Reducing emergency hospital admissions: A population health complex intervention of an enhanced model of primary care and compassionate communities

Authors

Dr Julian Abel, Director, Compassionate Communities UK, Honorary Senior Researcher, University of Bradford

Dr Helen Kingston, Lead GP Frome Medical Practice

Andrew Scally, Statistician and Senior Lecturer, School of Allied Health Professions and Midwifery, University of Bradford

Jenny Hartnoll, Service Lead, Mendip Health Connections

Gareth Hannam – IT lead Frome Medical Practice

Dr Alexandra Thomson-Moore, Sands End Health Centre, Fulham

Professor Allan Kellehear, PhD., FAcSS,, 50th Anniversary Professor (End-of-Life Care), University of Bradford

Corresponding author Dr Julian Abel email julian.abel@nhs.net

Abstract

Background

Reducing emergency admissions to hospital has been a cornerstone of health care policy. There is little evidence of systematic interventions which achieved this aim across a population. We report the impact on unplanned admissions to hospital through a complex intervention over a 44 month period in Frome, Somerset.

Aim

A population health complex intervention of an enhanced model of primary care and compassionate communities to improve population health and reduce emergency admissions to hospital

Design

A cohort retrospective study of a complex intervention on all emergency admissions in Frome compared to Somerset from April 2013 to December 2017.

Setting
Frome Medical Practice, Somerset

Methods

Patients were identified using broad criteria including anyone with cause for concern. Patient centred goal setting and care planning combined with a compassionate community social approach was implemented broadly across the population of Frome. .

Results

There was a progressive reduction, by 7.9 cases per quarter (95% CI: 2.8, 13.1; p=0.006) in unplanned hospital admissions across the whole population of Frome, over the study period from April 2014 to December 2017. At the same time, there was sharp increase in the number of admissions per quarter, within the Somerset, with an increase in the number of unplanned admissions of 236 per quarter (95% CI: 152, 320; p<0.001).

Conclusion
The complex intervention in Frome was associated with highly significant reductions in unplanned admissions to hospital with reduction of healthcare costs across the whole population of Frome

How this fits in

There is little evidence for successful Interventions that have significantly and sustainably reduced unplanned admissions to hospital. We report on a complex intervention across a population 28,510 people cared for by a single GP practice in Frome, Somerset. The intervention was rigorous identification of all those in need, not limited by age or diagnosis, care planning and referral to the community development service for goal setting and social network enhancement. We have been able to demonstrate a 16% reduction of unplanned admissions, compared to a 29% increase in Somerset.

Introduction

Reducing emergency admissions to hospital has been a cornerstone of health care policy, to try and shift care from the most expensive part of the health care system, secondary and tertiary care, into the community. There is little convincing evidence of systematic interventions that have successfully achieved this aim. Despite these efforts, emergency admissions in the United Kingdom rose by 47% from 1998 to 2013, from 3.6 million to 5.3 million, with only a 10% increase in population over this period. These admissions are expensive; in 2012 they cost the NHS £12.5bn (€16.8bn; $18.3bn)(1) (2). Systematic reviews of prediction models have a role to play in identifying those people with chronic disease who are at risk of emergency admission to hospital(3). However, these models have only a limited role in reducing the burden of unplanned admissions in the United Kingdom (4).

In 2013 the Nesta Foundation produced a report which described a comprehensive redesign of health care to cope with the rising number of people with long term conditions(5). The model built on interventions that had already showed some success in delivering improved health outcomes. In relation to primary care, the model included flexible collaborative consultations, development of self management plans and social prescribing. The House of Care has played a central role in developing care planning (6, 7). Care planning alone has a limited impact in improving outcomes (8, 9). Community centred approaches have generated significant recent interest with publication of a report by Public Health England recommending them as part of an overall strategy for health and social care(10). There are no reports of the impact of testing these two components (care planning and community development) together as a complex intervention on health outcomes.

Frome Medical Practice is a single general practice in Frome, Somerset in the south west of England. The practice provides comprehensive primary care for 28,510 people. The practice embraced the house of care model of person centred care planning and modified the national template to enable all care plans to be undertaken using principals of personalised care planning. A community development service, known as Health Connections Mendip, was formed. Through the combination of targeted identification of people at risk of unplanned admission, systematic care planning for this group and referral to the social prescribing scheme and proactive community development, the practice have been able to demonstrate an increasing trend of reduction of emergency admissions to secondary and tertiary care.

Compassionate Communities may include an element of what is widely known as 'social prescribing'.(11) However, it is important to remember that it is not primarily that activity which defines their action. Social prescribing is often a way that patient populations are connected – or reconnected – to their communities by linking their personal lives with new social activities and networks that were previously unknown to, or little used by them – book clubs, walking clubs, coffee mornings, gym classes, befriending groups, and more(12). These kinds of referrals work well enough for physically mobile populations, but work less well, or not at all, for those largely confined to home for mental or physical health reasons, or for reasons of geography or financial barriers. Compassionate Communities bring networks to people, whilst social prescribing requires people to go to the networks. Both types of movement are useful in Compassionate Communities, but social prescribing alone favour mainly those in better health, a resource less common in end-of-life care circumstances.

Objective

The hypothesis for the design for the complex intervention was that combining a group of interventions, all which have showed some impact on health outcomes, would result in a significant reduction in unplanned admissions into hospital.

Methods

The study is a cohort retrospective analysis of a complex intervention on all patients identified for care planning at Frome Medical Practice from 1st April 2014 to 30th December 2017. A systematic identification of patients for care planning was done. The criteria for identifying patients was broad and from a variety of professionals and services. It was not limited to those with long term conditions or age and anyone who arose cause for clinical concern could be referred into the service. Care planning was done with a high degree of reliability. Patients were referred to the social prescribing service as necessary. In addition, systematic identification of patients was done through nurse or GP review of all discharge summaries following hospital admission within 72 hours of discharge. Those patients identified as being of clinical concern were referred into the administrative hub. Actions from the gathered information, including the discharge summaries, were generated and were of various types, including GP visit, medication review and further services as appropriate. All of these patients received a phone call offering them a review and the opportunity to discuss patient centred goal setting and care planning.

The individual identified was offered an appointment at home or at the surgery to review their care and make a care plan focusing on enhancing their health and wellbeing. Care planning/patient centred goal setting included treatment escalation and resuscitation choices.

Once care planning had taken place, individuals were offered referral to the Health Connections Service. Health Connections Mendip arranged one to one appointments with Health Connectors to those who were interested. Goal setting and further care planning took place if wanted.

Health Connections Mendip is a community development service with five major components. These are

1. The Mendip Directory consists of an extensive list of local resources, ranging from professional support such as citizens advice, housing and drug and alcohol services to

voluntary and community groups. The Directory is web based and has open access to public and professionals alike.

2. Community development. Health Connections Mendip originally mapped the extensive variety of community resource, including community groups, peer support networks and use of volunteer support. Over 400 professional, voluntary and community groups were identified. If gaps were present, new groups were started. Examples of groups started by the team were a macular degeneration group, a leg ulcer club, a bereavement group and a stroke group amongst many others. The Health Connections Mendip Service was not limited to those identified by the hub and could include anyone at Frome Medical Practice. The groups helped people meet, set health goals and manage long term health issues. These groups were included in the Mendip Directory and provided a useful resource for social prescribing for professional practice.

3. One to one support. Health Connections Mendip employed Health Connectors who worked on patient centred goal setting and care planning for a number of sessions. Part of their role was to help patients and carers enhance and build their naturally occurring supportive networks. Building resilient networks was considered to be important to the physical and emotional health needed for the demands of long term care giving for those suffering from chronic illness.

4. Community Connectors. Community Connectors were volunteers from the community who were trained to help people by signposting to services like health, housing, education, exercise and debt, using the Mendip Directory as an information resource.

5. Health Connections Mendip run their own groups where gaps in community resource become apparent. For example, weekly Talking Cafes were started for people to have a place to meet. They can be signposted to support and make new friends, six week self-management programme and On Track goal setting groups as appropriate.

Patients made choices about the level of support they wanted. The Health Connections Mendip service was available directly to the population of Frome and was not limited to referrals made solely by the primary care team.

Care plans were reviewed on an on going basis as circumstances changed. A weekly multidisciplinary meeting took place to discuss complex patients, those discharged from hospital and those who circumstances had changed. The project was further supported by primary care discharge liaison employed by Frome Medical Practice and working at the Royal United Hospital in Bath. Near patient testing facilities and ambulatory services through enhanced community hospital role is also part of the model.

Setting

The GP practice in Frome provides care to inhabitants of the town and the surrounding area. The number of patients enrolled in the practice is 28,510. The local GPs work as one large practice. An internal hub was set up in the practice to identify patients at risk of unplanned admissions. These patients were tracked to ensure that goal setting and care planning took place and were referred to the Health Connections Mendip. Health Connections Mendip identified over 400 groups or services

in the area and when gaps were identified, new groups were formed. Data collection for analysis ran from April 2013 to December 2017.

Participants

Eligibility Criteria

Patients were identified using a variety of methods. These were a mixture of data base searches such as Quality and Outcomes Framework long term conditions database, specific searches by diagnosis on the practice database and by clinical impression. The clinical impression identification was open to all health professionals and was not limited to doctors. There are patients who would not necessarily be picked up by database searches who would still benefit from use of the model of care due to the limits of predictability of care using screening tools (13, 14)

- People aged 95 or older

- Dementia

- Those identified as high risk of admission the Health Numerics Risc tool

- Stage 4 and 5 chronic kidney disease

- Medical Research Council breathlessness scale 4 and 5

- Those on telehealth monitoring

- Nursing and residential home residents

- Palliative care register patients

Anyone identified clinically of concern by discharge liaison team, practice team, district nursing team, through recent contact, community hospital ward doctor, discharge summary review, ambulance and out of hours contacts. This included carers as the practice has a coding system specifically to identify carers.

Key outcomes

The primary outcome measures were unplanned admissions to hospital for all patients of all ages who were under the care of GP practices in Somerset. Hospital Episode Statistics (HES) were used to measure the monthly number of unplanned admissions. This information was aggregated into three monthly totals.

Data for Frome patients were compared to data from the whole of Somerset excluding the Frome patients. The data set from which the data was taken included both sets of figures.

Data Sources

Each unplanned admission to hospital is counted in the Hospital Episode Statistics. Patient identifiable data was not made available. The data set gave practice level information, GP federation

cluster and date of admission. This meant that the data comparing Frome Medical Practice to the rest of Somerset all came from the same data source.

Bias

Frome Medical Practice is the single practice for all the residents of Frome and the surrounding area. This means that the population described is a complete cohort. This is helpful in reducing bias, as particular groups or areas are not excluded. Frome has a mixture of populations, with areas of both deprivation and affluence. Its demographics are similar to the profile for the rest of Somerset except a slightly larger proportion of people aged 25 – 44 and the under 10s(15)

Study size

The study population included all of those people cared for by Frome Medical Practice, as the intervention took place for all patients deemed to be in need of increased support at the practice. The comparison group were all people under the care of a GP in the county of Somerset. Whilst other initiatives have taken place in Somerset which have components of the Frome Model of care, the Frome Model is unique in applying all four of the component interventions together. This has meant that it is possible to test the outcomes of the Frome Model against other areas in the county, as well as the county as a whole.

Quantitative variables

The outcome measure upon which we focused was the aggregate number of unplanned hospital admissions. These were recorded for patients with for the Frome Practice and the remainder of the Somerset Practices, and for the pre- and post-intervention periods. The total number of admissions was aggregated by quarter to reduce the noise in the data, particularly for the Frome Practice where, due to it being a single (though large) practice, the monthly variation was substantial.

Statistical methods

Statistical methods

Using the quarterly data, monthly variations are smoothed out considerably and with high counts, for which a Poisson distribution tends towards a normal distribution, a general linear regression model was considered to be appropriate to model these data. Four models were generated, evaluating the effect of time on admissions in Frome and (rest of) Somerset in the periods before and after the intervention began.

Regression models were used for each analysis, with quarter as a single (linear) covariate. Instead of using a single complex model, the analyses were stratified by Frome/Somerset . All analyses were undertaken using Stata, version 13.1.

The complete data set of all admissions was used for analysis. We were not aware of any cases being lost to follow up.

Results

Outcome data

During the time period of the study, there were 235195 unplanned admissions to hospital for patients registered in Somerset. In Frome, there were 9885 unplanned admissions to hospital.

Main results

In the pre-intervention period, there was a slight, but not statistically significant, trend for the number of unplanned hospital admissions to increase with time, by 38 cases per quarter (p=0.56) in Somerset and by 9.5 cases per quarter in Frome (p=0.27). However, these were recorded for only five quarters, so these analyses may be underpowered to detect a meaningful trend.

In the post-intervention period, there was a sharp increase in the number of admissions per quarter within the Somerset cohort, compared to the pre-intervention period, with an increase in the number of unplanned admissions of 236 per quarter (95% CI: 152, 320; p<0.001). In contrast, within the Frome cohort there was a progressive reduction, by 7.9 cases per quarter (95% CI: 2.8, 13.1; p=0.006) in unplanned hospital admissions.

The admissions per 1000 population in Frome during quarter 1 of 2014, at the beginning of the intervention was 25. For Somerset this was 27.8. The figure for Frome by the end of the study period, quarter 3 2017 was 21.5, whilst in Somerset this figure had increased to 35.7 per one thousand population.

Figure 1

Number of quarterly unplanned admissions Frome Medical Practice 1/7/2013 to 31/12/2017. Intervention starts at quarter 5.

Figure 2

Number of quarterly unplanned admissions Somerset 1/4/2013 to 31/12/2017.

Table 1

Total number of Health Connections Mendip service directory website hits per year.

The quarterly average number of one to one new appointments for April 2016 to March 2017 was 50. For the period of April 2017 to December 2017 the number was 69. The figure for the previous years is not available for Frome alone but is available for the whole of Mendip.

Discussion

Summary

The results have two main outcomes. Firstly, the number of total unplanned admissions across the population of Frome decreased significantly over the study period, from April 2014 to December 2017. The number of unplanned admissions per quarter at the end of the study period, compared to beginning , were 16% lower. Secondly, during the same time period, the number of unplanned admissions across Somerset increased sharply. The number of unplanned admissions at the end of the study period was 29% higher per quarter compared to the beginning.

The intervention has continued after the study period finished. Costs of unplanned admissions 2013 – 4 in Frome were £5,755,487. For 2016 -7 the costs were £4,560,421. This represents a 21% reduction. Cost data is not yet available for the financial year of 2017-8. Changes in costs are not linear as payment by results tariffs change over time. Further role out of the Frome Model is taking place in the Mendip area of Somerset, with a population of 112,500 people.

The method of identifying the people who were in need of the intervention in Frome was unlike many other studies that have looked to reduce unplanned admissions to hospital. Rather than relying on identification of people through risk scores or long term conditions register, the health professionals at the Frome Practice could identify individuals irrespective of diagnosis. In addition, referral from any source, including self referral, was possible to the Health Connections service. This openness of patient identification is likely to have helped the impact the whole population approach.

The complexity of the intervention has been summarised in four steps. However, the impact of the Frome project in terms of working practices and organisational culture is diverse. General practitioners, for example, are able to print off the list of resources available from the Health Connections Mendip directory(16). This website is open to the public and this may have further impact on hospital admission reduction. The Frome Model is both a medical and social intervention. The model directly involves community action. This being the case, it is not possible to conduct an analysis of those people who were exposed to an intervention compared to those who were not. For example, currently there are over 600 Community Connectors. On average, a Community Connector will have 20 conversations with people about the resources that are available on the Mendip Directory per year. This is over 12,000 conversations in a population of 29,000 people. The aim of community development is to enable as much resource as possible to exist within the community, without always involving health or social care services.

Social connectedness has long been known to be a primary determinant of health and longevity(17). We have found a way of bringing this into routine clinical practice in Frome in a systematic way. This may explain some of the reasons as to why the impact of the Frome Model has been successful in reducing unplanned admissions to hospital.

Strengths and limitations

The significant size of the study population strengthens the reliability of the results. The study setting of Frome meant that the population examined covered all patients who were registered with the general practice. This helps to reduce the risk of bias through exclusion.

Whilst the results are promising, it is not clear how generalizable they are. The four interventions are in principle applicable in a variety of circumstances. Government policy and a number of reports recommend use of these initiatives(5, 6, 18, 19)

This is an observational study and as such, does not provide proof of causation. The intervention set out to address the needs of people in the hope of providing better care. The original intention did not focus solely on reduction of admissions to hospital. During the two years of the study period, no other significant initiatives took place in the town either to health care or the social infrastructure or demographics of the town itself.

Comparison with existing literature, Implications for Research and/or practice

The results of the application of the Frome model of care are promising and support earlier but smaller scale indications of success noted for their broad public health mix of clinical and community development health care approaches(20-23). However, many questions remain unanswered and will need further evaluation. In Somerset a variety of admissions avoidance interventions took place in other areas at the time. This complicates the interpretation of the sole impact of the Frome model. The observational nature of the study does not prove causation and further quantitative prospective controlled studies are needed. The complexity of the intervention was summarised in to four components. It is not clear how much impact each component had and the relative importance of combining all four together.

Uniting primary care with community development worked well in Frome. There are further, more elementary indications that these work well in other locations in the UK.(20, 21, 24) Nevertheless, general practices are very diverse and it remains to be seen if the same principles can be applied equally effectively in inner city practices across England, as well as more rural settings.

This diversity in general practice models highlights the issue of community diversity more broadly. How receptive particular groups in urban areas in the UK, especially some older single household groups, or different ethnic/religious groups, may be to social prescribing and community development opportunities remains questionable. This lack of major empirical data stands out against a background of small studies about the support needs and barriers of these populations that often send out paradoxical, at times even counterintuitive recommendations(25-28).

Implications for practice

Through the development of the model in Frome, along with the roll out across the Mendip area of Somerset, we have learnt some principles which could inform a wider roll out of the Frome Model in other areas.

1. Implement all the functions of the model. We know from the literature and from partial implementation in other areas of Somerset that do not result in similar admissions reductions found in Frome. We believe it is the full model implementation that seems to be the cause of reduction in unplanned admissions. Data from partial implementation in other areas of Somerset failed to stop the rise in population unplanned admission numbers.

2. Implementation in Frome and across Mendip has been owned by primary care. Change has been from the ground up, designed by the people who do the work, rather than a top down command and control style change.

3. Clinical impression, rather than risk stratification or use of databases was used to identify those in need of support.

4. Quality improvement methodology was used as the tool for change. Not only does this build continuous improvement from the ground up, it allows for small scale testing to find out what works prior to wider use. In addition, safe, reliable systems are needed to be able to make the changes across a population to effect unplanned admissions reduction.

5. The community development worker is seen as a member of the clinical team. Their role has the added advantage of being able to cross organisational silos of professional care and community. We feel that it is the integration of both of these areas that has contributed significantly to the success of the project.

6. Working relationships across teams and organisational silos, come first. Building relationships is seen as the key starting point for change. Without these good relationships, ground up change is difficult.

In addition to these six key lessons, we recommend other factors which will help to build a successful project.

- Build on what is already there. Elements of good practice already exist. Building on these means that some of the infrastructure work is done and proper respect is given to the efforts already made.

- Given the siloed nature of health and social care, a steering group for area is helpful in coordinating an effective project.

- Whilst we believe we have described the key functions of the Frome Model, we advise that these be adapted to suit local structures. There is no one size fits all solution. Wider roll out should be participatory in nature, adapting to local circumstances and structures, built from the ground up.

- We recommend that any implementation project should be funded for three years. Our experience is that the cost reductions begin after the first year. Three years funding gives time for overall cost reduction to pay for the model. The return in investment for Frome was six pounds for every pound spent.

The paper serves the purpose of bringing the results to the attention of the medical community and beyond, rather than providing a comprehensive answer as to why the Frome Model has been effective. Many further studies will be needed to tease out the details that will allow us greater understanding of the model and its effectiveness. This includes looking at demographics as well as seeing what the impact of implementation is in other areas. Notwithstanding the limitations, the current study offers the first major indicator that these kinds of approaches can address the year on year increase in unplanned admissions in the United Kingdom.

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