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Hospital readmissions and socioeconomic deprivation in Switzerland

Summary

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Background

The healthcare system in Switzerland is known for its good performance and the high quality of care delivered¹. It is highly decentralised and many policy decisions (planning and financing) are made at cantonal level. Moreover, the coordination between primary healthcare and hospital care could be improved, and great attention is paid to hospital care².

Hospital readmissions are a problem faced by healthcare systems in industrial countries since they have an effect on costs as well as on patient safety, health and quality of life. While some readmissions are unavoidable, a significant proportion are deemed to be avoidable. Unplanned readmissions are a key area of attention for regulators of healthcare systems because of the associated costs and also because they are seen as a readily accessible indicator of the quality of hospital care³.

The literature shows various factors associated with the risk of readmission including factors linked to pathology, factors linked to usage of the healthcare system and factors linked to demographics and patients' socioeconomic status⁴. In particular, a lower socioeconomic status is associated with a higher risk of readmission⁵. Nevertheless, readmission policies do not pay sufficient attention to patients' socioeconomic status, which may increase inequality in healthcare.

Moreover, in Switzerland, studies are generally based on specific samples (covering specific regions, populations or types of pathology) and do not provide scope for a full overview of the distribution of hospital readmissions at national level. However, it seems relevant to know whether the distribution of hospital readmissions in Switzerland is consistent across all regions and/or cantons and whether accessing healthcare through hospital readmission depends on the socioeconomic attributes of the regions where the patients live.

In order to provide some answers to these aspects, this study examines national and cantonal variations in potentially avoidable hospital readmissions and the extent to which there is a link between socioeconomic characteristics of place of residence and potentially avoidable readmissions.

¹ de Pietro, C., et al., The performance of the Swiss health system: good results but high costs: Wilm Quentin. *European Journal of Public Health*, 2015. 25(suppl_3).

² Wyss, K. and N. Lorenz, Decentralization and central and regional coordination of health services: the case of Switzerland. *Int J Health Plann Manage*, 2000. 15(2): p. 103-14.

³ [Is the Readmission Rate a Valid Quality Indicator? A Review of the Evidence - PMC \(nih.gov\)](#)

⁴ [Réadmissions hospitalières : problématique actuelle et perspectives \(revmed.ch\)](#)

⁵ Zumbrunn, A., et al., Social disparities in unplanned 30-day readmission rates after hospital discharge in patients with chronic health conditions: A retrospective cohort study using patient level hospital administrative data linked to the population census in Switzerland. *Plos one*, 2022. 17(9): p. e0273342.

Objectives

The main aims of this study are:

- 1) To examine regional and cantonal variations in potentially avoidable readmissions
- 2) To investigate, at the regional level, the correlation between potentially avoidable readmissions and socioeconomic status
- 3) To evaluate explanatory models of the variation in potentially avoidable readmissions using multivariate regression models. The regression analyses are based on various models:
 - different groups of explanatory variables, including socioeconomic and cultural indicators (SDI, MEDINC, CLT)
 - the 30-day readmission indicator, plus the 10-day and the 11 to 30-day readmission indicators
 - a specific view of the correlation between readmissions and the educational level of the population
- 4) To evaluate the possible savings through potentially avoidable readmissions if the entire Swiss population were to have completed compulsory education.

Methodology

Indicator of hospital readmissions

- Hospital readmissions are defined as a return to hospital within 30 days, 10 days or 11-30 days following discharge. The first indicator (indicator 1) of potentially avoidable hospital readmissions is defined as the relationship between the number of potentially avoidable readmissions and the total number of hospitalisations. In addition, since population structure and morbidity vary between regions, to identify potentially avoidable readmissions more fairly, it is necessary to take these differences into account and make adjustments for them (these differences concern for example a higher risk of readmission for older patients and those with multimorbidity than for younger patients in better health. As a result, the expected rate of potentially avoidable readmissions varies according to population structure). The second indicator of readmissions (indicator 2) is defined as the ratio of observed to expected potentially avoidable readmissions in the MedStat regions. This measures the higher level of observed versus expected potentially avoidable readmissions taking population structure into account. A ratio of 1.1 indicates that potentially avoidable readmissions exceeded the expected level by 10%.

Indicators of socioeconomic disparity

- The Socioeconomic Deprivation Index (**SDI**) is a single variable reflecting the socioeconomic status of a MedStat region. It is compiled from 5 parameters, each of which represents a specific dimension of socioeconomic deprivation (social support, income, compulsory education, unemployment, unskilled workers);
- Educational level below compulsory schooling (**NOEDUC**) is a variable showing the proportion of adults (>19 years of age) who have not completed compulsory education on the level of MedStat regions.

Statistical analysis

1. Geographical variation in readmission indicators

The inter- and intra-cantonal variations in potentially avoidable readmissions are shown by maps and graphs.

2. Socioeconomic deprivation gradients in the readmission indicator

For all regions, a graph shows the Socioeconomic Deprivation Index (SDI) on the horizontal axis and the potentially avoidable hospitalisation rate on the vertical axis. These graphs can be used to examine whether there is a link between the SDI and the readmissions indicator. For example, systematically higher hospitalisation rates in more deprived regions than in less deprived regions can be interpreted as showing a socioeconomic gradient in readmissions.

3. Multivariate modelling

The analysis of certain factors that predict potentially avoidable readmissions and especially the effect of the socioeconomic dimension is based on an econometric estimate derived from several multi-level linear regression models. These allow taking into account the structure of the data, which are grouped at two levels: cantonal and regional. The models test explanatory variables defined at regional level (SDI, MEDINC, CLT, topography, NOEDUC) and cantonal level (density of care homes).

4. Impact of reducing the proportion of individuals who have not completed compulsory education on the number of days of potentially avoidable readmissions

The estimates derived from the regression models are used to predict the impact of a change in the educational level of the population on potentially avoidable readmissions. To calculate the associated readmission rates, the proportion of people who have not completed compulsory education is assumed to be zero.

Results:

For the sake of brevity, the parameters presented in this summary relate exclusively to the indicator of readmissions defined by the excess of observed potentially avoidable versus expected readmissions (indicator 2). Readers should refer to the full report for the analysis of readmission indicator 1.

1. Geographic variation in the 30-day readmission indicator

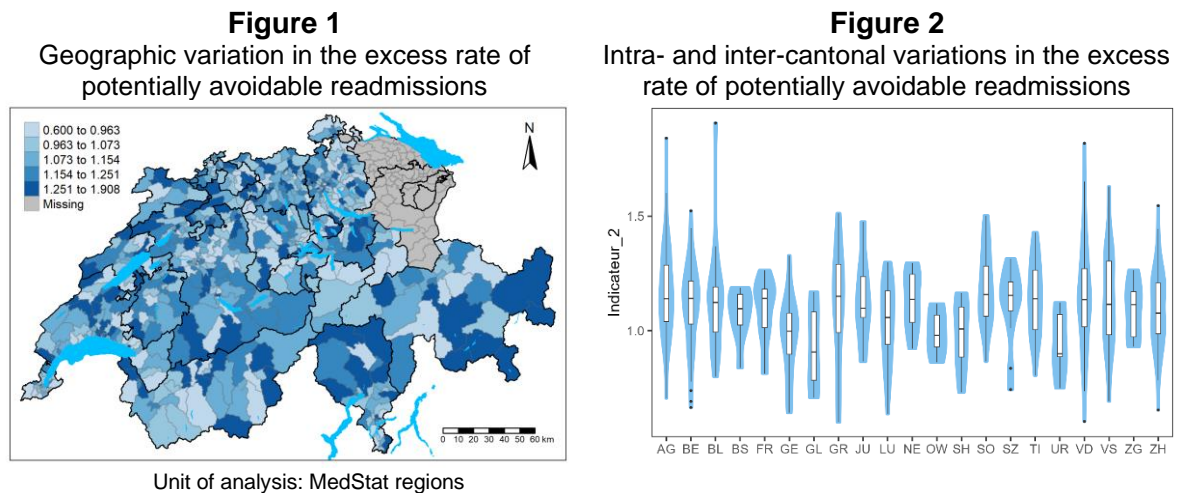
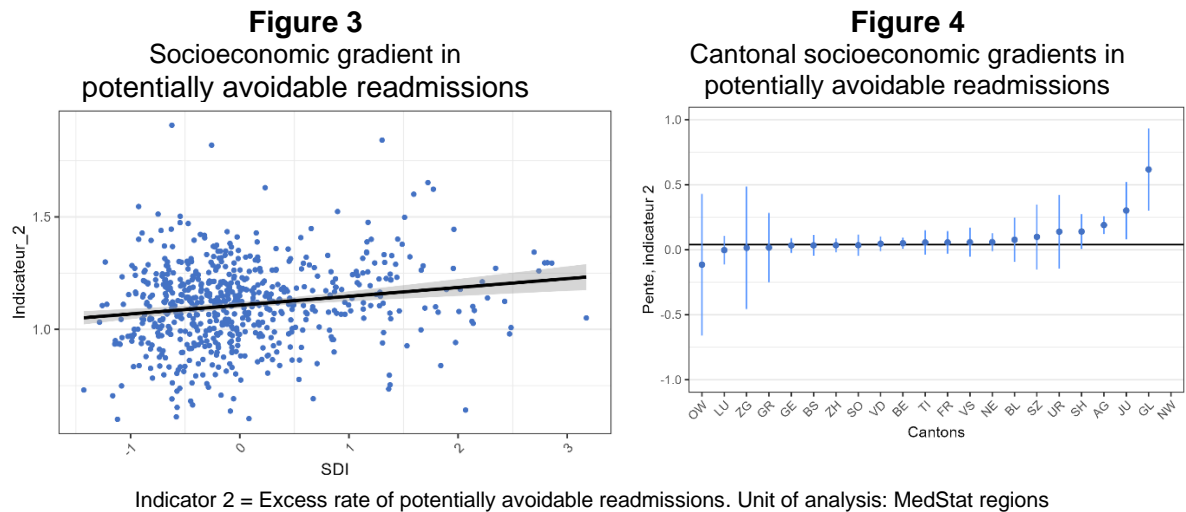


Figure 1 shows a certain disparity between the excess rate of potentially avoidable readmissions at inter- and intra-cantonal level (Figure 2). For example, the excess rate of potentially avoidable readmissions is highest at 1.8 in the canton of Vaud (VD). At the other end of the scale, the overall readmission indicator for the canton of Geneva (GE) is close to 1 (i.e. the number of observed and expected readmissions are close in this canton). Note that the variation within cantons is high. For example, in the canton of Vaud, the minimum levels for indicator 2 are close to 0.6 and the maximum levels are close to 1.8.

2. Socioeconomic deprivation gradients in potentially avoidable readmissions



The analysis of the variation in excess rates of potentially avoidable readmissions relative to the socioeconomic deprivation index shows a positive correlation between these two dimensions at national level in Switzerland (Figure 3). This relationship suggests that there is a socioeconomic gradient in potentially avoidable readmissions. Figure 4 shows the socioeconomic gradients in hospital readmissions at cantonal level. Each point represents the socioeconomic deprivation gradient in potentially avoidable readmissions relative to the national value (bold horizontal line). Certain cantons, such as Aargau, Jura and Glarus, tend to have gradients above the national gradient. This difference is significant when the vertical segments around the points do not intersect with the bold horizontal line.

3. Multivariate modelling

The results of multivariate analyses can be used to identify various factors predicting an excess rate of potentially avoidable readmissions.

- The results show a solid, positive and significant association between potentially avoidable readmissions and the SDI. There is a socioeconomic gradient in hospital readmissions: excess readmission rates are higher in regions with higher levels of socioeconomic deprivation.
- The results are less solid with regard to the relationship between potentially avoidable readmissions and income, but there is good evidence of a negative association. It is observed that the excess rate of potentially avoidable readmissions is lower in regions where the median income is higher.
- Introducing the educational level of the population into the analyses, where SDI is not included, shows a significant association with potentially avoidable readmissions. The

results suggest that the excess rate of potentially avoidable readmissions is higher where a high proportion of the population has a low educational level (defined as not having completed compulsory education).

- Overall, cultural diversity is not shown to predict potentially avoidable readmissions. Nevertheless, in certain specifications where the socioeconomic dimension is not taken into account, there is a significant positive correlation between the proportion of foreigners and potentially avoidable readmissions. It is probable that cultural diversity also reflects differences in socioeconomic deprivation.

If the 30-day readmission indicator is decomposed into a 10-day readmission indicator and an 11 to 30-day indicator, the analyses can be used to examine to what extent the association between the 30-day readmission indicator and the explanatory variables (especially socioeconomic and the availability of care) can be broken down between the 10-day and the 11 to 30-day indicator.

- Socioeconomic deprivation seems to be a weaker predictor of the 10-day readmission rate than of the 11 to 30-day readmission rate. The coefficient of the variable is slightly lower and less significant for 10-day readmissions than for the 11 to 30-day indicator.
- After applying controls for the socioeconomic dimension, the variables of topography and cantonal offer (density of care homes) display a significant association with the 11 to 30-day readmission indicator, but not with the 10-day indicator. In particular, urban areas have higher readmission rates than rural regions. A higher offer in care homes is associated with a reduction in the 11 to 30-day readmission rates. These results suggest that the patient's environment is a better predictor of readmission in the long term than immediately after discharge.

Discussion

Summary of the findings

1. The hospital readmissions indicator displays a significant geographical variation: the regions and zones presenting a relatively high or relatively low excess rate of hospital readmissions should be studied in more detail.
2. We observe robust socioeconomic gradients in potentially avoidable readmissions at national level on the basis of both socioeconomic deprivation and education.
 - The excess rate of potentially avoidable readmissions is higher in the more deprived, less rich regions and those with a lower educational level.

- There is some – albeit modest – variation in the socioeconomic gradients between the cantons; some cantons systematically show gradients above or below the national average.
 - The analyses can be used to gain a fuller and more detailed insight into the impact of certain variables affecting readmissions based on the time period for which the indicator is defined. Socioeconomic deprivation and a low educational level both impact the 10-day and 11 to 30-day readmission rate, but with a stronger impact on the second rate than on the first. The environmental variables (topography) and the supply variables (density of care homes) are found to predict readmissions further from the date of discharge rather than close to it. An increased offer in care homes would reduce readmissions.
3. The analysis can be used to estimate the potential savings via readmissions if the entire population had completed compulsory education. Across all pathologies, an estimated reduction of 6.9% in total potentially avoidable readmissions per year, representing 21,804 days in hospital, could be achieved if the proportion of the population that has not completed compulsory education were to reach this level. This corresponds to estimated savings in hospitalisation costs of between CHF 33 million and CHF 44 million, representing between 0.2% and 0.3% of the total curative hospital costs of the healthcare system.

Implications

This study's main contribution is to highlight the disparities in the Swiss healthcare system in terms of potentially avoidable hospital readmissions. Readmissions vary between socioeconomic groups and place of residence, which indicates a problem at the level of healthcare equity. In fact, we observe differences between the cantons and regions, with regions with greater socioeconomic deprivation showing higher average rates of potentially avoidable hospital readmissions.

There are several factors that may explain the number of readmissions and the variations between geographic areas. Our results show some of these factors and therefore suggest potential policy measures that could be introduced to help avoid some of these readmissions. These actions should target both patients and service providers of the healthcare system.

Low socioeconomic and educational levels impacting potentially avoidable readmissions could reflect financial difficulties in accessing healthcare, adherence to treatment, and the organisation of medical follow-up following discharge from hospital. Possible actions could include efforts to reduce the differences in health literacy. In particular, the proportion of people

with a low educational level is higher among older population groups and/or foreign nationals⁶, so action could be directed more specifically to these two groups. Better access to outpatient care, to care at home and to care homes are avenues that could be considered to influence avoidable readmissions. Offering better post-discharge follow-up combined with greater access to transitional care could also influence the risk of readmission.

In practice, we recommend that hospitals pay special attention to difficulties that patients have in understanding their own illness. Information aligned with their educational level should help them understand whether the aftermath of hospitalisation is normal, notice signs and symptoms of possible complications, understand the benefits of post-operative therapy and be aware of the need to seek advice rapidly in the event of problems. Information for relatives could also be useful in such situations. An assessment of such measures targeting people with a low educational level could be useful to verify their effectiveness.

For several years, the indicator of potentially avoidable readmissions has also been used in Switzerland as an indicator of the quality of Swiss hospitals and clinics. It is calculated by the ANQ and allows an assessment of the performance of each institution. Having shown a significant association between this indicator and both the socioeconomic characteristics of patients and the availability of care following discharge from hospital, it is evident that the quality of treatment offered to patients in hospital is not the only reason for unplanned readmissions after discharge and for which mitigating action is required.

Data discrepancies and next steps

Although we had access to a wide range of individual data on hospital readmissions, the socioeconomic, cultural and healthcare indicators were available on the regional rather than the individuals level. Data on hospital readmissions were therefore aggregated at the regional level for the current analyses. This study has shown that a reduction of differences in average educational level in some regions could lead to a drop of about 7% in potentially avoidable readmissions. This probably only represents some of the real impact of socioeducational variables because our estimates do not take into account the differences between individuals within the regions. A more detailed understanding of inequity would need to include further indicators, if possible at the individual level.

This project shows the feasibility and interest in using indicators to shed light more systematically on the problems that can occur at national and cantonal level. Potentially avoidable readmissions and their distribution within the population (based on socioeconomic

⁶ Wolter, S. C. *Bildungsbericht Schweiz 2018*. Aarau: Schweizerische Koordinationsstelle für Bildungsforschung, 2018: https://www.skbf-csre.ch/fileadmin/files/pdf/bildungsberichte/2018/Bildungsbericht_Schweiz_2018.pdf.

status) can be used as indicators to evaluate the impact of national and cantonal policies affecting various aspects of the quality of care and of the accessibility and coordination of inpatient and outpatient care.