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Assessment of health management information system implementation in Ayder referral hospital, Mekelle, Ethiopia

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Abstract: Effective Health Management Information System (HMIS) is essential for setting priority for community based problems, for allocation of budget and human resource and decision making in general to managers and stakeholders. In Africa there are many problems in data management in the health sector in relation to missing of data in reports this leads to a picture which could not represent the country health information. A facility based cross sectional study was conducted in Ayder referral and teaching hospital. Six months reports have been assessed including all the data, which were registered in the six month. In addition the tally sheets generated during this six month were also included as part of the assessment. Out of the six-month data used 63.3% was accurate. More than 95% of the reviewed patient cards were complete. Out of the questioned 50 staffs (93%) have good attitude towards HMIS. Data consistency between register and the tally sheets was measured as 72.2% even though the value difference was not largely seen. There was 78.6% an average report completeness measure in the HMIS unit. There was no sign of using the information generated by the facility. Use of accurate data in the facility was low. In addition, information was not still used for action. The original HMIS tallies were not used in the hospital instead minimized and photocopied tallies were used. Refreshing training was not given to staff. Therefore; training should be given to the higher bodies and all staffs about the importance of HMIS and the value of health data in decision making. The performance monitoring team should have to be established. The HMIS unit staffs should have to be trained on basic indicators calculation.

Keywords: HMIS, Ethiopia, Ayder Referral Hospital, Data Quality

1. Background

Health management information system (HMIS) is a System that allows for the collection, storage, compilation, transmission, analysis and usage of health data that assist decision makers and stakeholders manage and plan resources at every level of health service. It also used to improve patient satisfaction with health services by tracking certain dimensions of service quality [1].

In most African countries, a country-wide health management information system compiles records about how many patients are being diagnosed with and treated for certain diseases. The actual data are meant to be collected and reported monthly by the individual health-care facilities. The HMIS compiles and analyzes these records, giving a picture of which patients are being treated across districts, regions, and the entire country [2].

In Ethiopia, like the service delivery instruments, there is little standardization of HMIS reporting forms. At the onset of health system decentralization as a primary health care strategy, which constituted a key feature of health sector reforms across the developing world, efficient and effective health management information systems were widely acknowledged and adopted as a critical element of district health management strengthening programs[3]. According to the Ethiopian context Health Management Information System and Monitoring and Evaluation (HMIS/M&E) was one of seven components of the Health Sector Development Program (HSDPIII) [5].

Health service-based sources generate data on outcome of

health-related administrative and operational activities. There are a wide variety of health service-based data: facility-based data on morbidity and mortality among those using services; types of services delivered, drugs and commodities provided; information on the availability and quality of services; financial and management information. Most health service-based data are generated "routinely" in the course of recording and reporting on services delivered [6]. At the health facility it is better for providers to know how to use the forms, and that HMIS can generate useful information for planning and managing health services. Over all they have to create a sense of ownership putting themselves in the health system hierarchy. Basically Performance of Routine Information System Management (PRISM) broadens the analysis of RHIS performance to include three key categories of determinants that affect performance: behavioral, technical and organizational determinants [7].

Although reliable and timely health information is the foundation of public health action, it is often unavailable due to under-investment in systems for data collection, analysis, dissemination and use. The rationale for HMIS has been that the availability of operational, effective and efficient health management information systems is an essential component of the required district management capacity [8, 9]. Many data elements critical to high quality care were not recorded completely or accurately at enrollment or follow-up [10]. In addition resistance to change, which comes in form of individual actors having certain viewpoints and understandings of the nature and purpose of the HMIS, based on their past experience is a problem [11].

2. Methods and Materials

The study was in one of the hospitals of Tigray i.e. Ayder Hospital. It is both service and teaching hospital and one of the referral hospitals of Ethiopia which is found in Mekelle (the capital city of Tigray region) in which the manual HMIS was already implemented and partially the Electronic Medical Record was in practice (in the card room). The Hospital starts offering health service phase by phase. It started the service first by giving outpatient service followed by inpatient service with the four major departments namely internal medicine, surgery, pediatrics and child health, and gynecology and obstetrics. This service has already expanded to give more services that one referral hospital is required to give. The hospital is serving as a referral hospital not only for Tigray region but also neighboring regions like Amhara and Afar. [4]. Facility based cross sectional study was conducted to view the data collection, processing and reporting health related information used to measure the health management performance of the hospital.

The source of data was Ayder Hospital's data collection tools filled by the clients which submit their data to the HMIS unit, registration books ,data processing mechanisms used to analyze the collected information base on the standards, and compiled reports made by the hospital HMIS unit and the data and information processing and sharing at all level. From the huge amount of health information data only those reported according to the evaluation format which was designed to evaluate the routine health information system based on the basic indicators were used. On the other hand other type of information which exists may have not included in the study.

Samples were purposively selected for different data types. The samples were six month tallies, registered data, 50 staffs, 50 individual patient cards and the two quarter hospital reports. Qualitative data were collected using Focus group discussion with those who were working on the HMIS unit to assess factors that influence the HMIS performance including the main attributes of information system such as timeliness, simplicity, accuracy, completeness and usefulness of data. Observation of daily registers, compiling tools and reporting formats for data quality, consistency and completeness was undertaken using an adapted check list. All the data collection tools have been seriously checked in relation to the data which were generated by clinicians, nurses and other users. In addition to this the analysis methods were evaluated by observing basic indicator value calculation. The use of the compiled data has been also assessed.

All the data collected, processed and prepared as a report were evaluated using check lists for their quality in relation to accuracy, timeliness, consistency, relevance and completeness. This data were entered into statistical software (spss v.16) and descriptive analysis was performed.

3. Results

3.1. Data Collection

The registers were available in each unit but some of the registers were worn out their pages. There were findings on using different naming for specific disease by violating the HMIS disease classification. The size of the register has also its own effect on filling data because the total size of the left and right sides of the registers. The full name area in almost all registers was not completely used because of shortage of space. Registers were not complete; the values which have to be calculated were not performed.

In the facility there was no shortage of tally sheets. To some extent the tally sheet format made also some data mismatch because of the un-relaxed (small size) cells nature and the disease names were not easily identifiable and all used sheets were photo copied. In addition the HMIS tally sheet do not have place for the number of beds, total admission in IPD, length of stay, total discharges of IPD. The original HMIS tallies were not used in the hospital. On the other hand there were units which don't even use the tally sheet but used a white flat A4 sheets by preparing their own tables. The facility used photocopy tally sheets but the list of diseases was not easily readable. In some other units there were also reversely printed pages. The staff motivation to fill daily tallies is low, they prepare at the end of the month.

3.2. Reporting

The HMIS unit receives monthly filled tally sheets from the hospital units but there were units which do not sent report to the unit with no known reason. There were also units which report quarterly and others say no data to be reported in words of mouth. In some other units even though they report monthly but there was no responsible body to make that report at the end of the month. Difficulties on indicator calculation due to the nature of reporting formats like the current number of ART users was the largest drawback seen in the HMIS reports. In addition the average length of stay number is 100% incorrectly reported. The HMIS unit used an average value every month in the reports for average length of stay. Except the weekly epidemic reporting format both the disease and service reporting formats were available in the facility.

3.3. Data Quality

3.3.1. Data Accuracy

Even though it was not at good level, the facility shows an increase in using accurate data from time to time.

The largest data in accuracy use was observed in the indicators PLWHA currently on ART, length of stay and TB case detection which measures 100%, 100% and 66.6% respectively from the data of six months. There was a significant increase of data accuracy from the data of six months and the average data accuracy measure of 62.9%. There was a serious problem on ART and length of stay data evaluation even there was no month without discrepancy (Figure-1).

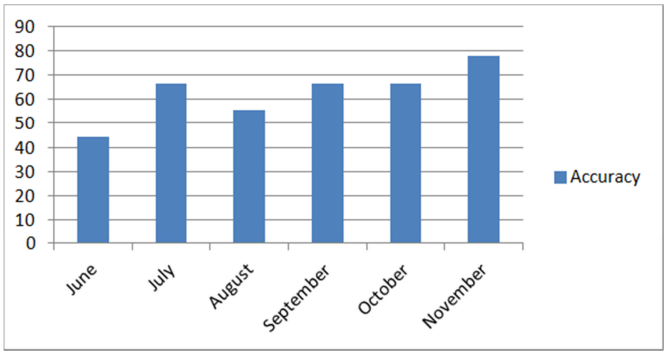

Figure 1. *Trend of data accuracy use in Ayder referral hospital between June/2010 and November/2010*

3.3.2. Consistency

Almost all the data were similar in both patient card and the register. But even though it was not much there was age registration difference observed. Consistency between register and the tally sheets measure showed 72.2% of the values were equal even though the difference was not largely seen. Insignificant value shows age miss match in counting individuals from the register to the tally sheet.

3.3.3. Completeness

In the facility there was no limited number of monthly reports expected by the HMIS unit. Many of the units report monthly, some of the others report quarterly and others never send their report. We have checked data completeness on both patient card and registers by taking 50 individual cards. On the patient card more than 95% of the required data were included except some cards miss summery sheet information and insignificant ART cards type of HIV test and date confirmed were left free. On the other hand, except the grand fathers name missed full information was included in all 50 individual register records.

A maximum of 95.5% report completeness and a minimum score of 71.2%. The average report complexness' measure in the hospital from the reports of six month submitted to the HMIS unit was 78.6% (Figure-2).

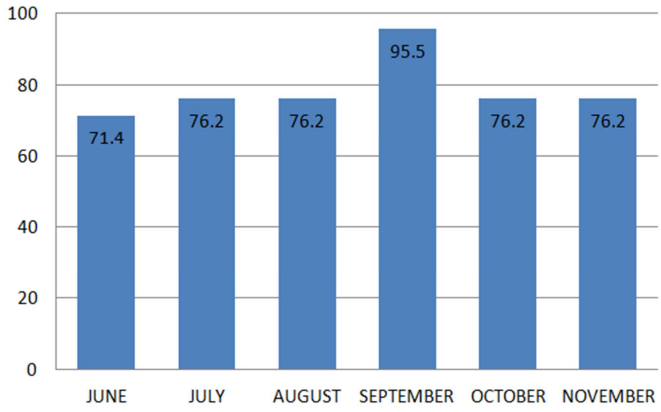

Figure 2. *Monthly report completeness in Ayder referral hospital between June/2010 to November/2010.*

3.3.4. Staff Attitude on HMIS

The result shows around 50(100%) of the respondents agreed that HMIS plays a great role for improving health of community and quality of decision making in the facility. Out of this respondents 30(40%) rated generally that HMIS is expensive. Ten (20%) of the respondents have doubt about its easy means of information communication to the higher bodies (Table-1).

Table 1. *Response of staffs to measure HMIS attitude in Ayder Referral Hospital January, 2011*

Questions	Agree N (%)
Facilitate information use	50(100)
Facilitate data standardization	50(100%)
Reduce data burden	46(92%)
Make reporting system simple	48(96%)
Data handling using HMIS is inexpensive	30(60%)
Improve early detection and solving of problem	48(96%)
Permit easy communication with RHB and WoHO	40(80%)

3.3.5. Training

A short training was given to majority of the workers before 2 years for five days on HMIS but there were no other trainings on HMIS as refreshment prepared in the hospital. Even new staffs do not have taken any training about HMIS. The HMIS unit staffs were not also well trained to accomplish the tasks and to play their role in the facility.

3.3.6. The HMIS Unit

It was before two years the facility implement HMIS. Currently there were two workers in the unit they have good skill on computer basics. There was no focal person and budget allocated for HMIS unit. The basic manuals of HMIS were not available in the facility HMIS unit. In addition there was no communication means like telephone, internet and printing device. The role of this unit was not clearly identified and understood by the higher officials out of submitting quarterly reports.

3.3.7. Information Use

In the hospital there was no known performance monitoring team but there was informal monthly performance made by the higher bodies' team which didn't include the HMIS unit as a part. This team doesn't evaluate the monthly data generated by the HMIS unit in relation to the regional or national level target instead using informal information from departments the team call meeting and take actions. The hospital also gets supportive supervision from RHB and frequent feedback made from different bodies at least four times per year. But there was no regularly monthly /quarterly data evaluation made with the alignment of the national and regional targets. In the facility there were no charts of target displayed at any of the higher officials. The catchment area map was not also available in the facility. There was no report displayed using a chart in the facility using the data of either quarterly or monthly.

3.3.8. HMIS Process

The hospital has a well established card room of size 111 m^2 with 4 windows, a total of 15 workers, 4 runners and total of six computers. There were 65 well established shelves. They made use of Medical Patient Index (MPI) card but MPI box and tracer card were not still in use. In the card room, cards were arranged according to the Medical Record Number (MRN) with in specified range.

4. Discussion

The use of accurate data in the facility on average was 63.3% which indicates significant percentage of data in accuracy. This value was low when we compare with the national HMIS guide line a minimum of 80% [15]. This was most probably due to counting error in the registers and lack of ability to calculate indicators. Data entry was also another problem that creates data in accuracy in the HMIS unit. In addition to this due to unreported values the HMIS unit uses average value of the reporting units every month for the non reporting units. On the other hand there was good measure of data accuracy improvement between months except one month shows a decrement. This improvement was due to the formation of good relationship between the HMIS unit and other departments which creates fine communication. In addition the HMIS staff motivation was increasing even they collect the monthly reports themselves.

In the hospital, 100% of the report of ART and length of stay were in accurate on the data of all six month. This could be due to some units don't submit the length of stay monthly because there was no space for this indicator in the tally sheet. As a consequence the compiled reports showed that a great discrepancy every month. For the ART, there was a significant number represented as other in the tally sheet. There was no space for such value in the HMIS unit reporting format so that this value was missed every month. This happened due to use of edited format of the HMIS ART tally sheet. In addition this might be due to lack of knowing what the basic indicators and lack of communication between the HMIS unit and the ART to identify with what values were reported [5, 13]

Like other previous studies there was a significant problem in data recording in registers observed in the facility [5, 11]. This could be due to the large size of the left and right sides of registers. The space provided to fill some data was not also enough which leads to incomplete or unreadable data on register. Like the space for Full name was not enough, some units use first name and middle name only and others used unreadable full names. Results showed, 73.3% the units do not fully calculate the number of admission, length of stay and sum of discharge at every completed page. This could be due to lack of knowledge about basic indicators and lack of supervision from the HMIS unit. Even since there were no cross checks made by the HMIS unit within the departments it gives them not to calculate these values.

Consistency of data value between registers and the tally sheets generated every month was measured as 72.2% which indicates significant difference. This could be due to use of different naming for a particular disease which causes counting error. In addition it could be category (age or sex) classification problem. Over the entire major problem was all units do not prepare daily tally rather they make it at the end of the month this leads to inn correct count. There was a slight data in consistency between the patient card and the register in some basic data values like the age.

Results showed that 46(93%) of have good attitude towards HMIS and 38(75%) of the respondents agree that their staff mates have good attitude towards HMIS. This value difference could be due to different reasons. Firs there were new staffs which do not have taken any training about HMIS. Secondly there could be resistant staffs which influence other staffs. On the other hand 12(24%) of the respondents have doubt about cost minimization by using HMIS. This could be due to lack of consecutive training to increase awareness and also staffs do not want to spent time in counting data every month even to follow every HMIS disease classification they think it kills their time[14].

There was no well established information-use culture in the facility. This might be mostly due to lack of knowledge on how to use HMIS data for allocation of resource and man power. In addition to this lack of strict supervision and follow up from the regional health bureau might be another reason. Lack of consecutive training to the higher bodies might be also another factor. Over all it looks the body who take responsibility for the implementation of this system was not

doing follow up after the first training has been given.

The HMIS unit received many reports from the facility departments. The results showed completeness maximum 95.5%, minimum of 71.2%. An average of 78.6% report completeness was measured from the data of six month this has a small difference with the HMIS guide line minimum requirement that was 80% [15]. The difference between the maximum and minimum results was seen due to some units start reporting lately. In addition to this some of the units submit their report quarterly which creates value difference between the end month of the quarter and the rest two months.

In the HMIS unit there were no enough resources made available. This could be due to lack of allocated badge to that unit this aligned with the national survey made in 2006 by the HMIS Re-engineering team. The staffs members were both degree holders but not health professionals this was the maximum staff number in the survey of the 2006 composition measured by Tigray and SNNP [14].

The results showed that there were registers, tally sheets and reporting forms made available in the hospital. The IPD tallies do not have space for length of stay, bed occupancy and discharged variables. There were also units which do not use this tally sheets.

Majority of the departments do not submit their report at a specific time and they didn't write date of submission. There were also difficulties in indicator calculation .The hospital shows an increase in using accurate data from time to time. In the hospital both the number of PLWHA currently on ART and length of stay shows the largest data in accuracy in all six months.

Data completes measured from individual patient cards was good, on the contrary the average report completeness measure in the hospital was lower than the national minimum. The HMIS unit lacks resources and new staffs have not taken ant training on HMIS. In the facility there was no performance monitoring team formed according to the HMIS procedure and composition. Information generated by the facility was not used for action.

Health management information system is an essential tool for strengthening planning and management in the health facilities. But in developing countries due to resource limitation, HMIS implementation is at its infant age. Many of health professionals focus on treatment due to lack of training there is no awareness on the importance of patient record. Consequently, decision-makers cannot identify problems and needs, track progress, evaluate the impact of interventions and make evidence-based decisions on health policy, programmed design and resource allocation. Staff training, information use culture and strengthening the HMIS units are some of the major focus areas that developing countries should have to work on because this will help them to collect complete, accurate and timely data, therefore decisions will be efficient and effective. At the top of this health facility managers and district heath managers should have to have knowledge on the importance of quality data, strict follow up, supportive supervision and feedback mechanisms are very important to produce quality information at the higher level.

Author's Contributions

KT.: proposal writing, designing, recruitment and training of supervisors and data collectors, analysis and write-up of the paper. EG. and GT.: proposal writing, designing, recruitment and training of supervisors and data collectors.

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Significance of the Work

We believe that this study is important to explore how HMIS is implementing in resource limited settings, Ethiopian. In this study it is illustrated what are the possible gaps during implementation. Not only for the Ethiopian setting, are findings in the study also useful for other developing countries.

References

[1] F. Rabbani, B.a (2005). health management information system: a tool to gauge patient satisfaction and quality of care. Easter Mediterranean health journal

[2] Gething PW, Noor AM, Gikandi PW, Ogara EAA, Hay SI, et al. (2006) Improving Imperfect Data from Health Management Information Systems in Africa Using Space–Time Geostatistics. PLoS Med 3(6): e271. doi:10.1371/journal.pmed.0030271

[3] HMIS reform, t. (2008). HMIS/M&E strategic plan for Ethiopia health sector. FMoH.

[4] MekelleUniversity. (2002). nine months performance report of 2002 fiscal year of Ayder referal hospital. Mekelle.

[5] Department, p.a (2005) Ethiopian sector strategic plane (HSDPIII) 2005/6-2009/2010.Addis Ababa: Federal Ministry of Health

[6] WHO, FMO, CSA, & HMN. (2007). Assessment of the Ethiopian national health informationsystem. Addis Ababa.

[7] Hotchkiss, D., Aqil, A., & Mukooyo, T. L. (2010). evalution ofperformance routine information system management(PRISM) framework:evidence from Uganda . BioMed central.

[8] World Health Organization. (2008). Framework and Standards for Country Health Information System.Geneva:WHO.

[9] MUTEMWA, R. I. (2005). HMIS and decision-making in Zambia: re-thinking. Oxford university.

[10] Peter Y. et al. Medical record completeness and accuracy at an HIV clinic in Mozambique. JHIDC.(2010)

[11] Murodillo Latifov A. Global standards and Local Applications: Case of Implementing ICD-10 Standard in HMIS Tajikistan..JHIDC.(2013).

[12] Garrib, N. Stoops, A.McKenzie, L.Dlamini, T.Govender, J.rohde, et al. (2008). An evaluation of District health informatio system Rural South Africa. south aafrican Medical jornal .

[13] Igira, F. T., Titlestad, O. H., Lungo, J. H., Makungu, A., & Khamis, M. M. (2006). Designing and Implementing Hospital Management Information Systems in developing countries: case study from Tanzania -Zanzibar.

[14] HMIS reform, t. (2006).HMIS Business Re-engineering Assessment Report. FMoH.

[15] HMIS Reform Team. (2007). Indicator definition: Area 1. Addis Ababa: FMoH.