Author's response to reviews

Title: Frequent emergency department attenders and frequently readmitted patients: how the differences can shape policy.

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Version: 4 Date: 29 April 2010

Author's response to reviews: see over
29 April 2010

To BMC Health Services Research Journal

Reply to reviewers’ and associate editor’s comments

MS: 7508608783262318

Preventing frequent readmissions: the influence of condition, access to services and patient choice.

Sue E Kirby, Sarah M Dennis, Upali W Jayasinghe and Mark F Harris

Thank you for the comments on the revised manuscript which included comments from the two reviewers and comments from the associate editor. We appreciate the opportunity to make amendments to the manuscript based on the comments. The suggested re-focussing of the study to concentrate on readmissions has simplified the research question thereby strengthening its impact.

I have attached the manuscript with track changes so that the way in which the paper has been amended can be clearly seen. In addition, a clean copy without track changes has been attached to this letter for ease of reading.

The title has been amended to reflect the change of focus to readmissions. By omitting the sections on frequent attenders, there is now more discussion of the meaning of the findings of analysis in terms of the patient demographics, clinical condition, access issues and patient choice.

A detailed response to each of the comments made is attached to this letter providing the page number and section in the revised manuscript without track changes.

Again thank you for the opportunity to revise the manuscript based on the second set of comments. I have pleasure in submitting the revised manuscript for your consideration.

Yours faithfully,

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Detailed Response to Comments

Reviewer Dr Judith Savageau

1. The study is limited by only looking at administrative data from that one hospital and not all admissions in a relevant geographic area.

The role and resources of hospitals plays an important part in the ability of a hospital to admit. Whilst we agree that it would have been worthwhile to include data from other hospitals in the geographic area to obtain a broader picture of patient characteristics associated with frequent readmissions across a range of hospitals in the network and to uncover possible differences between hospitals, such a study would have been beyond the scope of this PhD project. The work remains limited to only one hospital.

The hospital in the study functions as a regional/community hospital for the immediate geographic area. Patients who live locally present to the emergency department and if admission is judged to be clinically necessary, are admitted to the same hospital or, if no bed is available, to another hospital in the network. All admissions, including those admitted and transferred to another hospital have been included. This means that once the clinical decision to admit has been taken, the patient data is included in the study even though the patient may not have occupied a bed in the hospital under study. The excerpt below shows where this issue is taken up in the Methods section (page 10 of the clean copy):

Presenting patients judged to have conditions warranting admissions may be either admitted to the study hospital or to another hospital in the network if the bed supply is inadequate. All admissions, including those for which patients were placed in a bed in another hospital, were included in the sample.

2. Severity - the next layer of decision-making for admission of a patient once presented and evaluated really isn’t addressed in the article and would need to be acknowledged and discussed more.

There is no factor included in the data analysis which specifically captures the severity of the condition for which the patient is admitted. However, the clinical decision to admit points to severity, as less severe conditions would not require admission. This point is covered in the discussion on page 15 of the Discussion:
Although the regression models did not include a variable for severity of illness per se, other variables point to severity. The triage level specifically indicates urgency and more urgent conditions are generally more severe.

3. Minor issue – typographical errors

The typographical errors have been corrected.

Reviewer Dr Benjamin Friedman

1. I continue to have reservations about this work. ED overcrowding is an important problem. I encourage the authors to develop a hypothesis driven analysis that focuses on one particular question, be it frequent presenters or the frequently re-admitted, but I fear concentrating on both proves too distracting—the two groups are quite different.

The study has now been restricted to frequent readmissions suggested. The change of focus is reflected in the Introduction pages 4 and 5 as shown in the excerpt below:

Overcrowding of emergency departments has spawned a plethora of research on frequent emergency department users. Byrne et al [2] reported that frequent emergency department users were more likely to be males from low socioeconomic backgrounds with severe psychosocial problems who have a high morbidity and mortality. There have been similar findings from researchers in the UK [9-12], Canada [12, 13], Sweden [14-16], USA [17-25], Italy [26], Taiwan [27, 28] and Australia [29, 30].

Frequently readmissions, however, have received less research attention. The Patients At Risk of Readmission (PARR) tool, used extensively in the UK for identification of patients for case management to prevent readmissions, [31, 32] indicates that age, sex, ethnicity, number of previous admissions, and clinical condition are associated with readmissions. Howell et al [33] in a 2009 study in Australia identified age, co-morbidities, economic disadvantage, number of previous admissions as risk factors for frequent readmissions through a statistical algorithm derived from inpatient data. The Australian model was only moderately successful because of the relatively high number of false negatives. Our study examined clinical, demographic and hospital usage risk factors associated with frequent readmissions for chronic disease. The risk factors were identified using regression models which specified the most common diagnoses in presentations which resulted in admission. It is part of a broader research program which includes a
qualitative comparison of readmitted chronic disease patients with chronic disease patients managing without being readmitted.

2. Additionally, there needs to be some consideration of what exactly is being sought. If you are looking for an epidemic of under-treated asthma, then it would be interesting to identify a spike in respiratory-related admissions. If you feel that drunks are taking up a lot of space in the ED and that alternate treatment locales are needed, then it would be interesting to discover that poisonings do not contribute substantially to frequent ED use. Conclusions like “diversion of males seeking treatment for supplementary care to outpatient clinics would reduce the burden…” does not provide the reader with useful information.

The research question has been re-specified to overcome this problem. This study aims are stated in the Introduction page 8:

This research analysed emergency department data routinely collected by hospitals in the state of NSW, Australia, to identify patient related factors associated with three or more admissions a year and with admission for ACS conditions. The analysis was designed to answer questions about the impact on frequent readmissions of three sets of variables: demographic, clinical and arrival times and dates. The answers provide a basis for exploring the reasons underlying frequent readmissions. The research sets the scene for further examination of the reasons why people with chronic conditions are repeatedly admitted to hospital rather than seeking chronic disease management services.

3. Additionally, there should be a specific rationale for every independent variable that is included. Do you believe that immigrants are under-served within the existing primary care system? Then the born in Australia variable is of interest. Do you believe that patients are left without resources when the primary care clinics close on the weekends? Then this variable is of interest.

The significance of the contribution of each of the independent variables to frequent readmissions in the regression models is discussed. The relevant sections of the Discussion are detailed below.

Demographic: age, sex and ethnicity page 15. Clinical - Diagnosis: pages 15, 16 and 17.
4. The methods and results remain difficult to read. I encourage the authors to use subheadings such as these in the Methods section: “Primary Predictor Variables” “Co-Variates of Interest” “Primary outcome” “Study site” “Power”. In the Results section, could the whole univariate section be eliminated?

Subheadings are included in Methods and the univariate section of results has been deleted as suggested (pages 9-12).

5. Despite your statement to the contrary, I believe the “frequent admissions” model is over-fitted. Couldn’t this be corrected by combing several years of data for analysis? This might be worth doing regardless. Better to present all the data then to reassure us that “similar results were confirmed for other years in the data series”.

It was not possible to amalgamate the individual data files into one larger file for analysis because when the data was extracted, patient identifier numbers were assigned for each year and there was no way of matching patients from separate data files.

The regression models specify the five most common individual ICD 9 diagnoses in the presentations resulting in admissions and the three ACS diagnosis groupings (preventable, rapid onset and chronic) thereby demonstrating the association between the other independent variables and frequent readmissions.

6. Finally, I’m afraid the discussion needs to be better researched. Here are some statements that should be referenced and contextualized: “high proportion of male frequent attenders…explained by men preferring ED services....”; “patients seek help for musculoskeletal conditions from GPs, physiotherapists...”; “frequent readmissions for mental health conditions might be associated with paucity...”

With the elimination of frequent attenders from the study we believe we have now been able to concentrate on explaining the findings in context. The focus of the discussion has shifted to discussing the contribution of the variables in terms of condition, access and patient
preference. We believe the revision has achieved a clear indication of the evidence from our study and discussed the implications.

**Associate Editor’s comments**

1. "The review 1 (Friedman) raised a very important question. Frequent users and repeated admitted patients are different in terms of reasons and characteristics. Frequent users of ER have been widely described by other studies. However the admission is less studied. I see that is unique contribution to the literature.” I suggest that authors should focus on describing the frequent admission in the paper only.

The study has now been re-focussed as suggested and the aim clarified. See our response to Dr Friedman’s first and second comments.

2. Reasons for admission (major diagnoses for admissions) should be described using individual conditions. Broad classification is a way but provides limited information for prevention.

The independent diagnosis variables have been re-created to reflect individual ICD 9 codes. See Methods pages 10 and 11:

The independent diagnosis variables included the proportion of the most common ICD 9 diagnosis codes for presentations resulting in frequent readmissions: neurosis, chronic heart failure, chronic obstructive pulmonary disease (COPD), dyspnoeas and chest pain.

3. Reviewer 2 (Savageau) raised severity of illness issues. Administrative data lack the information but can be used to define case-mix for hospital admissions.

See our response to the second comment by Dr Savageau's.

4. Were repeated admissions admitted for the same diagnosis?

The way in which the independent proportional variables were constructed is more fully described in Methods, Logistic regression models and manipulation of predictor variables pages 10 and 11:

Two logistic regression models for multivariate analysis were constructed with the binary dependent variable. The independent
variables for which each hospital presentation was different (hour, day and season of arrival) and the independent variables for which each hospital visit was potentially different, (urgency, type of visit and diagnosis) were transformed by counting the number of occurrences in the group of presentations for each patient and dividing by the total number of presentations for that patient resulting in a measure of the proportion of occurrences. As the values ranged from zero to one, they were treated as covariates. The independent diagnosis variables included the proportion of the most common ICD 9 diagnosis codes for presentations resulting in frequent readmissions: neurosis, chronic heart failure, chronic obstructive pulmonary disease (COPD), dyspnoeas and chest pain. The other clinical variables were triage urgency and unplanned return visits. The creation of this set of variables took account of the issue that a patient presenting repeatedly during the year may present with a different diagnosis, urgency, mode of separation, type of visit and diagnosis for each presentation.

In the second logistic regression model, the three independent proportion-of-diagnoses variables were based on the ACS groupings: preventable conditions; rapid onset conditions and chronic conditions [40] were substituted for the ICD 9 diagnoses variables in the first model.

5. Could these admissions be prevented? Ambulatory care sensitive conditions may be an option to address this question.

On the basis of the data available, we are not able to fully answer the question of whether admissions are preventable. However, there are partial answers. The finding that chronic ambulatory care sensitive (ACS) conditions are associated with frequent readmissions suggests that they are. See pages 16 and 17 of the Discussion:

Patients with ACS chronic conditions were significantly more likely to be frequent readmissions. This finding could mean that access to primary care services for preventable conditions (immunisation and nutritional interventions) and rapid onset ACS conditions is adequate and access to chronic disease management services is not. Alternatively, the findings could indicate that patients are choosing hospital services over primary care services for chronic disease management. The results of the ACS model reinforce the results of the first model, because all the conditions found to be associated with frequent readmissions, except for neurosis, are included in the ACS chronic grouping [40].
Further discussion of access is to be found on page 17 of the Discussion:

Does poor access to other services contribute to frequent readmissions? Time and day of arrival had no significant impact on frequent readmissions. It might be expected that the more frequent emergency department users would opt for after hours or weekend visits when other community based services are less available. Our findings tend to negate any notion that access to after-hours and weekend services is an issue. However, the finding that ACS chronic conditions were associated with frequent readmissions suggests there are access issues at play. Although alternative general or specialist medical and chronic disease management services exits, there may be access difficulties other than the time of availability of services at play. Access factors such as, availability, accessibility, accommodation, affordability and acceptability, need to be further explored before we have a definitive answer on the impact on frequent readmissions.

6. Discussions should be focused on the repeated admission only. Admission is decided by physicians or clinicians. Could these admissions be prevented?

The study has been re-focussed, as suggested, on frequent readmissions. The following passage from the Discussion (page 18) illustrates the point about preventable admissions.

On the basis of the findings presented in this study, the question of whether readmissions are preventable was not directly answered, but the evidence from other studies shows that hospitalisation of chronic disease patients can be reduced by a range of targeted interventions to improve chronic disease management [45].