Unplanned Readmissions with Medication Related Problems in Hospitals

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Mini Review

Hospital readmission is defined as "patient readmission into the hospital within 30 days (or 4 weeks) of discharge". Readmission rates are used as an indicator of the quality of care that patients receive during a hospital admission and after discharge.

Readmission is a worldwide problem. It is an unacceptable outcome from the perspective of patient centered care. Readmission is considered as a good indicator for quality of care but is not perfect (should be interpreted with caution) because of the other factors such as patient's age and the disease complexity. Some countries started to deal with this issue effectively. For example, USA hospitals are accountable for their readmission rate to reduce the cost and volume of treatment. In UK and Australia they monitor hospital readmissions as well. Studies indicate that 5-10% of hospital admissions are as a result of adverse drug event and 50% of them are preventable.

A drug related problem (DRP) is defined as an event or circumstance that involves a patient's drug treatment that actually, or potentially, interferes with the achievement of an optimal outcome [1,2].

Problems associated with the drug use have a wide set of factors that can be considered as DRP viz. adverse drug reactions, drug interactions, untreated indication, inappropriate drug selection, sub-therapeutic dosage, supra-therapeutic dosage, non-compliance and drug use without indication.

There was a study about Pediatric Readmissions which showed that the rate of readmission was 7.6% with age group between 13-18 years and 6.1% in age group between 1-12 years. Pediatric disease state and child age are more related with Medication Related Problems (MRP) which can cause morbidity, mortality and significant burden on healthcare resources. MRPs are caused by adverse drug reactions, drug interaction,

untreated complication, incomplete treatment, inappropriate drug selection, sub-therapeutic dosage, supra- therapeutic dosage, non compliance and medication use without indication. Planned readmissions were identified with procedure codes from the International Classification of Diseases, Ninth Revision, Clinical Modification.

A large amount of empirical research has been sought to explain the variation in hospital readmission rates observed in many high-income countries [3,5]. Identifying the reasons for readmissions can be crucial to securing a reduction in readmissions that are potentially avoidable, thereby reducing healthcare costs and improving health outcomes. Hospital mortality and readmission rates are important indicators of hospital outcomes that are frequently used to assess and publicise hospital and physician performance. They are also often used in health services research to assess issues such as the impact of service organization [6-9], the relationship between hospital inputs and outcomes [10,11], the effect of introducing new policies [12] and the impact of new technologies [13].

The idea behind outcome-based quality indicators such as hospital mortality or readmission rates is that, if appropriate adjustment is made for patient case-mix and external environmental factors, then variations in reported levels of such outcome-based quality indicators are likely to be driven by differences in the (unobservable) quality of hospital services, as reflected in the processes of hospital care and service organization. For example, the provision of appropriate rehabilitation services for fall and fracture patients is known to have an impact on the risk of readmission [14]; similarly an efficient management of the surgical theatre and staff shifts can reduce the delay before the patients are treated and thus their mortality risk [15]. The intrinsic quality attributes are often unobservable by the researcher, because collection of the necessary data is either impossible or highly costly. However,

it is expected that hospitals with better quality should have on average better outcomes (as defined above) than their lower quality peers, after controlling for their differences in patient characteristics and environmental factors. Many empirical applications therefore examine unplanned readmissions occurring within 30 days from previous discharge of patients admitted with a similar primary diagnosis, such as hearth failures, AMI, strokes, pneumonia or hip fracture.

The advantage of outcome-based quality indicators is that they can be constructed by using routine administrative data on patient discharges without the need for costly additional information on the process of care. Outcome-based quality indicators can make it feasible for large population of patients and hospitals to be included in a study and followed for several years. However, these indicators can be inaccurate and have been criticized in the medical literature for their lack of clinical relevance [16,17]. Moreover, some outcome indicators have low correlation with more accurate measures of quality based on the process of care [18,19].

According to various studies on drug related hospital admissions, it was estimated that around 5-10% of hospital admissions were due to drug related problems, in which 50% of them are avoidable [20,21]. DRP admissions need high attention as DRP related admissions on an average accounted for 8.36% [22-28]. Increased use of medicines, existence of multiple inter current disease states and polypharmacy are some of the risk factors for DRPs. Geriatric population showed a high incidence of DRP admissions. Pharmacological and pathological changes leading to alteration in pharmacodynamic and pharmacokinetic parameters of drug absorption, distribution, metabolism and excretion in elderly patients are believed to be the reasons why geriatric population is the most affected group among DRPs. Antiplatelets, anticoagulants, antineoplastics, immunosuppressive agents, diuretics, antidiabetics and antibiotics showed a high profile of drug related problems. Majority of DRP admitted patients presented with chief complaints of weakness due to dehydration, electrolyte imbalance; bleeding, GI disturbances, anemia, hypoglycemia, secondary infections etc. It has been noticed that drug related problems associated with medications' use have contributed to a major portion of the health expenses in most of the countries [29-32].

Most of DRP studies were retrospective, multicenter studies conducted in general population in Europe. The main objectives of the studies were to estimate DRP frequency, incidence, risk factors and trends of DRP hospital admissions. Anti-neoplastic agents, CVS drugs and CNS drugs were related to most of the drug related problems. These studies concluded polypharmacy and older age were the major risk factors for developing drug related problems. It was found that the cost for the management of DRP was directly proportional to severity.

Among patients admitted to acute care pediatric hospitals, the rate of unplanned readmissions at 30 days was 6.5%. There was significant variability in readmission rates across conditions and hospitals. These data may be useful for hospitals' quality improvement efforts.

In this study sample selection bias in the identification of hospitals' performance on unplanned readmissions occurring within 28 days of discharge of patients with a primary diagnosis of fractured hip was reported. This intervention was especially relevant for the phenomenon that the scientists wanted to explore given the high risk of both mortality and readmission, and great deal of heterogeneity amongst patients. The bias was quantified at the patient level in terms of the unexplained correlation between the residuals of two separate probit models for survival and readmissions, similar to the models used in many applied studies. Second, having identified a bias, a solution was proposed to the sample selection problem relaxing the assumption of independence between the data generating process of patient survival and readmission implicitly adopted in most previous empirical applications. They used a bivariate sample selection model that allowed for the correlation between survival and readmissions and for the non-linear nature of the data generating process.

Gowrisankaran, et al. [33] shed some light on the inconsistency between outcome-based and process-based measures of quality. Using patients admitted with pneumonia in South California hospitals from 1989 to 1994, they showed that hospital risk adjusted mortality rates are affected by selection bias that invalidates inferences on the quality of care provided. Specifically, if patients' health conditions are not perfectly observable and patients are able to choose the hospital of treatment, then (unmeasurably) sicker patients are more likely to select high quality hospitals. Therefore, the differences in mortality rates across hospitals may be determined in part by difference in the quality of care they provide and in part by differences in unobservable patient health conditions. The latter effect systematically disadvantages high quality hospitals, and measures of the processes and outcome of care might show low correlation. Geweke et al. [34] provided an elegant econometric solution to correct for this bias by using a structural model that takes into account the patient choice of hospital and the two determinants of the mortality variable.

In general, observational studies based on hospital administrative data have only limited information on the heterogeneity in patient and treatment characteristics, which are therefore only partially observable. In contrast, other study designs in the medical and epidemiology literature, such as retrospective studies or prospective cohort studies, often have access to data describing such heterogeneity and thus are able to provide a better direct control for the latter. Therefore, observational studies need to pay careful attention

to the characteristics of the data generating process before any meaningful inference can be made on variations in hospital quality of care, and on the determinants of such variations.

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