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ASSESSMENT OF HEALTH INFORMATION SYSTEM AT PRIMARY HEALTH CARE FACILITIES OF PAKISTAN: A CATCH 22

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ABSTRACT

Health IT systems have the capability to improve the health outcomes for the patient and thus augmenting quality and improving efficiency as well. Despite highlighting the importance of electronic medical record system in hospitals leading to more efficient and improved patient care, very little attention has been paid in this regard, both in private and public setups. Therefore, the present study was designed to assess and identify the issues related to health information system operational at primary care healthcare facilities in located in Pakistan. A descriptive cross-sectional study design was used to assess the district health information system at six primary care (3 rural health centers, 3 basic health units) from Islamabad and 35 primary care facilities (17 rural health centers and 18 basic health units) located in Rawalpindi district, Pakistan. Pre-validated data collection tools were used. Written permission had been obtained from Department of Health, South Africa and North–West University, South Africa. After data collection, data was cleaned, coded and entered in SPSS version 21. Desk PCs (n=20, 48.8%) were available for the management of health information system, while none of the facilities had tools for back up of data, color printers, scanners, projectors and photocopiers. Internet access was absent in 78% (n=32) of the facilities, email services were available in only 24.4% (n=10) of

the total facilities, while 95.1% (n=39) of the facilities used manual files and books for storing data. Data was being analyzed manually in 90.2% (n=37) of the total healthcare facilities. Most of the respondents, 97.6% (n=40) reported that they did not have a district health information system at their facility and 87.8% (n=36) identified lack of administrative support as the major constraint in the health information data management. The present study concluded that health information system was almost not functional and up to the mark at primary healthcare level. Most of the primary healthcare setups were found non-operational. Stagnant adoption of these technologies in healthcare systems, difficulty in using or lacking technical skills to operate, systems are not fully interoperable and technology and capacity in terms of infrastructure and resources have been identified as major hindrance towards adoption of health information systems in Pakistan.

Keywords: Health information system, human resource, training, primary healthcare facilities, Pakistan

INTRODUCTION

Healthcare sector is perhaps one of the largest and rapidly growing industry in the world with a market value of 7.6 trillion USD **[1]**. As per an estimate, by 2020 the global spending on healthcare is expected to reach 8.7 trillion USD, possibly due to the improved integrated healthcare services has increased the cost and life expectancy **[2]**. Accurate and reliable information provides the basis for decision-making across all the segments of healthcare system **[3]**. "Modern health information systems are comprehensive, provides an integrated framework and specialized in managing different roles including administrative and managerial, financial and clinical decision support systems across all the health system building blocks" **[4]**. One of the benefits of health information systems is that they have the potential to promote safe and effective medication use, improving health of individuals and yielding improvement in quality of care, savings and greater engagement of patients by improving productivity of health care team **[5]**. However, still morbidity and mortality associated with medical errors remain an important issue in hospitals **[6]**. The aim of any medical institution is to be able to provide high quality medical care to its patients. Use of health information systems in hospitals may play an important role in reduction of such medical errors. There have been significant expectations in reducing

such risks by directly implementing information management systems in hospitals over the span of last four decades **[7]**.

The Ministry of National Health Services, Regulation & Coordination, Pakistan has recently stated its vision to improve the health of all individuals, the 'Right to life' given to them by the Constitution of the Islamic Republic of Pakistan. The MNHSR&C has put forward the National Health Vision 2016-2025 with the vision to lead the nation to affordable and quality health services delivered through equitable, responsive and resilient health care system and infrastructure through technological advances in the field of medicine, information technology and innovation **[8]**. Health IT systems have the capability to improve the health outcomes for the patient and thus augmenting quality and improving efficiency as well **[9]**. Despite highlighting the importance of electronic medical record system in hospitals leading to more efficient and improved patient care, very little attention has been paid in this regard, both in private and public setups. Therefore, the present study was designed to assess and identify the issues related to health information system operational at primary care healthcare facilities in located in Pakistan.

METHODOLOGY

A descriptive cross-sectional study design was used to assess the district health information system among the primary healthcare facilities of Rawalpindi district and Islamabad Capital Territory, Pakistan. Ethical committee of Hamdard University (HUERC/785) gave the approval for conducting the study. Consent to participate in the study had also been taken from respective authorities at primary healthcare facilities from where data was collected. Besides this, consent was also taken from the respondents and confidentiality of information was also ensured. Pre-validated data collection tools were used. Written permission had been obtained from Department of Health, South Africa and North – West University, South Africa. The tools were slightly modified in terms of demographics of the country. The list of all primary healthcare facilities (RHCs and BHUs) within the jurisdiction of Rawalpindi district and Islamabad Capital Territory was obtained from respective district offices of health. The sampling frame was comprised of professionally qualified physicians, pharmacists, nurses, admin and technical staff who not only interact but also manage

district health information system at these primary healthcare facilities. Six primary care (3 rural health centers, 3 basic health units) from Islamabad and 35 primary care facilities (17 rural health centers and 18 basic health units) from Rawalpindi district were selected for data collection **(Figure 1)**.

Prospective data was collected from primary sources by self-administering the questionnaires and getting them filled by the respondents by interviewing them. Respondents belonging to different fields were approached by visiting them at their respective offices. After data collection, data was cleaned, coded and entered in SPSS version 21. Descriptive statistics comprising of frequency and percentages were calculated.

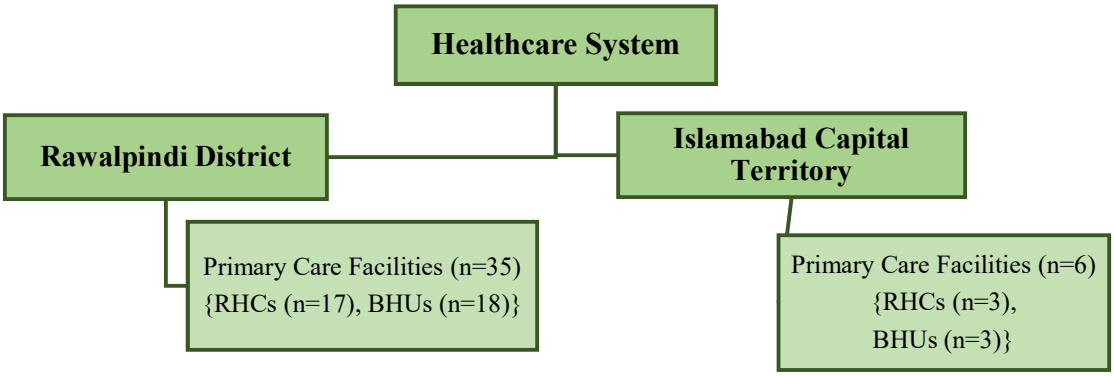

Figure 1: Data collection Units

RESULTS

Geographic Characteristics

Of the total 41 facilities, 51.2% (n=21) were rural health centers (RHCs) and 48.8% (n=20) were basic health units (BHUs). Out of all the facilities, 85.4% (n=35) were located in Rawalpindi district while 4.6% (n=6) were situated in Islamabad Capital Territory. Of the total facilities, 14.6% (n=6) were located in Gujjar Khan, Murree, Taxila and KotliSateyaan while 9.8% (n=4) were based in Kahuta and Kallar Sayedaan respectively **(Table 1)**.

Assessment of Human Resources and Training Requirements

Nearly seventy three percent of the respondents stated that there was no operational manager involved in data management activities of health information system, while 65.9% (n=27) of them reported that an average 1 - 5 patient registration personnel were available and 82.9% (n=34) stated that five Medical Practitioners were involved in data management activities. All the respondents reported that there was no pharmacist available for management of health information system. All the

respondents highlighted that staff members must be trained in different activities of health information data management, while 68.3% (n=28) of them reported that no schedule was available for planned training **(Table 2)**.

Available Current Resources and Documentation

The results of the study showed that the availability of policy document for the management of health information system was: National health act (n=3, 7.3%), district annual performance plan (n=19, 46.3%) and health information system management policy document (n=6, 14.6%). Desk PCs (n=20, 48.8%) were available for the management of health information system, while none of the facilities had tools for back up of data, color printers, scanners, projectors and photocopiers. Internet access was absent in 78% (n=32) of the facilities, email services were available in only 24.4% (n=10) of the total facilities, while 95.1% (n=39) of the facilities used manual files and books for storing data. Data was being analyzed manually in 90.2% (n=37) of the total healthcare facilities. Almost 87.8% (n=36) of the respondents reported that interim aggregation and validation of data was not part of the weekly activities, while 61% (n=25) stated that the facility had no schedule of administrative and managerial meetings. Most of the respondents, 97.6% (n=40) reported that they did not have a district health information system at their facility and 87.8% (n=36) identified lack of administrative support as the major constraint in the health information data management **(Table 3)**.

Table 1: Geographic Characteristics

Indicator	n (%)	
Type of PHC facility	Rural Health Center	21 (51.2)
	Basic Health Unit	20 (48.8)
Indicate your district.	Rawalpindi	35 (85.4)
	Islamabad	6 (14.6)
Indicate Sub-district	Gujjar Khan	6 (14.6)
	Kahuta	4 (9.8)
	Murree	6 (14.6)
	Taxila	6 (14.6)
	KotliSateyaan	6 (14.6)
	KallarSayedaan	4 (9.8)
	Islamabad	6 (14.6)
	Rawalpindi	3 (7.3)

Table 2: Assessment of Human Resources and Training Requirements

Indicator		n (%)
Available Human Resources		
Indicate the number of Operational Managers who are involved in data management activities (Collection, storage, transmission, analysis and reporting) of health information system in PHC facility.	Zero	30 (73.2)
	1 – 5	11 (26.8)
Indicate the number of Facility Receptionist/ Patient Registration Personnel who are involved in data management activities (Collection, storage, transmission, analysis and reporting) of health information system in PHC facility.	Zero	14 (34.1)
	1 – 5	27 (65.9)
Indicate the number of Registered Nurse/ LHVs/Midwives/Skilled Birth Attendants who are involved in data management activities (Collection, storage, transmission, analysis and reporting) of health information system in PHC facility.	Zero	5 (12.2)
	1 – 5	29 (70.7)
	6 – 10	7 (17.1)
Indicate the number of Medical Practitioner who are involved in data management activities (Collection, storage, transmission, analysis and reporting) of health information system in PHC facility.	Zero	7 (17.1)
	1 – 5	34 (82.9)
Indicate the number of Pharmacist who are involved in data management activities (Collection, storage, transmission, analysis and reporting) of health information system in PHC facility.	Zero	41 (100)
Indicate the number of Data-capturer/Clerk/Administrative officer who are involved in data management activities (Collection, storage, transmission, analysis and reporting) of health information system in PHC facility.	Zero	2 (4.9)
	1 – 5	39 (95.1)
Need for Additional Human Resource		
Are you of the opinion that there is a need for additional persons to be involved in Health Information Data Collection?	Yes	41 (100)
Are you of the opinion that there is a need for additional persons to be involved in Summarizing, Storage and Transmission of Health Information Data?	Yes	41 (100)
Are you of the opinion that there is a need for additional persons to be involved in Health Information Data Analysis?	Yes	41 (100)
Are you of the opinion that there is a need for additional persons to be involved in Health Information Data Reporting & Provision of feedback?	Yes	41 (100)
Are health information data management, monitoring and reporting part of your own performance contract and job description?	Yes	11 (26.8)
	No	30 (73.2)
Available Trained Human Resource		
Indicate the number of Operational Managers who received any training in data collection, analysis and reporting of health information data during the last five years.	Zero / No Training/ Data not available	40 (97.6)
	1 – 5	1 (2.4)
Indicate the number of Healthcare Professionals/ Registered Nurse who received any training in data collection, analysis and reporting of health information data during the last five years.	Zero / No Training/ Data not available	34 (82.9)
	1 – 5	7 (17.1)
Indicate the number of Healthcare Professionals/ Medical Practitioner/ Pharmacist who received any training in data collection, analysis and reporting of health information data during the last five years.	Zero / No Training/ Data not available	39 (95.1)
	1 – 5	2 (4.9)
Indicate the number of Data-capturer/Clerk/Administrative officer who received any training in data collection, analysis and reporting of health information data during the last five years.	Zero / No Training/ Data not available	25 (61.0)
	1 – 5	16 (39.0)
Training Requirement		
Do you think the staff members need to be trained in Health Information Data Collection?	Yes	41 (100)
Do you think the staff members need to be trained in Health Information	Yes	41 (100)

Data Capturing and Storage?		
Do you think the staff members need to be trained in Health Information Data Transmission?	**Yes**	**41 (100)**
Do you think the staff members need to be trained in Health Information Data Collation and Analysis?	**Yes**	**41 (100)**
Do you think the staff members need to be trained in Health Information Data Reporting and Provision of feedback?	**Yes**	**41 (100)**
Do you think the staff members need to be trained in Health Information Data Use?	**Yes**	**41 (100)**
Do you think the staff members need to be trained in Health Information Data Quality Assessment?	**Yes**	**41 (100)**
Is there a schedule available for planned training?	**No**	**28 (68.3)**
	Yes, for 1 year	**8 (19.5)**
	Yes, ≥ 2 years	**4 (9.8)**
	In principle (No time period)	**1 (2.4)**
Do you ensure that all new staff members are orientated on the health information management system in your facility?	**Yes**	**5 (12.2)**
	No	**36 (87.8)**
Do your personnel sign that they have read and understood the Standard Operating Procedures of the DHIS?	**Yes**	**4 (9.8)**
	No	**37 (90.2)**

Table 3: Available Current Resources and Documentation

Indicator		n (%)
Available Current Documents		
Do you have the National Health Act available in the PHC facility?	**Yes**	**3 (7.3)**
	No	**38 (92.7)**
Do you have the District Strategic Plan available in the PHC facility?	**Yes**	**31 (75.6)**
	No	**10 (24.4)**
Do you have the Provincial Strategic Plan available in the PHC facility?	**Yes**	**11 (26.8)**
	No	**30 (73.2)**
Do you have the District Annual Performance Plan available in the PHC facility?	**Yes**	**19 (46.3)**
	No	**22 (53.7)**
Do you have the Provincial Annual Performance Plan available in the PHC facility?	**Yes**	**8 (19.5)**
	No	**33 (80.5)**
Do you have the DHMIS policy document available in the PHC facility?	**Yes**	**6 (14.6)**
	No	**35 (85.4)**
Do you have the DHMIS Standard Operating Procedures available in the PHC facility?	**Yes**	**6 (14.6)**
	No	**35 (85.4)**
Available Resources		
Does the staff in your facility have Desk PCs available to support their responsibilities regarding the management of health information data?	**Yes**	**20 (48.8)**
	No	**21 (51.2)**
Does the staff in your facility have Notebook PCs/ Laptops available to support their responsibilities regarding the management of health information data?	**Yes**	**15 (36.6)**
	No	**26 (63.4)**
Does the staff in your facility have Tools for Backup of data available to support their responsibilities regarding the management of health information data?	**No**	**41 (100)**
Does the staff in your facility have Black and White Printer available to support their responsibilities regarding the management of health information data?	**Yes**	**12 (29.3)**
	No	**29 (70.7)**
Does the staff in your facility have Color Printer available to support their responsibilities regarding the management of health information data?	**No**	**41 (100)**
Does the staff in your facility have Scanner available to support their responsibilities regarding the management of health information data?	**No**	**41 (100)**
Does the staff in your facility have Digital Projector available to support	**No**	**41 (100)**

their responsibilities regarding the management of health information data?		
Does the staff in your facility have Photocopier available to support their responsibilities regarding the management of health information data?	**No**	**41 (100)**
Does the staff have access to E-mail services?	**Yes**	**10 (24.4)**
	No	**31 (75.6)**
Does the staff have access to Intranet services?	**No**	**41 (100)**
Does the staff have access to internet services?	**Yes**	**9 (22.0)**
	No	**32 (78.0)**
Do you think that their E-mail access is sufficient?	**Yes**	**7 (17.1)**
	No	**34 (82.9)**
Do you think that their E-mail access is reliable?	**Yes**	**6 (14.6)**
	No	**35 (85.4)**
Do you think that their Intranet access is sufficient?	**No**	**41 (100)**
Do you think that their Intranet access is reliable?	**No**	**41 (100)**
Do you think that their Internet access is sufficient?	**Yes**	**5 (12.2)**
	No	**36 (87.8)**
Do you think that their Internet access is reliable?	**Yes**	**4 (9.8)**
	No	**37 (90.2)**
Data Storage & Analysis		
Is the health information data in your facility stored Manually (files, books)?	**Yes**	**39 (95.1)**
	No	**2 (4.9)**
Is the health information data in your facility stored on a Basic Computer Program (Excel)?	**Yes**	**4 (9.8)**
	No	**37 (90.2)**
Is the health information data in your facility stored on an Intermediate or Advanced Computer Program (HIS)?	**Yes**	**3 (7.3)**
	No	**38 (92.7)**
Is the health information data in your facility analyzed Manually (files, books)?	**Yes**	**37 (90.2)**
	No	**4 (9.8)**
Is the health information data in your facility analyzed on a Basic Computer Program (Excel)?	**Yes**	**5 (12.2)**
	No	**36 (87.8)**
Is the health information data in your facility analyzed on an Intermediate or Advanced Computer Program (HIS)?	**Yes**	**3 (7.3)**
	No	**38 (92.7)**
Do you use Postal/Courier services to submit reports and health information data to the sub-district office?	**Yes**	**34 (82.9)**
	No	**7 (17.1)**
Do you use Own transport to submit reports and health information data to the sub-district office?	**No**	**41 (100)**
Do you use Hospital/District/Sub-district (Dept of Health transport) to submit reports and health information data to the sub-district office?	**Yes**	**3 (7.3)**
	No	**38 (92.7)**
Do you use E-mail services to submit reports and health information data to the sub-district office?	**Yes**	**6 (14.6)**
	No	**35 (85.4)**
Do you use Fax services to submit reports and health information data to the sub-district office?	**No**	**41 (100)**
Is there a continuous electricity supply?	**No**	**41 (100)**
How often is the electricity interrupted?	**Daily**	**41 (100)**
Is the room, where the computer hardware is kept, air-conditioned?	**No**	**41 (100)**

DISCUSSION

Health information technology systems are important tools for navigating institutions and healthcare setups on the road to optimizing patient care and achieving better outcomes **[10]**. The results of the present study showed the complete absence of health information system among the primary healthcare facilities of Islamabad and Rawalpindi district. The equipment (desk PCs, laptops, printers etc.) were mostly unavailable at the primary healthcare setups. The staff at the primary care levels also reported discontentment with the available

equipment and services as mostly archaic and outdated equipment are available at these setups. Similar results regarding the unavailability of computers were reported in another study in Saudi Arabia **[4]**. The results of the present study reported the unavailability of staff at most of the healthcare facilities with no regular recruitments and periodic training schedules. The results of the study highlighted administrative and financial constraints to be the major deterrents to successful adoption of these health information management systems at primary healthcare facilities. Similar results pertaining to behaviours and attitudes of the governing bodies and administration regarding the adoption and implementation of health information management systems have also been reported in USA **[11]**. Another study reported lack of capital and unavailability of staff as the major barriers in the country **[12]**. Data sharing with the district and sub-district health offices was found to be infinitesimal. The results of the present study also showed an insufficient human resource at primary healthcare setups. Further, the staff is either unavailable or inadequately trained in performing activities related to data collection, storage, management, analysis and reporting of the collected data.Similar evidences were observed in a study conducted in Indonesia highlighting the absence of training and inept staff for performing activities related to data management of health information system **[13]**.

CONCLUSION

The present study concluded that health information system was almost not functional and up to the mark at primary healthcare level. Most of the primary healthcare setups were found non-operational. Stagnant adoption of these technologies in healthcare systems, difficulty in using or lacking technical skills to operate, systems are not fully interoperable and technology and capacity in terms of infrastructure and resources have been identified as major hindrance towards adoption of health information systems in Pakistan. The study provides evidence based data for policy makers to design and implement effective health information systems befitting to local context of the country. Implementing the health information management systems at the National level will also prove to be conducive for the equitable and resilient healthcare systems in Pakistan.

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