Audit of Medical Admissions at a Rural South African Primary Care Hospital Between 2012 and 2016

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Abstract: Background: Contemporary audits of medical admissions to South African (SA) primary care hospitals are rare. We sought to address this paucity in the literature.
Methods: This was a retrospective audit of data for 17693 adult medical admissions collected as part of the Hlabisa Hospital administrative database between 01 January 2012 and 31 December 2016. The overall distribution of admissions, characteristics (age, gender, HIV status, Infectious disease–ID, and route of admission), length of stay (LoS), and mortality during the audit was analyzed using crude/univariate statistical methods (Descriptive statistics, chi-squared tests, and Mann-Whitney tests). Trends in admissions, median LoS, and mortality were analyzed through simple regression and trend line analysis. Results: Our most important finding was a moderate trend towards a decline in ID admissions (Trend line slope = -0.2295, R2 =0.6034; p<0.001). Conclusion: Our finding is indicative of the impact of antiretroviral therapy and the epidemiological transition in SA.

Key Words: Trends, Medical admissions, Primary care, South Africa.

Introduction: South Africa (SA) has a triple burden of disease which includes a traditionally high burden communicable disease, a growing non-communicable disease burden, and high levels of injury/trauma.(1,2) There is also an epidemiological transition in the country, whereby the non-communicable disease burden is approaching the communicable disease burden.(1,2) It is therefore expected that there would be a growing number of the SA population who require hospitalization for some sort of morbidity in coming years.

Only 16% of the SA population have health insurance which allows access to private healthcare.(3) Public healthcare facilities therefore have an important role in addressing the healthcare needs of the majority of the SA population. Healthcare facilities are classified according the services they provide, with primary level facilities offering mostly non-specialist healthcare services.(4) Nevertheless, the importance of primary levels facilities cannot be undermined as they are the first port-of-call for patients with medical ailments.(5,6) Primary level facilities also assist with reducing the volume of patients attending higher level facilities through prevention/promotion initiatives and provision of basic/non-specialist healthcare services, and referral of selected patients (where treatment of the patient lies outside the scope services offered by the primary level healthcare facility) to higher level facilities for specialist care.(4)

Although primary level facilities play an important role in the delivery of certain aspects of healthcare to much of the SA population, thorough descriptions of medical admissions to these facilities, particularly those facilities in rural areas, are rare. Of note, an audit conducted at a rural primary care hospital in northern KwaZulu-Natal Province prior to the national rollout of antiretroviral therapy (1991-2002) found several HIV-related pathologies to be important in adult medical admissions.(7) Since this audit by Reid et al.,(7) there have been several developments in SA healthcare, such as antiretroviral rollout.(8) There has also been a shift toward an increase in the burden of non-communicable disease in keeping with the current epidemiological transition.(1,2) Therefore, a new audit would yield important information related to contemporary healthcare utilization, quality of care, and disease trends. This information has important implications. Firstly, this information would assist public health specialists and policy makers with decisions related to budgets and resource allocation based on the most important causes of hospitalization at these facilities. Secondly, this information can be used to design health promotion initiatives in order to reduce morbidity from certain diseases, thereby preventing some of the hospital admissions. This could also have potential benefits in terms of reducing expenditure and streamlining resource utilization at these facilities.
The aim of this study was to conduct a contemporary audit of trends in medical admissions and outcomes related to quality of care at a rural SA primary healthcare facility. The objectives of this study were to: 1). Describe medical admissions; 2). Describe inpatient length of stay (LoS) and mortality; and 3). Describe trends in medical admissions, LoS, and mortality at a rural SA primary healthcare facility over a five year period.

Methods

This study was a retrospective audit of data from adult (=18 years old) medical admissions collected at the Hlabisa Hospital between 01 January 2012 and 31 December 2016 as part of the Africa Center Demographic Information System (ACDIS).(9) The Hlabisa hospital is a 296-bed rural facility which provides primary care services to over 230,000 people in the Hlabisa district, Mtubatuba, and parts of the “Big Five” municipalities in Northern KwaZulu-Natal Province, SA. The hospital also has a small critical care unit (CCU). A more detailed description of the Hlabisa district and its population is provided elsewhere.(9) Specific inclusion and exclusion criteria for the study are outlined in Table 1. This audit was approved by the Biomedical Research Ethics Committee of the University of KwaZulu-Natal, SA (Protocol: EXM578/17).

The primary discharge diagnosis ICD-10 code for each patient was considered as the reason for hospitalization. This was then categorized as an infectious or non-infectious reason for hospitalization for simplification of the statistical analysis. Secondary diagnoses codes were not investigated in this study. In this study we stratified the reason for admission (primary discharge diagnosis) into infectious disease (ID) and non-ID admissions. This was done so the impact of the current epidemiological transition on medical admissions could be studied.

Length of hospital stay was determined as the time (in days) between admission to hospital and discharge from hospital. Inpatient mortality was listed as a discrete variable in the database. In addition to variables directly related to the hospital visit, the database also contains information of patient age, gender, and HIV status (which was meticulously collected as part of ACDIS).

Statistics

We used descriptive statistics to determine the distribution of various characteristics during the audit period. This included computing the frequency/percentage of hospital medical admissions over the entire audit period (with 95% Confidence intervals – CI), as well as each month of the audit period (stratifying these by age, gender, HIV status, reason for admission, ID, and admission route). Simple regression and trend line analysis was to investigate trends. Mortality data was prepared and analyzed in a similar manner. Median LoS (and interquartile range - IQR) was calculated for the entire audit period, as well as for each month over the audit period and stratified according to age, gender, HIV status, reason for admission, and admission route. Trends in median LoS were investigated using simple regression and trend line analysis.

The direction of a trend was determined from the slope of the trend line, with a negative slope indicating a declining trend while a positive slope would be indicative of an increasing trend. The R2 value from the simple regression analysis was used to determine the strength of a trend. Trends with an R2 value of <0.5000 were considered “weak”, trends with an R2 value of 0.5000-0.7000 were considered “moderate”, and trends with an R2 value of >0.7000 were considered “strong”. The construction of graphs and the simple regression/trend line analyses were performed using the graph function in Microsoft Excel®.

Crude/univariate statistical analysis of the audit data was also performed. Comparisons of proportions between groups was done using the chi-squared test, or variations thereof. Comparisons of median LoS between groups was done using the Mann-Whitney test. A p-value <0.050 was considered a statistically significant result. The crude statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 24.0 (IBM Corp., USA).

Results

The derivation of the audit population is shown in Figure 1. Following exclusion of ineligible admissions from the dataset, there were 17693 eligible medical admissions (from 14460 patients) which were included in this audit (hereafter referred to as “N”).

### Table 1: Inclusion/Exclusion criteria for the study

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
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<tbody>
<tr>
<td>Admissions of patients 18 years or older</td>
<td>Admissions of patients &lt;18 years old</td>
</tr>
<tr>
<td>Admissions of patients between 01 January 2012 and 31 December 2016</td>
<td>Admissions of patients outside 01 January 2012 and 31 December 2016</td>
</tr>
<tr>
<td>Medical admissions</td>
<td>Surgical admissions or obstetric admissions</td>
</tr>
<tr>
<td>Patients with listed primary discharge ICD diagnosis codes</td>
<td>Patients with no listed/missing primary discharge ICD diagnosis codes</td>
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The data source to be used in this study is from the Hlabisa Hospital administrative database which forms part of ACDIS.(9) The database consists of over 35000 hospital admissions over the period 01 January 2012 and 31 December 2016, is publicly available, and is de-identified. The data contained in the database was collected routinely upon patient admission to the hospital and was concluded for the specified admission upon patient discharge. The route of admission for each patient (for instance via the CCU, surgical unit/ward, medical unit/ward, etc.) was also recorded in the database.

Reasons for admission and the associated underlying conditions were coded into International Classification of Disease 10th Revision (ICD-10) discharge diagnosis codes, and entered into the hospital administrative database by trained medical professionals. These codes can be used to study patterns of disease, patterns of care, and outcomes of disease; study risk-adjusted, cross-sectional, and temporal variations in access to care, quality of care, costs of care, and effectiveness of care; or as inclusion and exclusion criteria to define sampling frames, to document the comorbidities of patients, report the incidence of complications, track utilization rates, and determine the case fatality and morbidity rates. Furthermore, these codes are standardized and globally recognized.(10) There are ICD-10 codes for most communicable, non-communicable, and injury-related conditions.(10)
Figure 1. Derivation of the study population

The median number of monthly admissions over the entire audit period was 300.0, IQR: 265.5-328.0. There were 2749 elderly admissions (age ≥65 years old) over the audit period, which accounted for 15.5% (CI: 15.0-16.1%) of all admissions. A total of 8013/17693 (45.3%, CI: 44.6-46.0%) of admissions over the audit period were male. A total of 6513/17693 (36.8%, CI: 36.1-37.5%) admissions had HIV infection. Infectious disease was the reason for 28.1%, CI: 27.4-28.8% (n/N=4972/17693) of admissions over the audit period.

Admissions via the critical care unit peaked during May 2015 (5.3%, CI: 2.6-8.0%) and were lowest during September 2015 (0.6%, CI: 0.2-1.4%). Non-CCU admissions peaked during May 2015 (99.4%, CI: 98.6-100.0%) and were lowest during September 2015 (99.4%, CI: 98.6-100.0%). There was no overall trend in elderly/younger admissions during the audit period (Figure 2B, Trend line slope = 0.0056 for elderly admissions and -0.0056 for younger admissions, R² =0.0017; p=0.755). Elderly admissions peaked during July 2014 (20.5%, CI: 16.3-24.8%) and were lowest during May 2016 (8.2%, CI: 5.2-11.2%). Conversely, younger admissions peaked during May 2016 (91.8%, CI: 88.8-94.8%) and were lowest during July 2014 (79.5%, CI: 75.2-83.7%). Figure 2C shows that there was a weak trend toward a decline in male admissions, with a converse weak trend toward an increase in female admissions over the audit period (Trend line slope = -0.0978 for males and 0.0978 for females, p=0.01). The proportion of male admissions peaked during June 2014 (56.5%, 51.1-61.9%) and were lowest in May 2016 (27.4%, 22.5-32.4%). Female admissions peaked during May 2016 (72.6%, CI: 67.6-77.5%) and were lowest during June 2014 (38.1-48.9%). We also observed a weak trend toward a decline in admissions with HIV, and a corresponding trend toward an increase in HIV-negative admissions (Figure 2D, Trend line slope = -0.2153 for HIV-positive admissions and 0.2153 for HIV-negative admissions, R² =0.0376; p<0.001). The proportion of HIV-positive admissions peaked during January 2012 (49.8%, CI: 44.1-55.5%) and was lowest during March 2015 (23.4%, CI: 18.8-28.0%). HIV-negative admissions were highest during March 2015 (76.6%, CI: 72.0-81.2%) and lowest during January 2012 (50.2%, 44.5-55.9%). We identified a moderate trend toward a decline in ID-related admissions and a corresponding trend toward an increase in non-ID admissions (Figure 2E, Trend line slope = -0.2295 for ID admissions and 0.2295 for non-ID admissions, R² =0.0603; p<0.001). The proportion of patients admitted for ID peaked during July 2012 (38.4%, CI: 33.2-43.3%) while being at its lowest during October 2016 (17.8%, CI: 13.2-22.3%). Non-ID admissions were highest during October 2016 (82.2%, 77.7-86.8%) and lowest during July 2012 (61.6%, 56.5-66.8%). We did not identify trends in CCU or non-CCU admission over the audit period (Figure 2F, Trend line slope =0.0125 for CCU admission and -0.0125 for non-CCU admission, R² =0.0575; p=0.078). Admissions via the CCU peaked during May 2015 (5.3%, CI: 2.6-8.0%) and were lowest during September 2015 (0.6%, CI: 0.2-1.4%). Non-CCU admissions peaked during September 2015 (99.4%, CI: 98.6-100.0%), and were lowest during May 2015 (94.7%, CI: 92.0-97.4%).
The median LoS over the entire audit period was 5.0, IQR: 2.0-10.0 days. Median LoS was similar between elderly and younger admissions (5.0, IQR: 2.0-9.0 days versus 5.0, IQR: 2.0-10.0 days; p=0.858). There was a statistically significant difference in median LoS between the categories of the following characteristics: Gender (5.0, IQR: 2.0-10.0 days in males versus 5.0, IQR: 2.0-9.0 days in females; p<0.001), HIV status (6.0, IQR: 3.0-12.0 days in HIV-positive versus 4.0, IQR: 2.0-8.0 days in HIV-negative admissions; p<0.001), ID (7.0, IQR: 3.0-13.0 days in ID versus 4.0, IQR: 2.0-8.5 days in non-ID admissions; p<0.001), and CCU admission (3.0, IQR: 1.0-7.0 days in CCU versus 5.0, IQR: 2.0-10.0 days in non-CCU admissions; p<0.001).

Overall, there was a weak trend toward declining median LoS during the audit period (Figure 3A, Trend line slope = -0.0179, R2 =0.2057; p<0.001). Median LoS was highest in January 2012 (7.0, IQR: 3.0-12.0 days) and lowest in May 2016 (4.0, IQR: 1.0-9.0 days). There were also weak trends toward reduced median LoS in elderly (Figure 3B, Trend line slope = -0.0171, R2 =0.0648; p=0.023) and younger admissions (Figure 3B, Trend line slope = -0.0139, R2 =0.1151; p=0.008). Median LoS peaked in elderly admissions during December 2013 (8.5, IQR: 3.0-13.0 days) and was lowest during January 2015 (3.0, IQR: 1.0-7.0 days). In younger admissions, median LoS peaked during January 2012 (7.0, IQR: 3.0-12.0 days) and was lowest during May 2016 (4.0, IQR: 1.0-9.0 days). There were also weak trends toward reduced median LoS in both male (Figure 3C, Trend line slope = -0.0199, R2 =0.1806; p<0.001) and female (Figure 3C, Trend line slope = -0.0124, R2 =0.0715; p=0.039) admissions. In males, the median LoS was highest during January 2012 (7.0, IQR: 3.0-12.5 days), and lowest in March 2015 (3.5, IQR: 2.0-9.0 days). The median LoS was highest for females during January 2012 (6.0, IQR: 3.0-11.0 days) and lowest in May 2016 (3.0, IQR: 1.0-9.0 days). Weak trends toward reduced median LoS in HIV-positive (Figure 3D, Trend line slope = -0.0179, R2 =0.1007; p=0.013) and HIV-negative (Figure 3D, Trend line slope = -0.0149, R2 =0.1402; p<0.003) admissions were also observed. The peak median LoS for HIV-positive admissions was during January 2012 (9.0, IQR: 5.0-15.0 days), and lowest during May 2015 (5.0, IQR: 2.0-10.0 days). For HIV-negative admissions, the median LoS peaked during May 2012 (6.0, IQR: 2.0-12.0 days) and was lowest during May 2016 (3.0, IQR: 1.0-7.0 days).

Median LoS was also noted to have significantly declined over the audit period for both ID (Figure 3E, Trend line slope = -0.0187, R2 =0.1144; p=0.008) and non-ID admissions (Figure 3E, Trend line slope = -0.0109, R2 =0.0865; p=0.023). Median LoS for ID admissions peaked during March 2012 (9.0, IQR: 4.0-14.0 days), with the lowest median LoS for this group being observed during June 2013 (4.0, IQR: 2.0-14.0 days). In non-ID admissions, the median LoS peaked during January 2012 (6.0, IQR: 2.0-10.0 days) and was at its lowest during May 2016 (3.0, 1.0-8.0 days). There was no significant trend in median LoS over the audit period for CCU admissions (Figure 3F, Trend line slope = -0.0134, p=0.169). However, there was a weak trend toward reduced median LoS in non-CCU admissions over the audit period (Figure 3F, Trend line slope = -0.0221, R2 =0.2692; p<0.001). The median LoS for CCU admissions was highest during November 2012 (9.0, IQR: 3.0-14.8 days) and lowest during September 2014 (1.0, IQR: 0.5-6.0 days). Median LoS for non-CCU admissions was highest during January 2012 (7.0, IQR: 3.0-12.0 days) and lowest during October 2016 (4.0, IQR: 2.0-9.0 days).

*Figure 3. Trends analysis – Median LoS

A total of 2519/17693 admissions suffered mortality during the audit period (Incidence of 14.2%, CI 13.7-14.8%). Mortality in the elderly admissions group was significantly higher than that in the younger admissions group (22.0%, CI: 20.5-23.6% versus 12.8%, CI: 12.3-13.4%; p<0.001). Males suffered higher mortality than females (15.6%, CI: 14.8-16.4% versus 13.1%, CI: 12.5-13.8%; p<0.001). The proportion of HIV-positive admissions which suffered mortality was higher than that observed for HIV-negative admissions (19.5%, CI 18.6-20.5% versus 11.2%, CI: 10.6-11.8%; p<0.001). Mortality in ID admissions was statistically higher when compared with non-ID admissions (22.0%, CI: 20.9-23.2% versus 11.2%, CI: 10.7-11.8%; p<0.001). Lastly, mortality in CCU admissions was statistically higher than that observed for non-CCU admissions (17.6%, CI: 14.6-21.1% versus 14.1%, CI: 13.6-14.7%; p=0.025).

Overall, there was a weak trend toward declining mortality over the audit period (Figure 4A, Trend line slope = -0.1378, R2 =0.4590; p<0.001). There was statistically significant mortality amongst both male (Figure 4B, Trend line slope = -0.0324; p=0.169) and female (Figure 4B, Trend line slope = -0.0124, R2 =0.1151; p=0.008) admissions. In males, the median LoS was highest during January 2012 (6.0 days), with the lowest during May 2016 (3.0, 1.0-8.0 days). There was no significant trend in median LoS over the audit period for CCU admissions (Figure 4C, Trend line slope = -0.0199, R2 =0.1806; p<0.001). Overall, there was a weak trend toward reduced median LoS in non-CCU admissions over the audit period (Figure 4C, Trend line slope = -0.0134, p=0.169). However, there was a weak trend toward reduced median LoS in non-CCU admissions over the audit period (Figure 4C, Trend line slope = -0.0199, R2 =0.1806; p<0.001).
0.1253, R² = 0.2825; p < 0.001) and female (Figure 4C, Trend line slope = -0.1388, R² = 0.3593; p < 0.001) admissions. Mortality in male admissions peaked during March 2012 (25.0%, CI: 16.8-33.2%) and was lowest during December 2016 (6.7%, CI: 1.5-11.8%). Mortality in female admissions was highest during September 2012 (23.2%, CI: 16.1-30.2%) and lowest during March 2016 (5.2%, CI: 2.3-8.1%). Both HIV-positive (Figure 4D, Trend line slope = -0.2435, R² = 0.4705, p < 0.001) and HIV-negative admissions experienced reduced mortality over the audit period (Figure 4D, Trend line slope = -0.0477, R² = 0.1028; p = 0.013). For HIV-positive admissions, mortality peaked during January 2013 (29.6%, CI: 21.6-37.6%) and were lowest during March 2016 (6.1%, CI: 2.0-10.2%). For HIV-negative admissions, mortality peaked during December 2013 (17.2%, CI: 10.8-29.0%) and were lowest during February 2016 (5.9%, CI: 2.7-9.1%). We also observed trends toward reduced mortality in ID admissions (Figure 4E, Trend line slope = -0.2617, R² = 0.4117; p < 0.001) and non-ID admissions (Figure 4E, Trend line slope = -0.0586, R² = 0.1405; p = 0.003) over the audit period. Mortality was highest for ID admissions during October 2012 (33.3%, CI: 23.9-42.8%) and lowest during December 2016 (2.9%, CI: 2.7-8.4%). Mortality for non-ID admissions peaked during September 2013 (17.2%, CI: 11.8-29.0%), and was at its lowest during March 2016 (5.4%, CI: 2.7-8.2%). There was no trend in mortality for CCU admissions (Figure 4F, Trend line slope = -0.0110, R² = 0.0002; p = 0.918). Mortality in CCU admissions was highest during May 2014 (66.7%, CI: 13.3-100.0%), with mortality during several months being reported as 0.0%. There was a trend toward a reduction in mortality over the study period for non-CCU admissions (Figure 4F, Trend line slope = -0.1431, R² = 0.4775; p < 0.001). Mortality in this group of admissions was highest during September 2013 (21.0%, CI: 16.1-25.9%) and lowest during March 2016 (6.1%, 3.6-8.7%).

Figure 2. Trends analysis – Mortality

Discussion
We provide a report of hospital admissions and related outcomes at a rural SA primary care hospital over a five-year period. The demographic characteristics of our audit population are suggestive of a predominantly young and predominantly female population. There are two potential explanations for our findings. Firstly, our findings might be a reflection of the current demographic profile of the HIV epidemic in SA.(9) Indeed, HIV prevalence in the general population of the Hlabisa district is high,(9) which may also explain our findings related to the high proportion of medical admissions with HIV infection which were observed during the audit period. The HIV epidemic is intertwined with opportunistic infection, which is a major contributor toward increased hospitalization on the African continent.(12) This explains why we also observed an overall high prevalence of ID-related admissions in our audit population. The impact of HIV infection on hospitalization in our setting is of great concern. Strategies to reduce the risk of HIV acquisition, increase the uptake of HIV counseling and testing, and improve linkage to care in patients with HIV infection might therefore be beneficial in preventing HIV-associated admissions in our setting. There was a relatively low proportion of admissions through the CCU during our audit, although this is to be expected as admission to a CCU requires stringent criteria are met.(13) These criteria are usually put in place as resources within CCUs are often limited,(14) and so only patients who meet the requirements are admitted via this unit. We found no overall trend in medical admissions over the audit period. It is possible that a plateau in medical admissions has been reached in our study. This is likely to change in future as the current epidemiological transition progresses,(1,2) and more patients with HIV infection live longer as a result of increased antiretroviral therapy access.(15) For the same reasons, the observed plateau in trends for elderly and younger admissions are likely to change in the near future toward an increasing trend in elderly admissions and a decreasing trend in younger admissions. An increasing trend in female medical admissions at the Hlabisa Hospital between 1991 and 2002 was reported by Reid and colleagues.(7) Our findings confirm that there is still an increasing trend (albeit weak) towards a higher rate of female medical admissions at the hospital. There are two potential reasons for this. Firstly, the HIV epidemic disproportionately affects females and so this population is prone to HIV-related illness which might require hospitalization.(11,16) Secondly, increasing female empowerment and improvements in education also explain the increasing trend in female admissions over time.(17) The weak trend toward a reduced admissions with HIV-infection in our study might be attributed to the increased rollout of antiretroviral therapy in SA settings since the audit of Reid and
Antiretroviral therapy has been shown to improve overall health in patients with HIV infection, as evidenced by the increased life expectancy in patients receiving antiretroviral treatment, which can also reduce the risk of acquiring opportunistic infections in these patients. This would contribute to a reduced requirement for hospitalization in this patient group. As the most important IDs in the Hlabisa district are HIV and HIV-associated tuberculosis, it is possible that increased access to antiretroviral therapy is responsible for the moderate declining trend in ID admissions observed during our audit. The current epidemiological transition toward an increase in the burden of non-communicable disease may also have contributed to the moderate declining trend in ID admissions at Hlabisa Hospital during our audit.

Overall median LoS at the Hlabisa Hospital was reported by Reid et al. to have reduced from 10.9 days to 7.9 days between 1991 and 2002. We report that overall median LoS at the hospital has reduced by a further 2.9 days since that initial audit. Length of stay is an important indicator of quality of care, and our findings of a further reduction in the overall median LoS for medical admissions are encouraging as it represents improved quality of care at the hospital. There was no difference in median LoS between elderly and younger admissions over the audit period. Elderly admissions are usually described as having longer LoS when compared with their younger counterparts. This has been attributed to the high complication rate in admitted elderly patients. In our audit population, we report a high prevalence of HIV infection. Most of the HIV infection in the Hlabisa district affects patients in the younger age groups. HIV is known to delay the diagnosis of other conditions such as tuberculosis. This might explain why similar median LoS was observed for elderly and younger admissions during our audit. Addressing diagnostic challenges in younger patients with HIV might assist with reducing median LoS in this population. We also found a higher median LoS in male versus female admissions. An overall gender disparity in median LoS has also been reported in a survey of American hospitalizations, which could not be explained. We also could not establish a reason for shorter median LoS in female admissions when compared with male admissions in our audit. Further investigations are required, which explore possible reasons for this observed difference. Our finding of a higher median LoS in HIV-positive admissions versus HIV-negative admissions is in agreement with the published literature. Complex or atypical clinical presentation could be a possible explanation for this finding.

Similarly, a longer median LoS in ID admissions is likely the result of complex case presentation or delays in identifying the causative infectious agent. Efforts towards timeous diagnosis and treatment of HIV and ID should be considered to reduce LoS in these admission groups. The shorter median LoS in CCU admissions when compared with non-CCU admissions is most likely explained by the high levels of early mortality associated with critical illness. We report declining trends in overall median LoS, as well as by age, gender, HIV status, and ID during the audit period. While these trends were weak, they are encouraging and signify an improvement in quality of care at Hlabisa Hospital across a wide spectrum of admission profiles. However, we believe that there is still room for further improvement, and attainable benchmarks for LoS at the hospital should be developed. A collaborative effort between public health specialists and internists would be required to achieve this. Furthermore, in addition of care, LoS is often used as a measure of resource utilization and expenditure within hospital settings. Therefore, our findings suggest that there might also be a possible decline in resource utilization and expenditure at the hospital. However, this can only be confirmed through the conduct of an appropriate cost analysis study. While we did not observe a trend in median LoS for CCU/non-CCU admissions, this information is still important for planning CCU activities and admissions to this unit at the hospital.

Reid et al. reported an overall mortality rate of 20.0% in medical admissions at the Hlabisa Hospital during 2002. We report the overall mortality rate for medical admissions at the hospital during our audit was almost 6.0% lower than that reported by Reid and colleagues. As with LoS, inpatient mortality is often used as a benchmark for quality of care. Therefore, our results showing an overall decrease in mortality since the last audit at Hlabisa Hospital are encouraging and suggests improvements in quality of care. The higher overall mortality in elderly admissions (versus younger admissions) observed in our study is in agreement with the published literature. We report the overall mortality rate for medical admissions when compared with non-CCU admissions is also to be expected and can be explained by the pathophysiology of critical illness. We report decreasing trends in overall mortality, as well as mortality stratified by age, gender, HIV status, ID, and non-CCU admissions. While the strength of these trends are weak, this is still evidence of improvements in quality of care at Hlabisa Hospital. Note, any reduction in HIV and ID mortality in settings where these conditions are prevalent is promising. This is most likely the result of increased accessibility to antiretroviral therapy in the northern part of KwaZulu-Natal Province, and highlights the importance of linkage to care in patients with HIV infection in this setting. There were several strengths and limitations associated with our findings related to LoS and mortality during our audit. Our findings for higher mortality in CCU admissions versus non-CCU admissions is also to be expected and can be explained by the pathophysiology of critical illness. The higher overall mortality in elderly admissions is likely the result of complex case presentation or delays in identifying the causative infectious agent. Our findings are in agreement with the published literature.

In conclusion, the characteristics of our audit population are in keeping with a setting with a high burden of HIV and ID. Our
findings of several weak declining trends suggest that there have been slight improvements in aspects of quality of care at the Hlabisa Hospital since the last audit which involved data from admissions between 1991 and 2002. However, our most important finding was the moderate trend towards a decline in ID admissions during our contemporary audit. This is an important finding as it is indicative of the impact of antiretroviral therapy and the epidemiological transition in SA. We recommend additional research to confirm our findings and address the limitations of our audit.

References