# Review of Health Information in Hospital Reports - North Kordofan State- Sudan

**Abstract**

**Introduction:** Hospital as a health organization could have a reliable health information of high quality to assist in planning health interventions. **Objective:** to review the hospital reports for completeness and accuracy of health information with the emphasis on five health indicators in North Kordofan State, Sudan. **Methods:** A descriptive study carried in five main hospitals in Shiekan locality, North Kordofan State - Sudan. The study population was monthly health reports for year 2015. The health reports of second quarter of 2015 (April, May, June) was selected randomly. A total of 15 monthly hospital reports were reviewed using standard review checklist derived from the national format of the hospital report book. Ethical clearance was obtained and data was managed by SPSS version 20 and Microsoft Excel sheet. Descriptive statistics were presented in tables and one graph. m**Results:** Documentation of dates of receiving and sending reports was shown in 12 and 10 hospital reports respectively. All hospital reports showed recorded classification of patients by age and sex. Diseases were written according to the international classification of diseases (ICD) in 12 hospital reports. Authorship of general directors of the hospitals was shown in 3 reports. One hospital report had five health indicators completely documented but the study hospital reports lack the accuracy of health information. **Conclusion:** The study hospitals` reports in North Kordofan State- Sudan were incomplete and inaccurate. Emphasis needed on periodic capacity building of hospital staff on health information system.

Keywords: information, report, hospital, accuracy, indicator, health, Sudan

**Introduction**

Hospital as a health organization could have a reliable health information of high quality to assist in planning health interventions. Hospitals should generate quality and scientifically sound information ready for use by public health policy makers [1]. Incomplete hospital information with poor quality hospital records is a characteristic of health information system in developing countries [2]. Poorly recorded information underestimates the incidence of diseases and mortality data [3]. Mortality indicators derived from hospital data is supporting an evidence based strategic intervention to avert any preventable deaths [4]. The accurate hospital morbidity data is a strong tool for predicting the risk of adverse outcomes [5]. Mortality data at the hospitals could reflect the behaviour and ownership of staff to the measures of hospital safety where reliable health information is sensitive to the hospital values [6]. Failure of the hospitals to operate sensitive health information system could be due to poor revision and interpretation of the compiled hospital data and the lack of timely raise reports to hospital managers for auditing [6]. A limited literature of evidence is available regarding success and failure of health information in developing countries where health information studies confronted with the lack of supportive resources [7].

The aim of the study was to review the hospital reports for completeness and accuracy of health information with an emphasis on five health indicators in North Kordofan State Sudan.

**Material and Methods**

This was a descriptive study aiming to review the health information in the monthly reports of the hospitals. The study area was five main hospitals located in Shiekan locality, North Kordofan State - Sudan. Concerning the confidentiality and sensitivity of the review, the five hospitals were nominated as A, B, C, D and E. The study population was the monthly health reports of the hospitals for the year 2015. Usually, these reports are compiled in quarters. The second quarter of 2015 (April, May, June) was selected randomly for the study. A total of 15 monthly reports were reviewed using standard review checklist derived from the national format of the hospital report book.

The information in the front pages of the reports was reviewed for the completeness of dates of receiving the reports from different departments in the hospitals and dates of sending the reports to

State Ministry of Health.  The review addressed the completeness of classification of diseases according to the international classification of diseases (ICD) and patients' classification by age and sex. The study addressed also five sensitive health indicators for completeness. The indicators were total number of the patients, total number of malaria cases, top ten diseases in the hospital, total number of surgical operations and crude death rates. The total number of patients in the reports was selected purposively for identifying the accuracy of the reports by matching the total number of patients in the reports with the opposite registry books of the second quarter 2015. The back pages of the reports were checked for the signature of the key persons to identify their authorship and responsibility. Ethical clearance was obtained from the Sudan Medical Specialization Board and permission was taken from the State Ministry of Health at North Kordofan State and the hospitals` authorities. Data was managed by SPSS version 20 and Microsoft Excel sheet. Descriptive statistics were presented in tables and one graph.

**Results**

Twelve and 10 reports out of 15 had shown the documentation of dates of receiving and sending reports from the different departments in the hospitals and to State Ministry of Health respectively [Table 1]. Classification of patients by age and gender had been recorded in all reports, and diseases were written according to ICD in 12 reports [Table 1]. The general directors of the hospitals signed 3 reports only [Table 1]. The five health indicators were completely documented in one hospital report [Table 2].  Crude death rate, total number of malaria patients and surgical operations were recorded in two reports out of the fifteen [Table 2]. The total number of patients was complete and recorded in the 15 reports but it was accurately recorded according to the opposite registry books in two reports only [figure 1].

**Table 1:  Number of hospital health reports with documented basic information and the signatures of authorized persons in North Kordofan State - Sudan 2015 (n=15)**

| Reviewed items in 15 reports | | Number of reports / Hospitals | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | |
| Cover page of the reports | Written Date of receiving Reports from Different departments  in the hospitals | 3 | 3 | 1 | 3 | 2 | 12 (80%) |
| | Written Dates of sending reports to State Ministry of Health | 2 | 0 | 3 | 2 | 3 | 10 (66.7%) |
| Classification | Classification of patients according to the age and sex | 3 | 3 | 3 | 3 | 3 | 15(100%) |
| | Classification of disease according to the ICD | 3 | 3 | 3 | 0 | 3 | 12(80%) |
| Authorized signatures  on the reports | Signature of statistician of each department | 3 | 0 | 1 | 0 | 3 | 7 (46.7%) |
| | Signature of the  head statistician | 3 | 3 | 1 | 0 | 3 | 10 (66.7%) |
| | Signature of the medical manager of the hospital | 3 | 0 | 0 | 3 | 3 | 9 (60%) |
| | Signature of the general directors of the hospital | 0 | 0 | 3 | 0 | 0 | 3 (20%) |

**Table 2: Number of hospital health reports with complete documentation of five health indicators in North Kordofan State- Sudan 2015 (n=15)**

| Complete documentation of  5  selected indicators in 15 reports | Number of reports / Hospitals | | | | | Total |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | |
| Total number of the patients | 3 | 3 | 3 | 3 | 3 | 15 (100%) |
| Total number of malaria cases | 1 | 0 | 0 | 0 | 1 | 2(13.3%) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Top ten disease in the hospital | 3 | 3 | 0 | 0 | 0 | 6(40.0%) |
| Total number of surgical operations | 1 | 1 | 0 | 0 | 0 | 2(13.3%) |
| Crude death rates | 1 | 0 | 0 | 0 | 1 | 2(13.3%) |
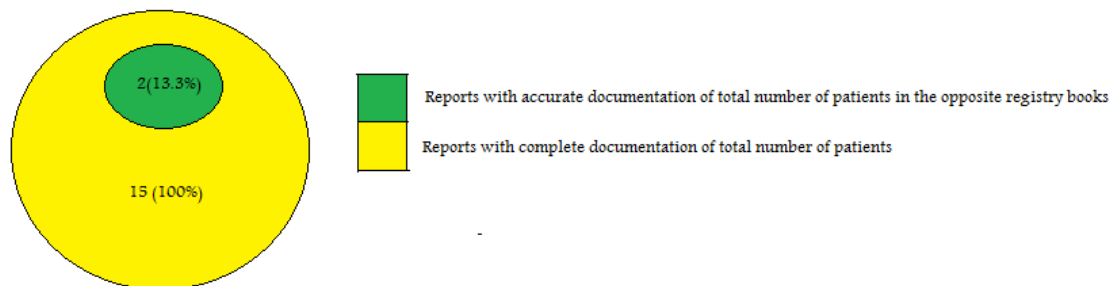


**Fig 1: Number of health reports that accurately matched in the opposite registry books in North Kordofan State- Sudan 2015**

## Discussion

Health information system is one of building blocks in the health system that attracting policymaker to make use of cheap and ready-made information. Complete and accurate health information in this block provides health indicators for monitoring the track of health system performance in the country [8]. Review of hospital records is the feasible and cheap method of studying morbidity, mortality and medical errors, nevertheless, it has the limitations of incomplete, miss located or absent records [9]. In this study, the incomplete information in the hospital reports limited further review of information in the study reports. It has shown that the dates were not written in some of the reports. The missed dates on hospital reports contribute to the inconsistency of information regarding the occurrence of health events such as date of patients` deaths in comparison with dates of last treatment procedures [10]. Furthermore, absences of dates in the reports could be a cause of delay to the timely flow of hospital information and obstruction of the pathway of utilization of information to improve hospital services.

Age and sex classification was completely recorded in the study hospital reports. Age and sex are used in ranking deaths in the country and to identify the demographic features of the population for tuning health policy [11]. However, a ranking of deaths by age and sex could be affected by the inherent limitations of coding the diseases according to ICD [11]. Coding with ICD in this study was not reported in three hospital reports. International classification of diseases in hospitals` reports is a method on which the causes of deaths could rely. Nevertheless, deaths due to care provider and health system errors are not associated with ICD in death certificates [12].

Almost half to one quarter of study reports had shown the signatures of the departmental statisticians and the general director of the hospitals respectively. The hospital and management components are playing a crucial role in the implementation of hospital services including management of health information system [13]. The authorship of statisticians and managers is contributing to the quality improvement, patients` safety; hospital culture and preventing prolong dispatch of reports to hospital planners [13, 14].

Three health indicators were poorly recorded in the study hospitals` reports: total number of malaria cases, total number of surgical operations and crude death rates. Malaria indicator is the most sensitive health indicator as far as malaria is an endemic disease in Sudan [15]. Under recording of patients, diagnosed with malaria is also shown in inpatients information received from hospitals in different states of Sudan [16]. Complete and accurate recording of diagnosed malaria could avail a surveillance data that help in adjusting the malaria control strategies over time [17, 18].

Two hospitals' reports in this study had the documentation of total number of surgical operations and crude death rates. Surgeons are usually reluctant to record surgical information including intraoperative and postoperative complications and considering it as routine work [19, 20]. Writing detailed procedures for surgical operation is of value and it is a fundamental practice that important in medico legal events [21]. Recording the total number of surgical operations could be the easiest variable to maintain the availability of surgical operation information in hospital reports.

The crude death rate was not recorded in most of the study reports. Under recording of crude death rate in hospitals` reports underestimates the deaths associated with communicable and non-communicable diseases in developing countries [22-25]. The top common ten diseases were shown in less than half of the study reports. The recording of common diseases in hospital reports is sometimes very poor [26]. Recording common diseases in hospital reports will adjust the performance metrics of the hospitals and assess the effectiveness and efficiency of hospital services [26].

The total number of patients was recorded completely in the study reports, but it was inaccurate when matched with the total number of patients in the opposite registry books for the same months. Compared to the developed countries, the quality of hospital information is reliable, accurate and provides useful information of disease outcomes [6, 27]. Checking accuracy of patients` information and provide feedback conclusion to hospital staff are improving hospital`s strategies [28]. It is common that the health information system has varied levels of under documentation at different stages of recording health data [29, 30]. The hospital managers should have a significant role in the quality and accuracy of patients` health information that seems to be of low capacity in the study area.

**Conclusion**

The study hospitals` reports in North Kordofan State- Sudan were incomplete and inaccurate regarding the authorship of hospitals` managers and the health indicators. Emphasis needed on capacity building of hospital staff on governance and stewardship regarding health information system.

**References**

[1] AbouZahr C., Boerma T. Health information systems: the foundations of public health. Bulletin of the World Health Organization 2005; 83 (8): 578- 583.

[2] Braa J., Hanseth O., Heywood A., Mohammed W., Shaw V. Developing health information systems in developing countries: the flexible standards strategy. MIS Quarterly 2007; 31 (2): 381-402

[3] Herrett E, Shah AD, Boggon R. Completeness and diagnostic validity of recording acute myocardial infarction events in primary care, hospital care, disease registry, and national mortality records: cohort study. BMJ 2013; 346:f2350 doi: https://doi.org/10.1136/bmj.f2350

[4] Souza JP., Gülmezoglu AM., Vogel J., Carroli G., Lumbiganon P., Qureshi Z., et al. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. The Lancet 2013; 381(9879):1747-1755.

[5] Mnatzaganian G., Ryan P., Norman PE., Hiller JE. Accuracy of hospital morbidity data and the performance of comorbidity scores as predictors of mortality. J Clinical Epidemiology 2012; 65(1):107-115.

[6] Chassin MR., Loeb JM. High reliability health care: getting there from here. The Milbank Quarterly 2013;91(3):459-490.

[7] Heeks R. Information systems and developing countries: Failure, success, and local improvisations. The information society 2002;18(2):101-112.

[8] Nnamuchi O. WHO's Building Blocks of a Health System and the Legal and Policy Environment in Nigeria: Any Missing Links? 2016. Available at SSRN: https://ssrn.com/abstract=2810659

[9] Wilson R, Michel P, Olsen S, Gibberd R. Patient safety in developing countries: retrospective estimation of scale and nature of harm to patients in hospital. BMJ 2012;344:e832 doi: 10.1136/bmj.e832

[10] Johnson LF, Dorrington RE, Laubscher R, Hoffmann CJ, Wood R, Fox MP, et al. A comparison of death recording by health centres and civil registration in South Africans receiving antiretroviral treatment. Journal of the International AIDS Society 2015, 18:20628. http://dx.doi.org/10.7448/IAS.18.1.20628

[11] Heron M. Deaths: leading causes for 2011. 2015. National Vital Statistics Reports 2007 ; 56 ( 5).Available from URL: https://www.researchgate.net/profile/Melonie_Heron/publication/42973404_Deaths_Leading_causes_for_2005/links/00b7d53c6a1de3cd37000000/Deaths-Leading-causes-for-2005.pdf.

[12] Makary MA, Daniel M. Medical error-the third leading cause of death in the US. BMJ 2016;353:i2139 doi: 10.1136/bmj.i2139

[13] Zingg W., Holmes A., Dettenkofer M., Goetting T., Secci F., Clack L., et al. Hospital organisation, management, and structure for prevention of health-care-associated infection: a systematic review and expert consensus. The Lancet Infectious Diseases2015;15(2):212-24.

[14] Basta YL., Zwetsloot IM., Klinkenbijl JH., Rohof T., Monster M., Fockens P., et al. Decreasing the dispatch time of medical reports sent from hospital to primary care with lean six sigma. Journal of evaluation in clinical practice 2016;22(5):690-698.

[15] Kafy HT, Ismail BA, Mnzava AP, Lines J, Abdin MSE, Eltaher JS, et al. Impact of insecticide resistance in Anopheles arabiensis on malaria incidence and prevalence in Sudan and the costs of mitigation. Proceedings of the National Academy of Sciences 2017: https://doi.org/10.1073/pnas.1713814114

[16] Sudan Ministry of Health. Indicator Data Visualization. Sudan Health Observatory 2012 [cited 2017]. Available from: http://www.sho.gov.sd/controller/datavis.php?sm_id=126&mid=109&lid=1&cat_id=34&ind_id=88

[17] Aregawi M., Lynch M., Bekele W., Kebede H., Jima D. Time series analysis of trends in malaria cases and deaths at hospitals and the effect of antimalarial interventions, 2001–2011, Ethiopia. PLOS ONE 2014; 9(11): e106359. https://doi.org/10.1371/journal.pone.0106359

[18] Okiro EA., Kazembe LN., Kabaria CW., Ligomeka J., Noor AM., Ali D., et al. Childhood malaria admission rates to four hospitals in Malawi between 2000 and 2010. PLOS ONE 2013; 8(4): e62214. https://doi.org/10.1371/journal.pone.0062214

[19] Day A, Donachie P, Sparrow J, Johnston R. The Royal College of Ophthalmologists' National Ophthalmology Database study of cataract surgery: report 1, visual outcomes and complications. Eye 2015; 29(4): 552–560 doi:10.1038/eye.2015.3

[20] Biffl WL., Gallagher AW., Pieracci FM., Berumen C. Suboptimal compliance with surgical safety checklists in Colorado: A prospective observational study reveals differences between surgical specialties. Patient safety in surgery 2015; 9(1):5 doi 10.1186/s13037-014-0056-z

[21] Hamza AA., Idris S., Ahmed O. Evaluating the Operative Notes of Patients Undergoing Surgery at Omdurman Teaching Hospital, Sudan. Sch J Appl Med Sci 2013; 1(6):668-72.

[22] Moran AE, Forouzanfar MH, Roth G, Mensah G, Ezzati M, Murray CJ, et al. Temporal trends in ischemic heart disease mortality in 21 world regions, 1980-2010: The Global Burden of Disease 2010 Study. Circulation. 2014; 129(14): 1483–1492. doi: 10.1161/CIRCULATIONAHA.113.004042.

[23] Schnabel RB., Yin X., Gona P., Larson MG., Beiser AS., McManus DD., et al. 50 year trends in atrial fibrillation prevalence, incidence, risk factors, and mortality in the Framingham Heart Study: a cohort study. The Lancet 2015; 386(9989):154-162.

[24] Widdifield J., Bernatsky S., Paterson JM., Tomlinson G., Tu K, Kuriya B., et al. Trends in excess mortality among patients with rheumatoid arthritis in Ontario, Canada. Arthritis care & research 2015;67(8):1047-1053.

[25] Bygbjerg I. Double burden of noncommunicable and infectious diseases in developing countries. Science 2012;337(6101):1499-1501.

[26] Lujic S., Watson DE., Randall DA., Simpson JM., Jorm LR. Variation in the recording of common health conditions in routine hospital data: study using linked survey and administrative data in New South Wales, Australia. BMJ Open 2014; 4(9): e005768 doi: 10.1136/bmjopen-2014-005768

[27] Lambert L., Blais C., Hamel D., Brown K. Evaluation of Care and Surveillance of Cardiovascular Disease: Can We Trust Medico-administrative Hospital Data? Can J Cardiol. 2012; 28(2):162-8 doi: 10.1016/j.cjca.2011.10.005.

[28] Parand A., Dopson S., Renz A., Vincent C. The role of hospital managers in quality and patient safety: a systematic review. BMJ Open. 2014; 4(9): e005055 doi: 10.1136/bmjopen-2014-005055

253 [29] Whitston M., Chung S., Henderson J., Young B. What can be learned about the impact of
254     diabetes on hospital admissions from routinely recorded data? Diabetic Medicine
255     2012;29(9):1199-1205.
256 [30] Hippisley-Cox J., Coupland C. Identifying women with suspected ovarian cancer in primary
257     care: derivation and validation of algorithm. BMJ. 2012; 344: d8009 doi:  10.1136/bmj.d8009