and 'quality-of-life' were a priori selected as potentially being the primary outcome measure for a future definitive trial because the former offers a clinically relevant outcome that previous trials have indicated may be responsive to deprescribing,[18] whilst the latter is offers a patient-orientated outcome. A preliminary sample size estimation for these outcomes indicated that up to 42 hospitals may be required. We therefore planned to evaluate the likelihood of achieving this using feasibility study recruitment data.

2.9. Process evaluation data collection and analysis

We conducted a mixed methods process evaluation following Medical Research Council guidance[19] which is described comprehensively elsewhere.[11] All consented participants were approached to undertake semi-structured interviews to explore their role in the study e.g. intervention implementation (e.g. PI), intervention receipt (geriatricians and pharmacists) and providing outcome data to evaluate the intervention's effects (e.g. patients/consultees). We also observed implementation activities e.g. pharmacist workshop.

We captured implementation fidelity using checklists developed from the Conceptual Framework for Implementation Fidelity[20] which was completed by implementation team members. We examined how each component was delivered and received and whether adaptations occurred. Rapid qualitative analysis[21] of interviews, observation data and meeting minutes was undertaken to identify learning about acceptability and feasibility of study processes and the intervention.[22]

3. Results

The feasibility study was conducted June–October 2022. Two intervention hospitals and the control completed all required elements of the study. The third intervention hospital implemented the intervention but did not have capacity to collect outcome data due to an unexpected insufficiency in research delivery staff.

3.1. Characteristics of participant population

Table 2 provides the number of patient participants enrolled and recruited at each hospital. One intervention hospital enrolled fewer patients than expected; however, the mean number of patients enrolled across the three hospital was >100. Supplementary file 5 provides an overview of the patient participant flow. Seven geriatricians and 11 pharmacists received the intervention.

Table 3 provides baseline characteristics of patients enrolled only and those who additionally consented. Both groups were comparable except that none of the consented patients were from a nursing or residential home and had a shorter average length of stay; these were also the characteristics that were most frequently missing from data reporting.

Descriptive statistics for the routinely collected outcome data are provided in Table 4. Due to the Clinical Trials Unit having insufficient

Table 3
Baseline characteristics of patients enrolled, and patients enrolled for whom consent/assent was obtained.

	Enrolled only (n = 293)	Enrolled and consented (n = 25)
Age at enrolment		
Median (IQR)	85 (81, 89)	85 (80, 89)
Missing	2	0
Gender: n (%)		
Male	136 (47 %)	11 (44.0 %)
Female	155 (53 %)	14 (56.0 %)
Missing	2	0
Place of residence: n (%)		
Own home	207 (72 %)	25 (100 %)
Nursing home	47 (16 %)	0
Residential home	32 (11 %)	0
Other[a]	3 (1.0 %)	0
Missing	4	0
Discharge destination: n (%)		
Own home	156 (63 %)	23 (92 %)
Nursing home	44 (18 %)	0
Residential home	18 (7 %)	1 (4 %)
Hospice	1 (0.4 %)	0
Other hospital	9 (4 %)	0
Other[b]	18 (7 %)	1 (4 %)
Missing	47	0
CCI[c] score		
Median (IQR)	7 (5, 8)	6 (5, 7)
Missing	5	0
Length of hospital stay (days)		
Median (IQR)	14 (7, 29)	7 (5, 11)
Missing	46	0

[a] Other place of residence includes: housing with care, lives with daughter, sheltered accommodation.
[b] Other discharge destination includes: deceased (n = 13), temporary address (n = 3), temporary care home placement (n = 1), still inpatient (n = 1), other ward (n = 1).
[c] CCI=Charlson Comorbidity Index (a zero score indicates no co-morbidities, a higher score indicates increased severity of comorbidities).

Table 2
Hospital level enrolment and recruitment of participants.

	Hospital 1 (intervention)	Hospital 2 (intervention)	Hospital 3[a] (intervention)	Hospital 4 (control)	Totals
Patient/consultee participants					
Number patients enrolled	125	85	n/a	108	318
Number (%) of enrolled patients/consultees approached for consent/assent	35 (28.0 %)	12 (14.1 %)	n/a	19 (17.6 %)	66 (20.8 %)
Number (%) of patients/consultees approached who provided consent/assent	15 (42.9 %)	2 (16.7 %))	n/a	8 (42.1 %)	25 (37.9 %)
Consent/assent not obtained due to patient leaving ward too soon	25 (22.5 %)	3 (3.6 %)	n/a	34 (34.3 %)	62 (21.1 %)
Consent/assent not obtained due to patient being 'too unwell'	0	75 (90.4 %)	n/a	43 (43.4 %)	118 (40.3 %)
Consent/assent not obtained due to lack of consultee available	0	0	n/a	10 (10.1 %)	10 (3.4 %)
Consent/assent not obtained due to patient/consultee refusing	0	0	n/a	9 (9.1 %)	9 (3.1 %)
Consent/assent not obtained due to 'other reason'	86 (77.5 %)	5 (6 %)	n/a	3 (3.1 %)	94 (32.1 %)
Geriatrician and pharmacist intervention recipient participants					
Number of geriatricians recruited and received CHARMER intervention	2	2	3	n/a	7
Number of pharmacists recruited and received CHARMER intervention	6	1	4	n/a	11

[a] Hospital 3 implemented the CHARMER intervention but withdrew before the patient enrolment phase thus did not collect patient data.

Table 4
Routinely collected outcome data descriptive statistics.

	Intervention group (n = 210)	Control group (n = 108)
Number of regularly prescribed medicines on admission		
Mean (SD)	6.9 (3.6)	7.1 (3.4)
Median (IQR)	7.0 (4.0, 9.0)	7.0 (5.0, 9.0)
Number of prescribed medicines for when required use on admission		
Mean (SD)	0.4 (0.6)	0.3 (0.6)
Median (IQR)	0.0 (0.0, 1.0)	0.0 (0.0, 0.5)
Number of regularly prescribed medicines at discharge		
Mean (SD)	8.9 (4.8)	8.8 (4.4)
Median (IQR)	8.0 (6.0, 11.0)	8.5 (6.0, 11.0)
Number of prescribed medicines for when required use at discharge		
Mean (SD)	0.4 (0.7)	0.3 (0.6)
Median (IQR)	0.0 (0.0, 1.0)	0.0 (0.0, 1.0)
Number of prescribed medicines that are stopped		
Mean (SD)	1.5 (1.9)	0.4 (1.3)
Median (IQR)	1.0 (0.0, 2.0)	0.0 (0.0, 0.0)
Number of prescribed medicines with dosage reduced		
Mean (SD)	0.1 (0.3)	0.0 (0.1)
Median (IQR)	0 (0, 0)	0 (0, 0)
Number of stopped medicines that are re-started	Data unavailable	
Number of hospital stays		
0	132 (74 %)	66 (78 %).
1	36 (20 %)	14 (17 %).
2	7 (4 %)	5 (6 %)
3	4 (2 %)	0
Missing	5	23
Mortality	19	17

capacity to request outcome data from NHS Digital, we were unable to obtain the three routinely collected outcomes ('number of stopped medicines that are re-started', 'number of hospital stays' and 'mortality'). The locally captured proxy measure 'number of enrolled patients readmitted' was provided by the three hospitals that enrolled patients.

The number of regularly prescribed and when required medicines on admission were comparable between groups. There was a trend towards a higher number of medicines being stopped and dosages reduced in the intervention group; however, the number of medicines prescribed at discharge were similar.

For consented patient/consultee reported outcome data we investigated completion rates at baseline and 12-weeks. Due to the small sample size and proportions often close to 0 or 1, exact 95 % confidence interval was used (Clopper-Pearson method).

For health-related quality of life at baseline, both the EQ-5D VAS and SF-36 completion rate (proportion) and [95 % exact confidence intervals] were 24/25 (0.96 [0.796, 0.999]). For EQ-5D-5L response rate was 23/25 (0.92 [0.74, 0.99]). Response rate at 12 weeks fell to 13/22 for EQ-5D VAS and EQ-5D-5L (0.591 [0.364, 0.793]), and 12/22 for the SF-36 (0.546 [0.322, 0.756]). EQ(5D) VAS score median (IQR) at baseline were similar at 67.5 (50.0, 75.0) for intervention and 60.0 (50.0, 80.0) for control. EQ-5D-5L utility score median (IQR) at baseline was 0.64 (0.44, 0.84) for intervention and 0.71 (0.67, 0.86) for control.

The satisfaction with deprescribing questionnaire response rate was 6/23 (0.261 [0.102, 0.484]). There were no missing data except item 1 which asks who initially suggested stopping the medication and was completed by five of the six respondents. Non-completion was primarily due to participants not being contactable by telephone. The completion rate for the medication-related adverse event questionnaire was 14/22 (0.636 [0.407, 0.828]). The median (IQR) number of medication-related adverse events reported was $4^{3,5}$ for intervention and $2^{2,3}$ for control.

3.2. Performance against progression criteria

The first four hospitals approached from 27 expressions of interest agreed to participate. Whilst the target was 42 patients/consultees (across four hospitals) consenting to provide outcome data, adjusting for only three hospitals recruiting patients/consultees, the sample size target was revised to 32. As 25 consented (78.1 % of sample size target), performance was 'Green' for the criterion related to the consent rate of patients/consultees. Performance was 'Red' for attrition rate at follow-up for quality-of-life data; out of 25 patients/consultees who completed both EQ(5D) and SF-36 at baseline, 12 (45.4 %) completed the measures at 12 weeks.

3.3. Study and process evaluations

3.3.1. Study processes

A detailed process evaluation will be reported elsewhere and a summary is provided below. We identified processes that were problematic for hospitals (see Supplementary file 6). Consenting professional consultees was challenging due to COVID-19 restricted hospital visiting; remote recruitment was suggested as an alternative. Allowing time between introducing patients to the study and returning to obtain consent meant some patients were missed. Some patients expressed concern about their ability to answer questionnaire or interview questions and some indicated they would have difficulty hearing and completing questionnaires by telephone. Feedback from research nurses indicated that patients were too 'frail' and 'unwell', were at end of life and many lacked capacity.

3.3.2. Intervention

All five intervention components were feasible to implement with acceptable fidelity. Minor refinements were identified for the definitive trial (summary in Supplementary file 7).

The benchmarking/dashboard component proved most challenging to implement due to a lack of clarity at hospitals regarding who should extract and submit the required data. One site automated the process, however the others indicated this was not possible within the 4-week implementation timeframe and extracted and submitted data manually. Not all participating geriatricians and pharmacists viewed the dashboard weekly as intended. With refinement of guidance and extending the implementation period to three months, benchmarking appeared feasible.

Launching an action plan was unfamiliar to some implementation team members and feedback was that a hospital-wide action plan was not possible as it is time consuming and requires substantial engagement from high level stakeholders. An action plan launched at an OPM and Pharmacy departmental level was deemed feasible.

The pharmacist workshop was well-received and one site adapted the workshop to include deprescribing tools to support less experienced pharmacists to participate.

There was variation in how geriatrician videos were delivered and received. One site delivered the videos in a group enabling discussion between peers whilst an observation at one site that delivered the videos individually showed a less engaged geriatrician. Geriatricians requested an additional video featuring general practitioners endorsing hospital-initiated deprescribing to address concerns about resistance from primary care.

Briefings were perceived positively at the two hospitals that enacted this component; one site held a weekly 30-min meeting to discuss proactive deprescribing opportunities whilst the other site opted for ad-hoc briefings as opportunities were identified. At one site, no briefings occurred as participating geriatricians and pharmacists were unclear about who was participating and one pharmacist reported that there was no one to lead the process.

4. Discussion

This study demonstrated that progression to a definitive trial of the CHARMER intervention is likely to be feasible. The intervention was implemented with acceptable fidelity and the patient/consultee consent rate was high. Whilst linked data for enrolled patients were not obtained

during the study, previously reported trials successfully using data linkage[23] provide assurance of its feasibility. Low completion rates for quality-of-life measures post-discharge support using enrolled data and thus re-admission rate within 3 months as the primary outcome measure for the definitive trial.

Four hospitals participated in the feasibility study; however, the restriction on one site's capacity to collect patient data and the current portfolio of 27 expressions of interest from hospitals for CHARMER participation indicate that further expressions of interest are necessary to achieve the target 42 hospitals for a definitive trial.

Primary outcome measures for deprescribing trials focus on process outcomes such as number of prescribed medicines, Drug Burden Index and number of medicines deprescribed.[24] This is likely a recognition of clinical and patient-orientated outcomes such as morbidity, mortality and quality of life being challenging to capture for the large sample size required to achieve an adequately powered trial.[25] Proactive deprescribing aims to prevent a future adverse event and thus requires long-term follow up in order to capture any beneficial impact on health outcomes and quality of life.[26] Given the target population includes a high proportion of older adults, capacity to complete quality of life measures is also problematic.[25] The baseline mean EQ-5D-5L in the present feasibility study indicates that respondents were in reasonably good health (baseline EQ-5D-5L score of 0.628). For comparison, a study of older people in care homes (mean age 85) estimated a mean EQ-5D-5L value at 0.41[27]. Given that the target population was older adults who have been admitted to hospital, it suggests that consent and thus responses may have been from a healthier subset of potential participants. Use of consultees was intended to overcome the challenge of capacity, however, this also proved problematic. Whilst the consent rate for patient/consultee reported outcome data met the criteria for progression to definitive trial, given the nature of respondents and high attrition rate to follow-up, it appears inappropriate as the primary outcome measure for a proactive deprescribing trial. In contrast, the Canadian MedSafer hospital deprescribing trial with participants comparable to our study population, collected follow-up EQ-5D-5L responses via telephone from 87.5 % of 5,698 consented participants.[18] This difference may be attributable to burden of both the EQ-5D-5L and SF36 being tested rather than just EQ-5D-5L. Accordingly, selecting the shorter EQ-5D-5L only as the measure for health-related quality of life is likely to be feasible in the definitive trial as a secondary outcome.[14].

Permission from the Confidentiality Advisory Group to include data for all enrolled patients admitted to participating wards is important given concerns regarding underrepresentation of older people in research.[28] Unlike previous hospital deprescribing trials that have relied on consenting older people,[24] enrolment permits including people who might otherwise be excluded due to lack of capacity but may be the population most likely to benefit from proactive deprescribing.[25,29] This was demonstrated in the present study in which no patients from nursing and residential homes were consented but they represented nearly one third of the patients enrolled. Of the two potential primary outcome measures: health related quality of life and three-month hospital readmission, the latter is therefore the most appropriate for a definitive trial.

Successful implementation of all intervention components reflects the theory, evidence and co-design approach underpinning its development.[4,7,30] However, four weeks was insufficient for implementation, with the benchmarking component requiring greatest time and resource. A longer implementation period is therefore necessary.[31]

Whilst most components require no or minimal adaptations, the request from geriatricians to introduce additional content to the video component is a notable change. This additional content seeks to address the barrier of perceived resistance to hospital deprescribing by primary care. This barrier operates via the same 'social influence' mechanism as the barrier that the video is already intended to address; perceived patient and family resistance to hospital deprescribing. Perceived primary care resistance to deprescribing was not reported in the focus groups with geriatricians underpinning the CHARMER intervention; however, 'primary care respecting hospital decision-making', was a reported enabler.[4] A component to address this enabler was not originally included in the intervention as the underpinning work suggested that this was already a widely held view by geriatricians.[4] However, learning from the process evaluation suggests that this is not the case for all geriatricians and that a hospital deprescribing intervention should include a component addressing perceived primary care resistance.

5. Conclusion

Implementation of the CHARMER intervention and collection of most outcome data, including a proposed primary outcome measure was feasible. One criterion for progression to definitive trial was not met owing to high attrition to follow-up of patients/consultees when using the two quality of life measures. Learning from the process evaluation suggests that changing the study design to reduce participant burden by adopting the short EQ-5D-5L as the quality-of-life measure is likely to be feasible, thus allowing progression to a definitive trial.

CRediT authorship contribution statement

Sion Scott: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Supervision, Writing – original draft, Writing – review & editing. **Jacqueline Martin-Kerry:** Data curation, Formal analysis, Investigation, Methodology, Resources, Writing – review & editing. **Megan Pritchard:** Data curation, Investigation, Methodology, Writing – review & editing. **Bethany Atkins:** Resources, Writing – original draft, Writing – review & editing. **Allan B. Clark:** Conceptualization, Formal analysis, Funding acquisition, Methodology, Writing – review & editing. **Kelly Grant:** Formal analysis, Methodology, Writing – review & editing. **David P. Alldred:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Antony Colles:** Data curation, Software, Writing – review & editing. **Amber Hammond:** Data curation, Project administration, Writing – review & editing. **Katherine Murphy:** Formal analysis, Methodology, Resources. **Victoria L. Keevil:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Ian Kellar:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Martyn Patel:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Erika Sims:** Data curation, Formal analysis, Supervision, Writing – review & editing. **Jo Taylor:** Conceptualization, Formal analysis, Funding acquisition, Methodology, Resources, Writing – review & editing. **David A. Turner:** Formal analysis, Methodology, Writing – review & editing. **Miles Witham:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **David Wright:** Conceptualization, Funding acquisition, Methodology, Writing – review & editing. **Debi Bhattacharya:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Supervision, Writing – review & editing.

Ethics committee approval

Ethical and governance approvals obtained from the Health and Care Research Wales Research Ethics Committee 1, the Health Research Authority and the Confidentiality Advisory Group (REC reference: 22/WA/0087).

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Conflicts of interest

MDW reports consulting fees from Rejuvenate Biomed.

Appendix ASupplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.sapharm.2025.11.005.

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