RE-ADMISSION RATE AND ITS ASSOCIATED FACTORS IN A COUNTY HOSPITAL IN KENYA

Maureen Muriuki, School of Medicine, Jomo Kenyatta University of Agriculture and Technology, , P.O BOX 13290 - 00100 Nairobi Kenya, Patrick Mburugu, Department of Child Health and Paediatrics, School of Medicine, Jomo Kenyatta University of Agriculture and Technology, , P.O BOX 62000 - 00200 Nairobi Kenya, Alvin Kagari, School of Medicine, Jomo Kenyatta University of Agriculture and Technology, , P.O BOX 62000 - 00200 Nairobi Kenya, Veronica Kihugi, School of Pharmacy, Jomo Kenyatta University of Agriculture and Technology, , P.O BOX 62000 - 00200 Nairobi Kenya, Derrick Khaemba, School of Nursing, Jomo Kenyatta University of Agriculture and Technology, , P.O BOX 62000 - 00200 Nairobi Kenya, Catherine Munyendo, Thika Level Five Hospital, Department of Child Health and Paediatrics, , P.O BOX 227 - 01000 Thika Kenya, Margaret Kamanguya, Department of Child Health and Paediatrics ,Thika Level Five Hospital, , P.O BOX 227 - 01000 Thika Kenya, Jane Aduda, Department of Statistics and Actuarial Science, School of Mathematics, Jomo Kenyatta University of Agriculture and Technology, , P.O BOX 62000 - 00200 Nairobi Kenya, Justus Simba, Department of Child Health and Paediatrics, School of Medicine, Jomo Kenyatta University of Agriculture and Technology, , P.O BOX 8064 - 01000 Thika Kenya.

Corresponding author: Maureen Muriuki, School of Medicine, Jomo Kenyatta University of Agriculture and Technology, P.O BOX 13290 - 00100 Nairobi Kenya. Email: maureenmuriuki0@gmail.com

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M. Muriuki, P. Mburugu, A. Kagari, V. Kihugi, D. Khaemba, C. Munyendo, M. Kamanguya, J. Aduda and J. Simba

ABSTRACT

Objective: **To assess the re-admission rate and its associated factors in the paediatric ward at Thika level five hospital.**

Design: **A descriptive cross-sectional study.**

Setting: **Secondary level hospital in sub-Saharan Africa.**

Subjects: **A total of 803 children aged 13 years and below admitted between March and June 2019.**

Outcome measures: **Re-admission of a patient within 30 days of the index admission.**

Results: **The study found a re-admission of rate 10.2%. Among the readmitted patients 26.83% had a comorbidity and 29.26% had been given incorrect drug dosages during their first admission. A greater proportion (63.4%) of the readmitted patients had the same diagnosis with the index admission with pneumonia, gastroenteritis and meningitis ranking top in the list. A larger percentage of the readmitted children were discharged (83.5%), 8.9% were referred and 7.6% died. Multivariate analysis identified strong associations of hospital re-admission with the length of hospital stay during the index admission, the qualification of the health practitioner who initially discharged the patient and whether the correct drug dosages were administered during the index hospital stay.**

Conclusion: **About a tenth of discharged children were readmitted within 30 days of discharge. Pneumonia was the commonest condition at admission and re-admission. The hospital factors associated with re-admission included length of hospital stay, level of training of the health care worker who discharged the patient as well as having received incorrect drug dosage during the first admission. There were no significant patient factors.**

INTRODUCTION

Hospital re-admission is defined as admission of a patient to an inpatient service of an acute care hospital who was discharged from an inpatient service of the same or different acute care hospital within a given time period, usually 30 days[1]. Hospital Re-admission Rates (HRRs) are screening tools that could be used to assess the quality of health care that patients receive while admitted in a ward[2,3,4]. A high HRR could indicate poor inpatient care or a disconnect in patient follow up after being discharged from hospital. Various factors have been postulated to influence re-admission rates. Re-admissions could be as a result of premature discharge or incomplete treatment, failure to educate patients on their condition, inadequate follow up procedures after discharge, poor management of the underlying problem, disorderly service coordination at the time of discharge, inadequate discharge planning and/or inadequate access to care[5]. Re-admissions incur vast expenses on the individual, their family, the hospital and ultimately the nation as a whole financially and timewise. Moreover, they are a cause of great psychological stress to the patient and their families and predispose the patients to contracting nosocomial infections.

These determinants of unplanned re-admissions are varied and multifactorial with some being preventable while others are unpreventable. Potentially Preventable Re-admissions (PPRs) are those that are clinically related to a prior admission. PPRs are more likely to occur depending on the severity of the disease, in extremes of age and if there is a comorbidity of a mental illness[6]. Potentially avoidable causes of re-admission include premature discharge and doctor-error during the index admission[5].

We set out to determine the re-admission rate, the hospital and patient factors associated with re-admission, and the most common diagnoses that lead to re-admission at the paediatric ward at Thika level five hospital in Kenya.

MATERIALS AND METHODS

A cross-sectional study was carried out to determine re-admission among children admitted between March and June 2019 at Thika level five hospital which is located in an urban setting in Central Kenya. In-patient files during the period of study were retrieved and studied. Files with incomplete data and those which had planned re-admissions were excluded from the study. A total of 803 files were studied using consecutive sampling method. Data was collected using an encrypted data abstraction sheet. The independent variable was re-admission while dependent variables included age, gender, residence (whether urban, rural or slum), comorbidities, exclusive breastfeeding, immunization status, length of hospital stay and diagnosis at index admission.

Data was analysed using Microsoft Excel spreadsheets and International Business Machine Statistical Package of Social Sciences (IBM SPSS) version 21.0. Charts, graphs and tables were used to represent collected data.

Ethical approval was sought from the Jomo Kenyatta University of Agriculture and Technology Institutional Ethical Review Committee (JKU/2/4/896B) and permission to collect data was sought from Thika level five hospital. Patient information was treated with the utmost confidentiality.

RESULTS

Patient characteristics: Of the 803 patients studied, 82 patients had been readmitted. This represents a hospital re-admission rate of 10.2%. The mean age of the studied population was 20 months with 46% being female and 54% were male.

Diagnoses at Index Admission and Re-admission: This study demonstrated a relationship between the re-admission episodes and the index admission in that, majority (63.4%) of the re-admissions had the same diagnosis that they had during the index admission. Pneumonia, gastroenteritis, meningitis, bronchiolitis and convulsive disorder were among the topmost diagnoses during both admissions. This is shown in table 1.

Table 1
Common diagnoses at index admission and re-admission

Diagnosis	Index admission	Re-admission
Pneumonia	38.5%	46%
Gastroenteritis	20.9%	13%
Meningitis	9.8%	10%
Bronchiolitis	4.6%	7%
Neonatal sepsis	4.2%	3%
Convulsive disorder	3.1%	5%
Others	22%	16%

Factors Associated with Re-admission: Using multivariate analysis, there was a strong association between re-admission and length of hospital stay during the index admission, qualification of the health practitioner who initially discharged the patient and whether the correct drug dosages were administered during the first admission. This is shown in table 2.

Table 2
Factors associated with re-admission

Variable	Re-admitted N=82(%)	Did not require re-admission N=721(%)	Odds Ratio (95 CI)	P value
Mean Age in Months	15.07	21.00	0.717 (0.4-0.9)	0.152
Co-morbidity *No* *Yes*	 60 (73.17) 22 (26.83)	 561 (77.80) 159 (22.20)	1.625 (0.6-3.8)	0.270
Length of stay *<7 days* *≥7 days*	 41 (50.00) 41 (50.00)	 456 (63.24) 265 (36.76)	1.051 (1.02-1.07)	0.000
Correct drug dosage *No* *Yes*	 24 (29.26) 51 (62.19)	 130 (17.38) 560 (82.62)	2.606 (2.0-2.7)	0.031

Discharged by				
Consultant	44 (53.65)	209 (28.98)	0.294 (0.1-0.5)	0.000 0.118
Medical officer	13 (15.85)	113 (15.67)	0.539 (0.2-1.1)	0.948
Clinical officer intern	10 (12.19)	157 (21.77)	0.973 (0.4-2.2)	
Medical officer intern	15 (18.29)	242 (33.56)		

Of the readmitted patients, 26.83% had a comorbidity while majority (73.17%) did not have a medical comorbidity. Presence of a comorbidity increased risk of re-admission {OR=1.625 (0.6-3.8) p=0.270}.

The average length of hospital stay at the index admission was 7.0 days while the mode was 5.0 days. A longer hospital stay at first admission decreased risk of re-admission {OR=1.051 (1.02-1.07), p=0.000}.

Among the readmitted participants 62.19% had received correct drug dosages, 29.26% had not received correct drug dosage and for 8.55% was unspecified. In this study a patient was deemed to have received the correct drug dosage if they got the right quantity of medicine, via the right route of administration and in the right frequency. The patient was labelled as having received the correct drug dosage if all three parameters were met. Patients who received incorrect drug dosages were more likely to be readmitted {OR=2.606 (2.0-2.7), p=0.031}.

The health professional who authorized discharge also influenced risk of re-admission. Patients discharged by pediatricians were less likely to be readmitted by 71% {OR=0.294 (0.1-0.5), p=0.000}. Discharges performed by the clinical officer intern decreased re-admission by 3% {OR=0.973 (0.4-2.2), p=0.948} while medical officers reduced re-admission by 47% {OR=0.539 (0.2-1.1), p=0.118}.

Re-admission Outcomes: A majority of the readmitted patients were discharged after their second hospital stay while 8.86% were referred for further management at different facilities and 7.59% succumbed to their illness. This is shown in figure 1.
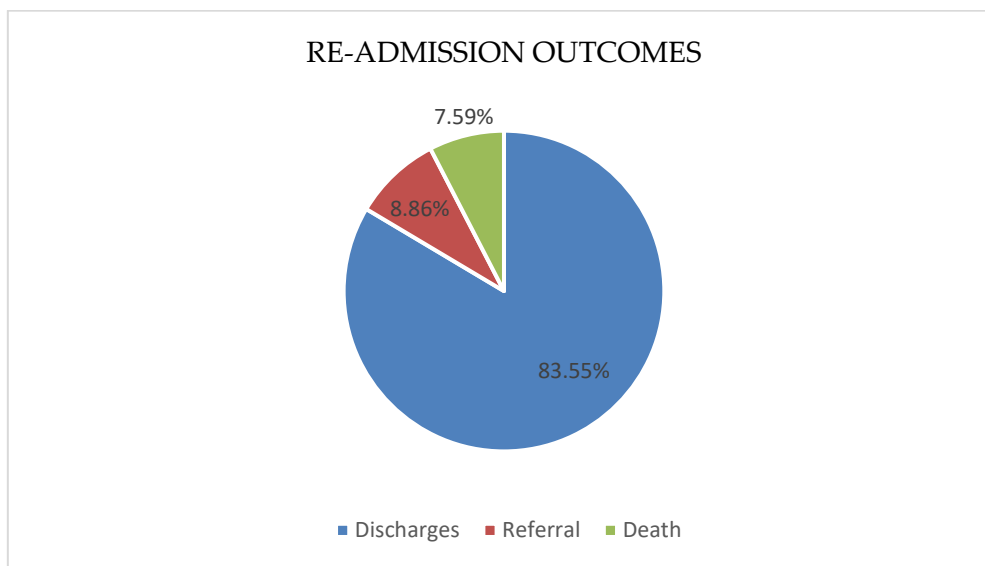

Fig 1: Outcomes of re-admission

DISCUSSION

This study found that the hospital re-admission rate at the paediatric ward at Thika level five hospital was at 10.2%. This compares with similar studies done in other parts of Africa and other parts of the world. In Kenya, a longitudinal cohort study done at Kenyatta National Hospital found the re-admission rate to be 26.5% among late preterm infants and 8.8% among term infants[7]. In a study done in a Cape Town hospital, the hospital re-admission rate was found to be at 10.5%[8] while a study done in a hospital in Southern Italy concluded that the re-admission rate was at 10.2%[9]. However, there is a marked discrepancy in the hospital re-admission rate with that of a Polish study which found the 30-day re-admission rate of 33.9% in the paediatric population. The reasons for the high re-admission rate in the Polish study were that the hospital has a high referral rate therefore it treats most complicated diseases susceptible to re-admission and the paediatric ward offers chemotherapy and radiotherapy sessions which lead to high number of re-admissions[10].

We were able to find associations between re-admission and various factors such as length of hospital stay during the index admission, qualification of the health practitioner who initially discharged the patient and whether the correct drug dosages were administered during the index hospital stay.

Children who had been admitted for a longer amount of time during the index admission were less likely to be readmitted. A study done in Dallas showed that inadequate length of hospitalization is a predictor of future re-admission risk. It was also noted that it is more economical to lengthen hospital stay as opposed to permitting an early discharge. Moreover, it permits adherence to medication by patients through supervision by health workers in the wards[11].

Administration of the correct drug dosages via the correct route and in the correct frequency is important in determining re-admission risk. In our study incorrect drug dosages administered during an earlier admission increased the chance of being readmitted. We used the Basic Paediatric Protocol by the Ministry of Health Kenya, 4th edition which outlines the frequency and dosages of common drugs used at this level of hospital[12].

This study showed that the health officer who discharges a patient also affects the risk of re-admission whereby children discharged by pediatricians were less likely to be readmitted. A consultant has vast experience and would therefore be better placed to judge the right time to discharge a patient than junior doctors.

A study done by Tang et.al on predictors of re-admission compares closely to the results of our study. Factors associated with re-admission in the study which was conducted specifically for pneumonia patients included length of stay on index admission, health care utilization and comorbidities[13].

Our study was limited in that some files encountered during the study contained incomplete data, some files were missing at the records department and some patients had multiple diagnoses. Some patients initially seen at Thika level five hospital could also have been readmitted elsewhere within the 30-day period from discharge.

CONCLUSION

The re-admission rate of patients at the paediatric ward was 10.2%. The most common diagnosis at admission and re-admission was similar with pneumonia being the common diagnosis. The hospital factors associated with paediatric re-admission included length of hospital stay whereby a longer initial hospital stay

decreased chance of re-admission. The health care worker who discharged the patient also influenced re-admission, a patient discharged by a consultant at index admission was less likely to be readmitted. This study also demonstrated that a patient who received incorrect drug dosage during the first admission was more likely to be readmitted. No patient factors were found to be significant.

REFERENCES

1. Hunter T, Birmingham J. Preventing re-admissions through comprehensive discharge planning. Professional case management. 2013 Mar 1;18(2):56-63.

2. Ashton CM, Del Junco DJ, Souchek J, Wray NP, Mansyur CL. The association between the quality of inpatient care and early re-admission: a meta-analysis of the evidence. Medical care. 1997 Oct 1:1044-59.

3. Friedman B, Basu J. The rate and cost of hospital re-admissions for preventable conditions. Medical Care Research and Review. 2004 Jun;61(2):225-40.

4. Miller ME. Statement of executive director of the Medicare Payment Advisory Commission, before the Subcommittee on Health, Committee on Energy and Commerce. US House of Representatives. 2007 Apr 18.

5. Auerbach AD, Kripalani S, Vasilevskis EE, Sehgal N, Lindenauer PK, Metlay JP, Fletcher G, Ruhnke GW, Flanders SA, Kim C, Williams MV. Preventability and causes of re-admissions in a national cohort of general medicine patients. JAMA internal medicine. 2016 Apr 1;176(4):484-93.

6. Goldfield NI, McCullough EC, Hughes JS, Tang AM, Eastman B, Rawlins LK, Averill RF. Identifying potentially preventable re-admissions. Health care financing review. 2008;30(1):75.

7. Kaguongo LN. *Prevalence of Re-admission and Early Mortality of Late Preterm Infants Compared to Term Infants at the Kenyatta National Hospital* (Doctoral dissertation, University of Nairobi).

8. Dreyer R, Viljoen AJ. Evaluation of factors and patterns influencing the 30-day re-admission rate at a tertiary-level hospital in a resource constrained setting in Cape town, South Africa. South African Medical Journal. 2019;109(3):164-8.

9. Bi Bianco A, Molè A, Nobile CG, Di Giuseppe G, Pileggi C, Angelillo IF. Hospital re-admission prevalence and analysis of those potentially avoidable in southern Italy. PloS one. 2012 Nov 2;7(11):e48263.

10. Kryś J, Łyszczarz B, Wyszkowska Z, Kędziora-Kornatowska K. Prevalence, reasons, and predisposing factors associated with 30-day hospital re-admissions in Poland. International journal of environmental research and public health. 2019 Jan;16(13):2339.

11. Silverstein MD, Qin H, Mercer SQ, Fong J, Haydar Z. Risk factors for 30-day hospital re-admission in patients≥ 65 years of age. InBaylor University Medical Center Proceedings 2008 Oct 1 (Vol. 21, No. 4, pp. 363-372). Taylor & Francis.

12. Basic Paediatric Protocol, 4th Edition, Ministry of Health Kenya

13. Tang VL, Halm EA, Fine MJ, Johnson CS, Anzueto A, Mortensen EM. Predictors of rehospitalization after admission for pneumonia in the veterans affairs healthcare system. Journal of hospital medicine. 2014 Jun;9(6):379-83.