

Predicting the potential value of the new discharge medicines service in England

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Abstract

Objectives In 2021, community pharmacies in England were commissioned to support patients post-discharge through the discharge medicines service (DMS). Past studies described the benefit of DMS in avoiding readmissions. This study aimed to estimate the impact of DMS in this respect, projecting the maximal benefit if all areas mirrored the most active region.

Methods A retrospective observational study, including modelling, using DMS claims data from March 2021 to February 2022, obtained from the NHS Business Services Authority (data from all community pharmacies in England for patients discharged where hospital clinicians referred them to community pharmacy). The impact of DMS on reducing readmission during this period was estimated using previous study data and estimated maximal benefit from full implementation of the service across England.

Key findings In the study period 65 634 completed DMS claims were made. Claims at Integrated Care System (ICS) area level varied from 509/10 000 admissions to <1/10 000 admissions. Combining data from past studies provides a relative risk ratio of 0.756 (95% CI 0.678 to 0.843) for 90 day readmission (DMS versus normal care). DMS is estimated to have resulted in 8393 (95% CI 7061 to 9564) fewer readmissions after 30 days reducing to 5869 (95% CI 3774 to 7740) after 90 days. If all-ICS areas were as active as the highest performing area, DMS would avoid estimated >29 000 readmissions at 90 days each year.

Conclusions DMS has significant potential to reduce readmissions. DMS implementation is currently variable and full implementation across all-ICS areas could increase the benefits five-fold.

Keywords: health policy; health services research; modelling.

Introduction

Transitions of care are defined as ‘changes in the level, location, or providers of care as patients move within the health systems’.^[1] Examples of this are when patients move in and out of the hospital and poor communication around such transitions risks preventable harm, particularly linked to medication.^[2, 3] Significant changes are often made to medicines during hospitalisation, with up to 40% of medicines being discontinued and 45% of all medicines prescribed at discharge being new.^[2] The risk of medicines changes made in hospitals not being implemented in primary care has long been a concern,^[4] despite NICE guidance recommending medicines reconciliation following any change in care setting since 2015.^[5, 6]

Patients are frequently not aware of changes to their medicines or the reasons for these when they are discharged from the hospital,^[7] but communicating these changes directly to community pharmacy teams have been shown to support patient care^[4, 8] and reduce readmissions to hospital.^[8, 9] In light of the evidence of benefit, community pharmacy-based discharge support services were commissioned in Wales in 2011 and in England in 2021.^[10, 11]

In Wales, discharge information is transmitted for all patients electronically to the patient’s pre-registered pharmacy

of choice, but pharmacies can decide whether to offer the service. If the electronic option is not available, a paper discharge advice letter is issued to the patient and the pharmacist is reliant on the patient alerting them of a recent discharge.^[12] Patients are eligible for referral where medications are changed, take four or more medicines, require medicines administration support, or are identified by the community pharmacy staff as benefitting from receiving the service.

In contrast to this, the discharge medicines service (DMS) in England has a more active referral mechanism, whereby hospital staff identify patients who may benefit from a DMS consultation and discharge information is securely shared directly with the patient’s chosen community pharmacy. The community pharmacy that receives the DMS referral is contractually obliged to contact the patient and offer the service.^[11] As such, these systems rely on the professional judgement of either the community pharmacist in Wales or the discharging team in England.

DMS in England consists of three stages: (1) medicines reconciliation, (2) a review of the first prescription received by the community pharmacy and (3) a patient consultation. These do not need to be provided in the order and can be done in parallel. Pharmacy teams can theoretically provide any of these three stages and claim for the stages provided.

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In practice, some patients are lost to follow-up and stages are not completed, which may be due to death, readmission to the hospital, or patient disengagement. However, a DMS is not considered ‘complete’ unless all three stages are provided.

DMS guidance recommends that NHS trusts collaborate with the community and Primary Care Network teams, to optimise the use of the service, with a particular focus on medicines or patients that are considered high-risk.^[13] However, when the service was launched, clinical teams were not obliged to refer to community pharmacies and there was a heavy reliance on local relationships. This has been addressed to some degree with the 2022/23 Commissioning for Quality and Innovation (CQUIN) indicators for the hospital now including referrals to community pharmacies, creating a financial incentive for hospitals to refer relevant patients.^[14]

In both countries, when providing the service, a community pharmacist (or pharmacy technician) performs medicines reconciliation, by comparing details on the discharge message with primary care records and following up on any issues to ensure that the patient continues their medication as intended and minimises the risk of harm. In addition, the pharmacist discusses the medicines with the patient to ensure that they are aware of the changes and understand how to take their medicines.^[12]

An observational review of the Welsh discharge medicines review (DMR) service showed that those receiving the service were 14% less likely to be readmitted within the first 90 days following discharge.^[12] Similarly, an evaluation of an unfunded discharge medicines service pilot in Northeast England during 2014/15^[15] demonstrated a statistically significant reduction for patients who received the service in re-admission to the hospital at each of 30 days, 60 days and 90 days post-discharge.^[15]

During the financial year from April 2020 to March 2021, 544 pharmacies (76%) in Wales claimed for at least one discharge medicines review,^[16] with an overall mean rate of 39 DMRs carried out per 10 000 population. As the DMS service has been commissioned in England for a year, it is now time to explore the extent to which it has become established. Following the passage of the 2022 Health and Care Act, health care systems in England have been organised into integrated care systems (ICSs). There are 42 ICSs across England covering populations from 0.5 to 3 million people and will form the unit of analysis for this study.^[17]

This study aims to describe DMS provision by examining service claims, including any geographic variation, then use previous study data, to estimate the impact of the service on hospital readmissions at current levels of provision and project the potential achievable impact of the service.

Method

This study is a retrospective observational study, including modelling. Data indicating the number of DMS consultations claimed by each community pharmacy between March 2021 and February 2022, the pharmacy unique identifiers and the integrated care system (ICS) area, were taken from publicly available data sets published by the NHS business services authority (BSA) (nhsbsa.nhs.uk).^[18] Both complete and incomplete DMS data were available. However, the number of consultations in the modelling reflects ‘complete’ service provisions only, that is DMS where all three stages have been provided by the community pharmacy, to ensure that the

results are not overestimating the benefit. This was assumed to reflect the number of service episodes of the DMS services during that period. Data were collated in Microsoft Excel, before transfer to SPSS v27 for further analysis.

Data from the Office of National Statistics mid-year 2020 population estimates (the most recent data)^[19] were used to estimate the population within each of the 42 ICS boundary areas and DMS claim data were grouped by ICS area by pharmacy location. These data were used to standardise the number of DMS claims per 10 000 residents in each ICS area.

Data from published NHS hospital admissions were grouped by ICS area.^[20] The published DMS data and hospital admissions data were used to determine the number of DMS claims per 10 000 hospital admissions in each ICS area. The admissions data used were for all ‘Total Non-elective G&A Admissions’ (the number of finished consultant episodes for the general and acute specialities) recorded in 2019/20 (the most recent complete year).^[20] This supported the comparison between areas, by controlling for factors such as mean age, that directly impact hospital admissions. These values were used in the later model. Data from the BSA were also used to determine the DMS claims per 1 000 000 prescriptions dispensed by community pharmacies at an ICS level.^[18]

Finally, readmission numbers were estimated for each ICS using published admissions data and the published average readmission rates.^[20, 21] This required the data to be mapped from local authority boundaries to ICS boundaries using open government databases.^[22]

To provide robust outcome measures, for the extrapolation of claim data to estimate the impact of the service provision, a literature search was conducted to identify relevant studies. The MEDLINE database was searched independently by all authors and the findings were compared. Search terms were (‘discharge’ OR ‘transfer of care’) AND (‘community pharmacy’ OR ‘pharmacy’ OR ‘pharmacist’ OR ‘pharmacists’). Results were restricted to the English language. Studies that compared the impact of providing support with medication in a community pharmacy setting in the immediate period following discharge from the hospital with standard care and used outcome measures of readmission rates at 30 or 90 days were included. Results were excluded if they did not report the impact on discharge at 30 days.

Data from the included studies were collated in SPSS v.27 and relative risk ratios were calculated (using an online calculator—[omnicalculator.com](https://www.omnicalculator.com)) for readmission at 30 days, 60 days and 90 days following discharge, with data summarised in forest plots. These ratios were applied to the DMS claims data to estimate the impact of DMS provision during this period.

The hospital admission standardised rate of DMS claims for the highest performing ICS area was used to create a projected achievable level of provision, using an assumption that this level could be matched in all-ICS areas. This is a prediction of the likely achievable potential number of patients that would be identified for a referral. This estimated achievable level of provision was then used to estimate the maximal DMS impact of readmission. These results were then compared with the estimated number of readmissions in each ICS to determine their credibility.

A favourable ethical opinion was obtained from the Faculty of Medicine and Health Sciences Research Ethics Committee at Keele University (MH-210178) before any data being collected.

Results

Current DMS provision in England

From March 2021 to February 2022, there were 89 892 claims (both complete and incomplete) made for the provision of DMS from 4 805 pharmacies, equating to 43% of the 11 295 registered community pharmacies in England (March 2021). Of all claimed DMS, there were 65 634 (73%) recorded as complete and this was used in later modelling.

The claims were not evenly distributed across these pharmacies with a median of six claims per pharmacy (IQR

2–16) and 886 (20%) of the pharmacies only claimed for a single complete DMS. Each of the 42 ICS areas, had at least one pharmacy that claimed for the service, but there was a substantial difference between areas, with the most active area (Cheshire and Merseyside) having 168 completed claims per 10 000 residents (Figure 1). The median claim rate per ICS area was 5 per 10 000 population (IQR 2.75–15.00). When considered by hospital admissions the variation is greater. Cheshire and Merseyside remain the ICS with the highest rate (509 DMS per 10 000 hospital admissions), with a median

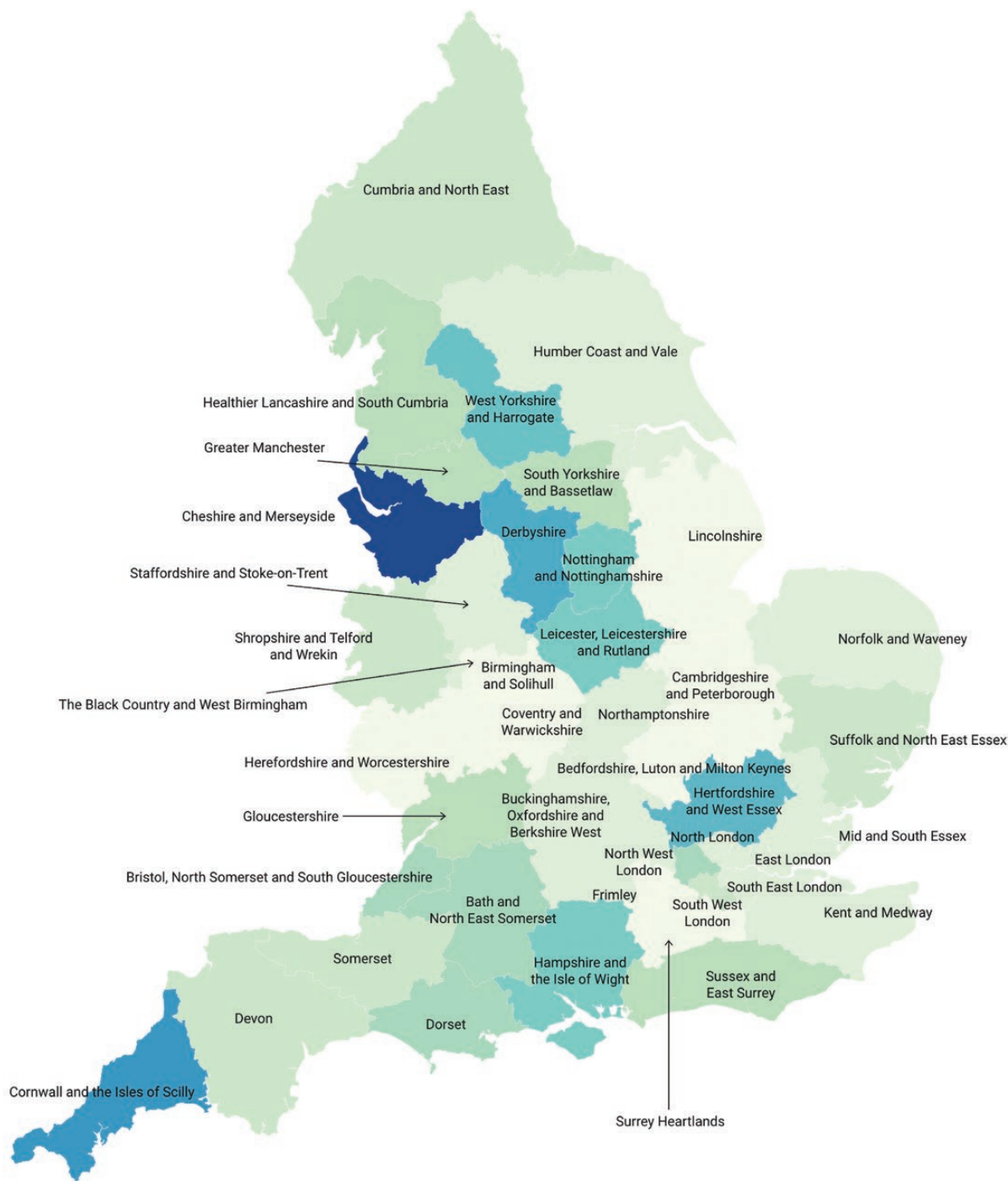


Figure 1 Completed DMS provision per 10 000 population across each ICS area. Shading indicates completed DMS claim volume per 10 000 population, with darker shades indicating greater volumes.

claim per ICS area of 56 DMS per 10 000 hospital admissions (IQR 27.75–119.00).

The rate of DMS per 1 000 000 dispensed prescriptions showed a similar variance. Again, Cheshire and Merseyside had the highest rate with 324 DMS per 1 000 000 dispensed prescriptions. The median rate was 34 DMS per 1 000 000 dispensed prescriptions (IQR 19.0–78.5). Bivariate correlations were performed between the rate of DMS per 10 000 hospital admissions and DMS per 1 000 000 prescriptions. These were found to be strongly correlated $r(42) = 0.990, P < 0.001$.

As there is a strong correlation between hospital admissions and prescription items, only the rate of hospital admissions was used in the models presented below.

Estimated impact of full DMS implementation in England

The literature search yielded 166 results. These were screened initially by title and subsequently by abstract and then full text for relevance. A total of three papers met the inclusion criteria including data for 4360 patients.^[12, 15, 23] A fourth study was excluded due to the low number of patients and risk of bias ($n = 59$).^[24] One study was excluded from the analysis as the follow-up period was 6 months post-discharge and this was the only paper to report this outcome, so it could not be combined with the other studies.^[25]

Across the three studies, there was a relative risk ratio of 0.514 (95% CI 0.446 to 0.591) for readmission at 30 days post-discharge for those in the intervention arm. The relative risk ratio was 0.689 (95% CI, 0.609 to 0.781) at 60 days post-discharge and 0.756 (95% CI 0.678 to 0.843) at 90 days post-discharge (Figure 2).

Projecting the claims data for the DMS service in England, with these risk ratios indicates that, during the study period, 8393 (95% CI 7061 to 9564) admissions are estimated to have been avoided at 30 days post-discharge, reducing to 5869 (95% CI, 3774 to 7740) admissions avoided by 90 days (Figure 3).

The median readmission rate across England in the year 2019/20 was 14.28% (IQR 13.71–14.55).^[26] Published data show there were 6 480 199 hospital admissions recorded in England (2019/20).^[20] Using the published ICS-specific readmissions rates, it is estimated there were 924 008 (95% CI 887 667 to 961 966) readmissions at 30 days across England.

As described above, the highest rate of claims was in Cheshire and Merseyside with 509 DMS consultations provided per 10 000 published hospital admissions.^[20] If all-ICS areas were to operate at this level, then an estimated 329 785 DMS could be provided each year. If this were done, an estimated 42 171 (95% CI, 35 478 to 48 055) readmissions are projected to have been avoided at 30 days post-discharge, reducing to 29 487 (95% CI, 18 963 to 38 892) readmissions after 90 days.

The modelling presented here estimates the total number of readmissions in England could be reduced by 4.5% in 30 days. For each ICS this would vary, with a median benefit of 4.6% (IQR 4.48–4.74) of readmissions avoided. This is based on an assumption that only 509 patients for every 10 000 hospital admissions (5.1%) are suitable for a DMS, matching the rate in the highest performing ICS area (Cheshire and Merseyside). As the service is still being implemented across

the country, it is likely that the number of eligible patients may be even higher.

Discussion

This study aimed to describe the current DMS activity in England to date and project the potential benefits through extrapolation using data from prior studies. The findings highlighted significant variation in provision across England, but it is estimated that the service has avoided over 8000 readmissions in the first year. However, there is still substantial scope for expansion and, if DMS was provided at the rate of the highest performing ICS across England, there is potential to avoid >29 000 readmissions at 90 days each year.

Despite being commissioned in all community pharmacies in England, only 43% had claimed for a DMS in the first year (complete or incomplete), with substantial variation in the level of claims between pharmacies. The patient choice may play a role in the distribution of referrals, both through existing pharmacy usage and decisions made at discharge. Further work is needed to understand how patient choice impacts referrals and service uptake after referral. However, referrals must be made for the service to be provided and this relies on secondary care clinicians acting. During the study period, there was no expectation to generate community pharmacy referrals, (although there was the promotion of the service to both community pharmacies and hospital trusts).^[13] With the recent addition of DMS referrals to the new NHS Commissioning for Quality and Innovation framework (CQUIN) incentive structure^[14], it is reasonable to expect that DMS referrals will increase in many areas, increasing the potential for benefit.

The NHS England toolkit highlights the importance of local collaboration in the initiation of DMS referrals^[13] and differing progress with this in different areas is a likely cause of the marked variation in provision seen across ICS areas. It is unclear why one ICS area is so far ahead of the other regions, but may be the result of local initiatives and priorities as highlighted in the NHSE toolkit,^[13] or may have come about through stronger local working relationships between primary and secondary care. Communication between secondary and primary care teams is important to patient benefit and a commissioned service such as DMS gives pharmacy teams reasons to work together at discharge.^[27] New working practices will likely develop over time and as Cheshire and Merseyside were one of the areas that piloted the service before the national launch this may explain the variance.

The NHSE toolkit highlights the patients most likely to benefit from discharge services and these patients are more likely to be at risk of readmission.^[13, 28] The targeting of the service to this patient cohort may be part of the reason the benefits of the service are the size they are.

Based on the DMS studies, at 30 days the readmission rate is 26% in the DMS-eligible population.^[12, 15, 23] This is higher than the published readmission rate at 30 days for the English population (14.2%).^[26] However, the readmission rate at 30 days where a DMS has been provided is 14%, bringing the readmission risk of the target population in line with the national rate. In effect, the additional risk of readmission in patients eligible for DMS is countered by the DMS

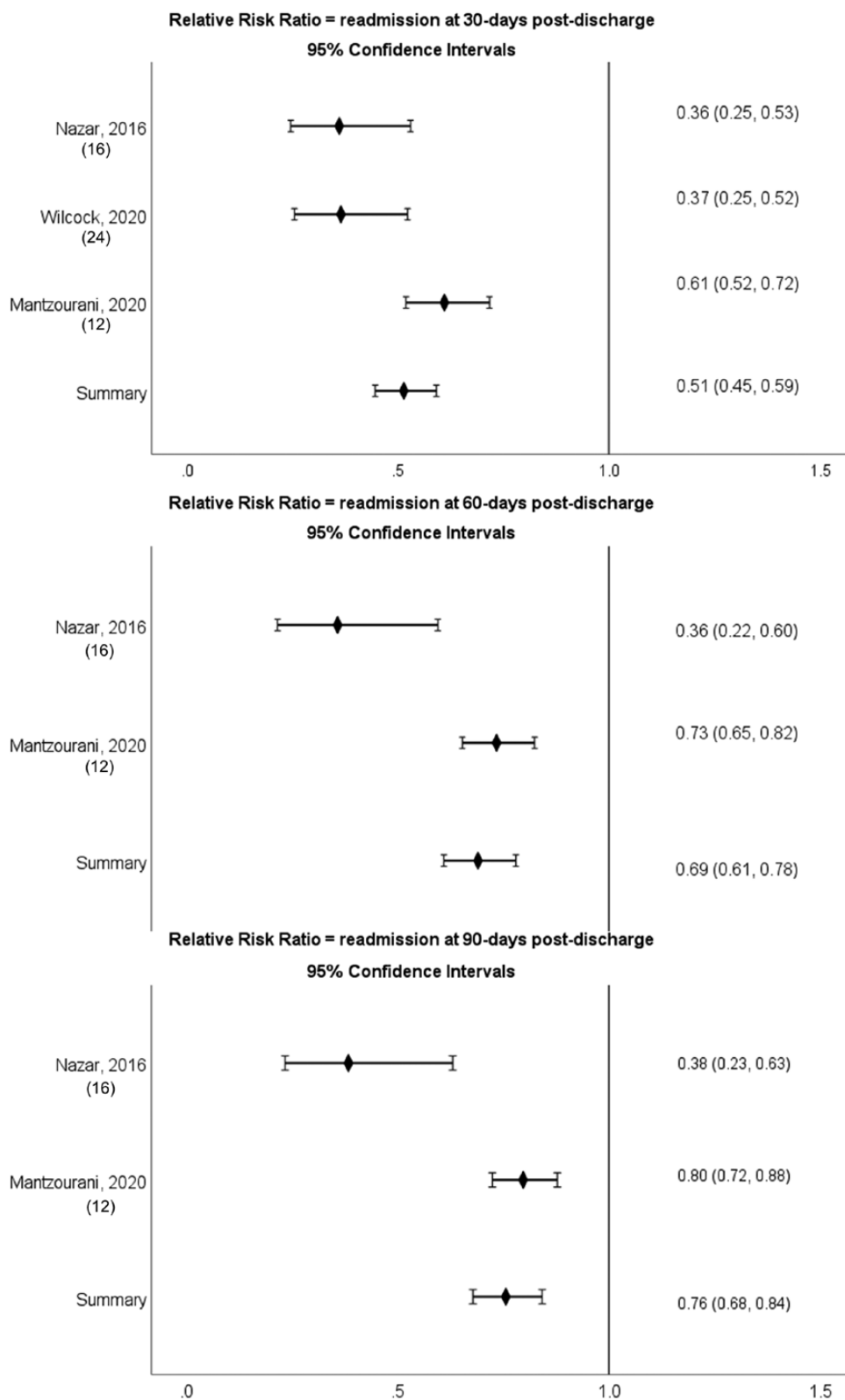


Figure 2. Relative risk ratio, readmission rate at 30 days, 60 days and 90 days post discharge.

service—making their readmission outcomes comparable to the wider population.

It should be noted that there are no data to suggest that the highest performing area has reached the maximum number of referrals and it is likely that more than 5.1% of the admitted

population would be eligible for the DMS service. The model estimates the total benefits on the assumption that the highest performing area successfully refers all eligible patients for a DMS service. This means the estimates presented here are likely an underestimation of the total potential benefit.

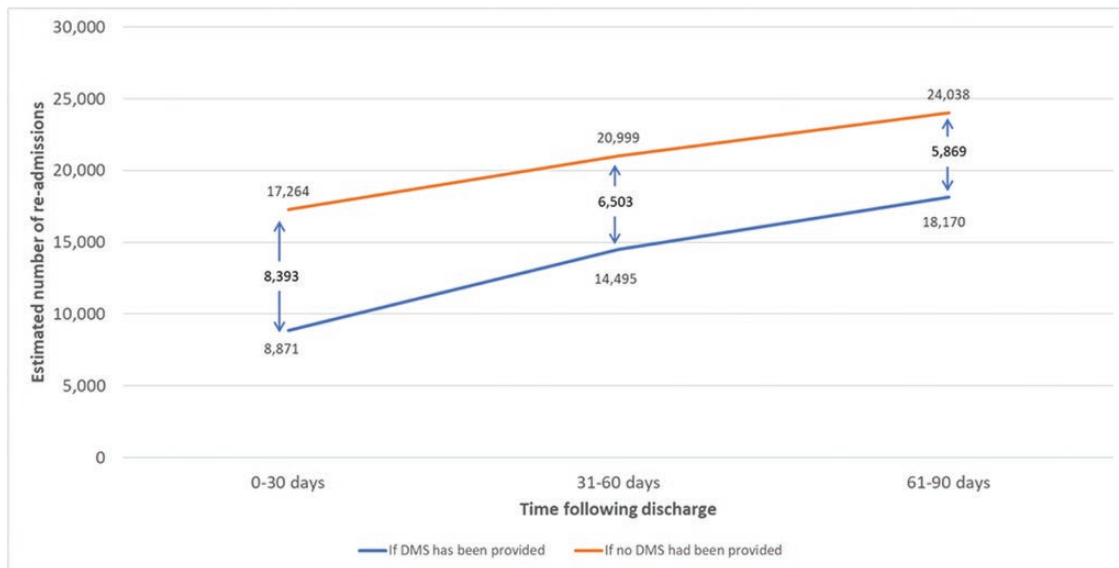


Figure 3. Estimated readmission rates at 30 days, 60 days and 90 days post discharge (total discharges = 65 634).

A strength of the English DMS commissioning structure is that all community pharmacies are included and all are required to respond to every referral received, placing the power to decide who receives the service in the hands of the patient and their secondary care team. This contrasts with the DMR service in Wales, where the provision of the service relies more heavily on decisions by the community pharmacist, who has not been involved in the hospital care of the patient and may not be able to identify which patients are most likely to benefit.

To provide DMS, pharmacists must undergo online training provided by the Centre for Pharmacy Postgraduate Education. There are no published data which indicate the proportion of pharmacists or locum pharmacists who have completed training, but it is probable that there will be some areas where a shortage of trained pharmacists would mean that a referral may not be acted upon, which may reduce the overall benefit that can be realised through increased referrals.

However, pharmacies have three working days to provide stage 1 of the DMS and usually up to a month to complete stages 2 and 3. This gives flexibility for pharmacies, reducing the possible impact of no trained pharmacist being present when the referral is received.

Owing to the design of this study, it is only able to report on DMS activity where a claim has been made, meaning that cases where a referral was made, but no DMS was provided, cannot be captured. This may happen where a referral is received and the service provided, but due to administration error, the DMS is not claimed for by the pharmacy. Furthermore, a limitation of the model is the decision to only include complete DMS claims, as these are most likely to provide the benefits described in the literature. This may however have led to an underestimate of the benefits of DMS due to benefits accrued from incomplete DMS provision. Also, referrals to community pharmacies may suffer from a selection bias as secondary care staff is selecting patients for referral based on local guidance, which inevitably leads to variation between areas in the number and nature of patients that are referred to the service and may

result in variable benefits in different areas. Secondary care staff may also have limited capacity (or willingness) to capture patient consent for referral, which will also vary between hospitals. Previous experience with referral pilots may influence this.

A further limitation of the study is that the three prior studies used mirrored the Welsh model for referrals, where community pharmacy teams were able to choose if DMS care was provided. It is reasonable to assume that the English model would identify those patients that are most likely to benefit as it empowers those closest to the patient's recent clinical care to decide who received the service. However, further work is needed to establish the effects of the different referral mechanisms on the benefits realised from the service.

Conclusion

This paper has described the current DMS activity in England and its potential impact on patient readmissions to hospitals, based on previous work. Further, it has also projected the potential impact if DMS is provided at the rate of the highest performing ICS areas. The data presented demonstrate there is significant potential to reduce the readmission of patients owing to medicines-related issues. However, there is still considerable work to be done to fully embed the service into the health system. This paper does not comment on the feasibility of achieving these numbers but does suggest a target for health systems to aim for.

Further work is needed to understand the reasons for variation in activity levels and the enablers that are needed to address this, to realise the full benefit that the DMS has to offer patients and the wider health system itself.

Author Contributions

All authors were involved in the study design and conception. Data collection and analysis were completed by Nick Thayer. Data sourcing, transfer and analysis were reviewed by Adam Mackridge. All authors contributed to the drafting, editing and completion of the manuscript.

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Conflict of Interest

N Thayer—Employed by the Company Chemists' Association (community pharmacy trade association), Member of the Royal Pharmaceutical Society.

A Mackridge—Employed by BCUHB, Member of the Royal Pharmaceutical Society.

S White—Member of the Royal Pharmaceutical Society.

Ethics Approval

A favourable ethical opinion was obtained from the Faculty of Medicine and Health Sciences Research Ethics Committee at Keele University (MH-210178) before any data being collected.

Data Availability

No new data were generated or analysed in support of this research.

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