A multifaceted intervention to reduce antimicrobial prescribing in care homes: a non-randomised feasibility study and process evaluation

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Declared competing interests of authors: Carmel Hughes is a member of the Health Services and Delivery Research Commissioned Panel. Mark Loeb has worked for the World Health Organization as a consultant to develop antibiotics for an essential list of medicines and algorithms for appropriate antibiotic use. Martin Underwood is a member of National Institute for Health Research (NIHR) Journals Library Editors Group. He was chairperson of the National Institute for Health and Care Excellence accreditation advisory committee from 2013 until March 2017, for which he received a fee. He is chief investigator or co-investigator on multiple previous and current research grants from NIHR and Arthritis Research UK and is a co-investigator on grants funded by Arthritis Australia, Australian National Health and the Medical Research Council. He has received travel expenses for speaking at conferences from the professional organisations hosting the conferences. He is a director and shareholder of Clinvivo Ltd (Tenterden, UK), which provides electronic data collection for health services research. He is part of an academic partnership with Serco Ltd (Hook, UK) related to return-to-work initiatives. He is an editor of the NIHR journal series, for which he receives a fee. He has accepted an honorarium for advice on Research Excellence Framework submission from Queen Mary University of London. He is co-investigator on an Efficacy and Mechanism Evaluation grant, receiving support in kind from Orthospace Ltd (Caesarea, Israel).

Published February 2020
DOI: 10.3310/hsdr08080

Scientific summary

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Health Services and Delivery Research 2020; Vol. 8: No. 8
DOI: 10.3310/hsdr08080

NIHR Journals Library www.journalslibrary.nihr.ac.uk

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Background

The most frequent acute health-care intervention that care home residents receive is the prescribing of medications. There are serious concerns about the quality of prescribing generally, and antimicrobial prescribing in particular, with facilities such as care homes being described as an important 'reservoir' of antimicrobial resistance (AMR). A cluster randomised controlled trial conducted in Canadian care homes demonstrated that a multifaceted intervention was effective in reducing the number of courses of antimicrobials prescribed for urinary tract infections (UTIs) in intervention care homes compared with control care homes (Loeb M, Brazil K, Lohfeld L, McGeer A, Simor A, Stevenson K, *et al.* Effect of a multifaceted intervention on number of antimicrobial prescriptions for suspected urinary tract infections in residents of nursing homes: cluster randomised controlled trial. *BMJ* 2005;**331**:669). No significant differences were found between intervention and control sites in terms of total numbers of antimicrobials prescribed, admissions to hospitals and mortality. This study sought to adapt and extend this approach to include respiratory tract infections (RTIs) and skin and soft tissue infections (SSTIs) in UK care homes.

Study aims

The primary aim was to evaluate the feasibility and acceptability of a multifaceted intervention on prescribing for infections in a non-randomised feasibility study in care homes. To achieve this, there were a number of underpinning objectives:

- to recruit six care homes – three in Northern Ireland (NI) and three in the West Midlands, England
- to adapt and develop an intervention (a decision-making algorithm and small group interactive training) that was originally developed and implemented in Canadian care homes
- to deliver training in respect of the intervention in the care homes and associated general practices
- to implement the intervention in the six feasibility care homes and collect relevant data
- to undertake a detailed process evaluation of the non-randomised feasibility phase and test data-collection procedures
- to undertake a survey in a sample of care homes to assess interest in participation in a larger future study.

Methods

The REACH (REduce Antimicrobial prescribing in Care Homes) study was a non-randomised feasibility study that employed a mixed-methods design, with normalization process theory as the underpinning theoretical framework. The study consisted of four interlinked phases, followed by a survey in a sample of care homes in NI and the West Midlands to gauge interest in a larger study. Ethics approval was received prior to the start of the study (Research Ethics Committee reference 16/NI/0003).

Recruitment of care homes

The aim was to recruit a sample of six care homes, with two nursing homes and one residential home in each area. REACH Champions were identified in the care homes; these were members of staff who would promote the use of the intervention and who provided additional training if required.

The basic inclusion criteria were:

- care homes with/without nursing care providing 24-hour care for residents aged ≥ 65 years
- care homes with a minimum of 20 (permanent) residents
- care homes associated with a small number of general practices (up to four per care home, providing care for a minimum of 80% of residents within a care home)
- care homes with an exclusive arrangement with one pharmacy for dispensing medications.

The recruitment process took place during April to June 2016.

Adaptation of the decision-making algorithm and training phase

The original Canadian intervention consisted of a decision-making algorithm focusing on UTIs and a training package. Rapid screening of the literature was undertaken in relation to the management of UTIs, plus RTIs and SSTIs to update the decision-making algorithm produced for the Canadian study. A consensus group was conducted, using the nominal group technique, to obtain the views of selected health-care professionals on the updated decision-making algorithm. The updated decision-making algorithm was also presented to key stakeholders, including care home staff, family members and general practitioners (GPs), via focus groups and semistructured interviews. Topic guides were informed by normalization process theory and analysed using constant comparison. The process was also informed by continual iterative internal review and analysis within the research team. A training programme was developed based on the ongoing adaptation of the decision-making algorithm and on the approach taken in the original Canadian study. It incorporated aspects of didactic instruction on AMR, along with more interactive elements, such as applying the decision-making algorithm to case studies and how to communicate with GPs using the situation–background–assessment–recommendation (SBAR) tool. Two versions of the training programme were developed to meet the needs of different types of staff within the participating care homes.

Implementation of the intervention

Training sessions were organised and conducted in the six participating care homes. Specific data-collection forms were developed and used to assess characteristics of the participating care homes, including residents' demographic information, whether or not the decision-making algorithm was used, details of hospital services used, contacts with health and social care professionals and adverse events. These data were analysed using descriptive statistics. A standard operating procedure was created to allow associated pharmacies/practice-based dispensaries to download dispensing data related to antimicrobial prescribing for 12 months prior to intervention implementation and during the 6-month implementation period. Dispensing data were converted to defined daily doses (DDDs) using standard methodology. The number of prescriptions dispensed for all antimicrobials prescribed was also calculated. The data were used to estimate an intraclass correlation coefficient (ICC) that could be used in a future trial. Data were also collected on relevant resources and costs involved in the set-up of the REACH intervention. The most recently published unit costs in health and social care were used for costing the time input of staff in the analysis. For events such as hospitalisations and deaths, the feasibility of retrieving anonymised resident-level data (aggregated up to care home) from large centralised databases, such as NHS Digital in England and the various relevant agencies in NI, was also explored. Analysis of any available administrative data was descriptive in nature.

Process evaluation

A mixed-methods approach was used, combining qualitative and quantitative data. The context, the reach of the intervention, the dose delivered and the dose received were of particular interest. Analysis of qualitative data was guided by the components of normalization process theory, notably making sense (coherence), engagement and commitment (cognitive participation), facilitating the use of the intervention (collective action) and the value of the intervention (reflexive monitoring). Quantitative data were analysed descriptively.

Survey of care homes

A postal survey was undertaken in a sample of care homes in NI (n = 446 care homes) and the West Midlands (n = 1040 care homes) to assess interest in participation in a larger future study. Two mailings were undertaken (in January 2018) and responses were entered into and analysed using IBM SPSS® Statistics version 20 (IBM Corporation, Armonk, NY, USA).

Results

Recruitment of care homes

Six care homes were recruited, with two nursing homes and one residential home in each area. The number of beds ranged from 32 to 62, with occupancy at almost 100% in all care homes. In NI, more general practices provided care to the care homes, whereas in England each participating care home was served by one practice. Care homes varied in ownership, with three being part of a chain and the other three being owned by single proprietors.

Adaptation of the decision-making algorithm and training phase

Following the rapid literature review, eight papers/guidelines were used to inform the adaptation of the intervention. The consensus group (September 2016), focus groups (September to October 2016) and interviews (January to March 2017) led to refinement of the algorithm in respect of key symptoms, consideration of residents with dementia and the maximum time to wait before referral to a GP. The revised algorithm, with one pathway for each infection, was categorised on the basis of initial assessment of the resident, observation of the resident and action by care home staff. Temperature was considered as an important symptom, but staff from care homes without nursing reported that they were not allowed to measure temperature as this was seen as a nursing task. Training utilised a blended learning approach incorporating a visual presentation (Microsoft PowerPoint®; Microsoft Corporation, Redmond, WA, USA) and supporting documentation (study handbook). Staff had the opportunity to rehearse the use of the decision-making algorithm and communication skills using case studies and the SBAR tool. They were also given an overview of the data-collection forms. A video of the training material was produced and provided to care homes on a DVD (digital versatile disc), on a flash drive and via an online platform to facilitate ongoing training.

Implementation of the intervention

A total of 87 staff from the six care homes received training from the REACH team, which delivered 21 training sessions over 35 hours. Training was well received by staff, who reported that the content was relevant and of high quality. Following management agreement, further training on temperature measurement was undertaken in care homes without nursing. The decision-making algorithm form was used 81 times and the outcome was varied. The hospital services used were largely in relation to outpatient appointments and were not associated with infections. The contacts with other health and social care professionals were primarily with nurses outside the care homes. Adverse event data were very difficult to collect as it was impossible to judge if any reported event could be attributed to the intervention. Community pharmacy/dispensary data revealed that there was a decrease in the total number of prescriptions dispensed for antimicrobials post implementation (n = 334 antimicrobials) compared with pre implementation (n = 383 antimicrobials), representing a 13% reduction; this was also reflected in the DDDs pre implementation (2848 DDDs) compared with DDDs post implementation (2559 DDDs), which equated to a 10% reduction. Some antimicrobial prescribing may have been for prophylaxis of UTIs, which was not a specific target for the intervention. The ICC was 0.11 [95% confidence interval (CI) 0.00 to 0.24] at baseline, 0.05 (95% CI 0.00 to 0.13) post implementation and 0.09 (95% CI 0.00 to 0.24) overall. Resource use and costing revealed that from a societal perspective the mean cost per care home was £1239 (£33 per resident). It was not possible to obtain any administrative data for the participating care homes in England from NHS Digital. Limited data were available from equivalent agencies in NI, in terms of being able to enumerate the number of residents in each care home through the use of an algorithm that used the care home name, address

information and Unique Property Reference Number. The numbers extracted by this method appeared to slightly underestimate resident numbers in comparison with data collected directly from care homes. It was not possible within the given time scale to extract data on hospitalisations and deaths of residents.

Process evaluation

From both the pre- and post-implementation focus groups and one-to-one interviews, it was clear that there was varying levels of knowledge and understanding of AMR [the 'making sense' (coherence) component of normalization process theory]. Staff noted that the decision-making algorithm was useful in the care home but they were unsure if it would change how GPs prescribed. The analysis revealed that 'engagement and commitment' (cognitive participation component) was generally high. Care home managers felt that being involved helped to empower the staff to increase their knowledge for the benefit of the residents. In 'facilitating the use of the REACH intervention' (collective action component), there was evidence that many staff were implementing the decision-making algorithm but others were not. The staff were very willing to provide feedback on the decision-making algorithm, particularly with regard to some of the symptoms that had been included following the adaptation and development phase. There was tension between an evidence-based approach highlighted in the literature and ingrained practice. The 'value of the intervention' (reflexive monitoring component) reflected a more negative outcome than those reflected in the other constructs. Although most believed that the approach was a good idea, operationalising it was more problematic. The workload issue of time associated with intervention implementation and documentation was highlighted.

Survey

A response rate of 26% ($n = 160$ care homes) was obtained. From those who responded, 83% (80% of the care homes in NI and 88% of the care homes in England) indicated that they would welcome a larger study. Concerns were expressed regarding time commitment and the need to involve GPs and family members.

Conclusions

Based on the findings, the following conclusions are drawn:

- Feasibility in respect of recruitment, data collection and implementation of the intervention has been demonstrated, although challenges remain with respect to accessing centralised administrative data and data-collection burden for staff.
- Stakeholder involvement in the adaptation and development of the intervention was challenging, but also valuable as it provided an important perspective and may have engendered a sense of ownership of the intervention, particularly among care home staff.
- The intervention appeared to be broadly acceptable to care home staff, and could be integrated into everyday practice.

This was a feasibility study to assess various elements of research methodology and possible progression to a larger trial, so implications for practice are somewhat limited at this stage; however, the following points should be considered:

- Training for care home staff was an important aspect of this feasibility study. Being able to integrate training into everyday practice and shift patterns was a challenge in the study, and would also appear to be difficult outside a research context. More generally, care home organisations should consider how best to provide and facilitate training events and opportunities to their staff to ensure that their practice is up to date and evidence based.
- In care homes without nursing, it was accepted practice not to measure temperature; this would have been challenging for the implementation of the intervention. However, agreement was obtained from the management of such care homes to allow the training of staff so that they could undertake this task during the course of the study.

As a result of this feasibility study and process evaluation, it has been demonstrated that it was possible to recruit care homes, oversee implementation and collect data; however, there are a number of key issues that need to be considered to allow a future study to proceed:

- Obtaining resident-level data from care homes and other sources – consideration of obtaining individual consent or employing an 'opt-in' approach may be the best course of action in order to obtain the data that would be needed for a definitive trial. General use of administrative data sources is being advocated by research funding bodies, but the experience of this research team was that this was not feasible.
- The content and focus of the intervention may need to be reviewed in the light of antimicrobial use for prophylaxis in the case of UTIs.
- Although DDDs were chosen as the outcome in respect of prescribing, there is debate in the literature as to what is the most appropriate outcome. Further consideration should be given and guidance should be produced in respect of the most appropriate outcome measure to assess the effects of antimicrobial stewardship interventions, with a focus on a 'prescribing outcome'.

Trial registration

This trial is registered as ISRCTN10441831.

Funding

Funding for this study was provided by the Health Services and Delivery Research programme of the National Institute for Health Research. Queen's University Belfast acted as sponsor.

Health Services and Delivery Research

ISSN 2050-4349 (Print)

ISSN 2050-4357 (Online)

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This report

The research reported in this issue of the journal was funded by the HS&DR programme or one of its preceding programmes as project number 13/97/12. The contractual start date was in April 2016. The final report began editorial review in May 2018 and was accepted for publication in November 2018. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HS&DR editors and production house have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the final report document. However, they do not accept liability for damages or losses arising from material published in this report.

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