International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

An Assessment of the Information System of Out Patient Dental Clinics in Base Hospitals and Divisional Hospitals in a Selected Regional Director of Health Services Area in Sri Lanka

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Abstract: ***Background: Recording and reporting systems are part of the general health information system which forms the foundation for decision making. Therefore having a uniform recording and reporting system not only improves accuracy and timeliness of oral health information systems, but also facilitates decision making and planning of health services. Aim: This study was carried out to assess the information system which included the recording and reporting systems of the Out-Patient Dental Clinics (OPDC) in the Regional Director of Health Services (RDHS) area, Kalutara in Sri Lanka. Methodology: The research was carried out to assess the existing information system of the OPDC in 3 Base Hospitals and 10 Divisional Hospitals in the selected RDHS. Opinion of all the Dental Surgeons and Dental Surgery Assistants working in these institutions were obtained using interviewer administered questionnaires. Opinions of 4 key informants were obtained using a key informant interview guide. The quality of the patient register and the monthly return used was assessed by an observation check list. Results: The results showed incomplete registers, incomplete monthly returns, poor accuracy of registers (89%) and returns (84%). The timeliness of the monthly return was 78% and took an average duration of 72 days to reach the Medical Statistics Unit from a Dental Surgeon. The majority of both Dental Surgeons (83%) and Dental Surgery Assistants (57%) perceived dissatisfaction with the current information system. The key informants expressed the importance of having timely data but the current system resulted in delayed publications. Conclusion: The assessment found gaps in the system design, system delivery and system outcomes of the information system. The system design gaps were pertaining to incompleteness, poor accuracy and timeliness. The system delivery gaps showed dissatisfaction among the staff and the outcome gaps showed a link of poor design to poor outcomes which calls for an improvement of the information system following further studies in other types of dental clinics.***

Keywords: Information system, Out Patient Dental Clinics, Regional Director of Health Services, Kalutara

1. Introduction

Health information systems (HIS) could be defined as a set of components and procedures organized with the objective of generating information that will improve health care management decisions at all levels of the health system (Lippeveld T, 2000). Recording and reporting systems are part of the general health information system which forms the foundation for decision making. Hence, the information generated needs to address the needs of policy-makers, managers, health care providers, and communities.

Recording patient's details accurately is important in both clinical and legal aspects which is instrumental for giving a good first impression of a healthcare organization and a positive patient experience (patientengagementhit.com,2017). Reporting to convey the key elements of performance is important to improve performance and facilitate better control over an organization (Careertrend, 2019).

There is an increasing demand from the health administrators to have high quality data. The current HIS in relation to oral health in Sri Lanka is a paper based system. The data in Out Patient Dental Clinics (OPDC) under the Ministry of Health is recorded daily on the patient register (PR) and Out Patient Department (OPD) prescription and reported by the monthly return (MR) which is a format used to capture the monthly performance data as a summary.

The data quality (accurate, complete and timely) and data reliability (data recording in the same way across practices over time) are fundamentals in a good HIS (Greiver et al, 2012). It would facilitate good patient care and also help the administrators to improve the healthcare services.

It is important to assess the current HIS in OPDC to identify any gaps in quality of data as well as room for improvement. Assessment was done in OPDC of Base hospitals (BH) and Divisional hospitals (DH) administered by the Regional Director of Health Services, Kalutara (RDHSK). This study was conducted with the objective to assess the existing information system of out-patient dental clinics in BHs and selected DHs in the RDHSK.

2. Methodology

The study setting included 10 DHs and all 3 BHs of the RDHSK which had permanent Dental Surgeons (DSs) and the study was conducted within 3 months in the year 2020.

The sample included members in different strata involved in the information system such as, Dental Surgeons (DS) and Dental Surgery Assistants (DSA). All the 18 DSs and 21 DSAs working in the selected hospitals were included. A purposive sample of key informants were chosen that included the Director, Dental Services, Ministry of Health (MoH), Head, Research and surveillance unit, Institute of Oral Health (IOH), the Director, Medical Statistics Unit, MoH and the Regional Dental surgeon of the RDHSK.

Study instruments to assess the opinion of DSs and DSAs was carried out by two separtate interviewer administered questionnaires to assess regarding user friendliness and perceived satisfaction of the current recording and reporting system. It was developed in English and a five point Likert scale was used to mark their opinion. The main stakeholders were interviewed using a Key Informant interview (KII) guide and the quality of both the MR and the PR was assessed for completeness, accuracy and timeliness by a observation check list (OCL). The availability of the necessary required components of the information system was assessed by an observation check list as well.

The following domains which are contained in the De Lone and Mc Lean model of the information system was assessed such as,

The design of the system
Dimensions of Information quality, user friendliness and service availability were assessed under this domain. The assessment of information quality included completeness, accuracy and timeliness of both the MR and the PR as described below.

- Both the PR and the MR were assessed by counting the number of entries that are required to be filled and actually filled in the month previous to the assessment and calculated as,

$$\text{Completeness} = \frac{\text{Number of elements filled}}{\text{Total number of elements expected to be filled}} \times 100$$

- The accuracy of the PR was assessed by considering the accuracy of 5 elements such as number, name, age, gender and treatment carried out comparing the OPD prescription and the PR for 3 days.

$$\text{Accuracy of Register} = \frac{\text{Number of entries accurately entered}}{\text{Total number of entries}} \times 100$$

- The accuracy of the MR was assessed by comparing the last completed MR and the relevant section of the PR.

$$\text{Accuracy of the MR} = \frac{\text{Number of accurate entries in the return}}{\text{Total number of entries in the return}} \times 100$$

- The timeliness of the MR was assessed by the number of MRs the RDS received by the 10th of the month (the reference date) next to the relevant month of the return.

$$\text{Timeliness of MR} = \frac{\text{Number of MRs received on/before 10th of next month}}{\text{All MRs expected to reach RDS office by 10th of that month}} \times 100$$

- The duration the MR takes to reach the RSU and the MSU from the RDS was also assessed by calculating the average time taken from the RDS to reach the RSU and the MSU.
- Dimension of user friendliness was assessed by the IAQ. Service availability was assessed by the OCL.

System delivery
Under this domain User satisfaction and information uses were assessed using the IAQ.

System outcome
The contribution gained from the information system in decision making was assessed under this domain using Key informant interviews.

Analysis of qualitative data was carried out by thematic analysis. Excel and SPSS 21 statistical packages were used for the analysis of quantitative data. The Wilcoxon signed rank test was used to test the statistical significance of satisfaction and the Mann Whitney U test was used to test the other indicators at 5% significance level.

Ethical approval was granted from the Research Ethics Committee, Faculty of Medicine, University of Colombo, Sri Lanka. Administrative permission received from the Provincial Director of Health Services, Western Province and RDHSK and institutional heads.

3. Results

All the members of the purposive sample responded. The results of the different domains of the De Lone and Mc Lean model mentioned above are shown below.

Table 1: Distribution of information quality

Criteria	PR	MR
Completeness	90.39%	58.41%
Accuracy	88.82%	84.03%
Timeliness of MR		
DS to RDS		78.57%
RDS to RSU		9 days
RSU to MSU		53 days

The average completion of the PR was 90% and 89% entries were accurate while the completeness of the MR was 58% and 84% accurate. The timeliness of the MR was 78%. The monthly return took 62 days on average to reach the MSU from the DS (Table 1).

Table 2: Distribution of perceived user friendliness of the existing information system

Perceived user friendliness	Dental surgeons N (%)	Dental Surgery Assistants N (%)
User friendly	10 (55.5%)	9 (42.8%)
Not user friendly	8 (44.4%)	12 (57.1%)
Total	18 (100.0%)	21 (100.0%)

User friendliness of the system was assessed using the IAQ. A Majority of DS perceived that the system was user friendly but the majority of DSA perceived the system as not user friendly (Table 2).

Table 3: Availability of components of the information system

Components	Availability for past 12 months N (%)
Register	13/13(100%)
Return	13/13(100%)
OPD prescription	11/13(84.6%)
Mailing facilities	13/13(100%)

The availability of components was above 85% for all the necessary components assessed of the information system except for computers. (Table 3).

Table 4: The percentage distribution of formats used as registers

Format	Frequency, N (%)
CR book	7 (53.8%)
Ward admission register	2 (15.4%)
General OPD register	2 (15.4%)
Others: Drug register, Diary	2 (15.4%)
Total	13 (100%)

Majority of the OPDCs (54%) used a CR book as a register and 46% of others used different formats of registers as shown above (Table 4).

Table 5: Distribution of data elements in the PR

Number of data elements	Distribution	
	N	%
6	1/13	7.7%
7	3/13	23.1%
8	1/13	7.7%
9	7/13	53.8%
10	1/13	7.7%

The number of data elements in registers varied from 6 to10. Majority (54%) of PRs consisted of 9 elements as shown in table5..

Table 6: Distribution of perceived satisfaction among staff

Category of staff	Satisfied N (%)	Dissatisfied N (%)	Total N (%)
DSs	3 (16.7%)	15 (83.3%)	18 (100%)
DSAs	9 (42.9%)	12 (57.1%)	21 (100%)

The majority of DS (83%) and DSA (57%) were dissatisfied with the information system (Table6).

Table 7: Distribution of purposes the information was used by DS

Purpose	Frequency N (%)
Only to fill the MR	13 (72.2%)
Review and follow up	4 (22.2%)
To review, analyze and other	1 (5.6%)
Total	18 (100.0%)

The gathered information was used by DSs for different purposes and a majority of DSs used the information gathered to only fill the monthly return (72%) and only 1 response was received as using for analysis (Table 9).

Table 8: The responses of the key informants on organization impact and contribution gained in decision making

Key informant	Contribution gained from the Information system in decision making
RDS	Information in returns is used for monitoring of DS performance, planning purposes for drug estimation and cader projections and prioritization for distribution of resources such as equipment, dental materials and drugs etc.
RSU	The main role is to verify and transfer the return to the MSU. Therefore, delay disrupts the chain and results in poor quality.
MSU	Timely receipt is necessary and delays result in the delay of the whole analysis and statistical outputs. The Annual Health Bulletin (AHB) is prepared based on this data and the current AHB published is of 2017.
Director/ Dental Services	The information does not reach the Director. Currently, the planning decisions are based on information available in bulletins which have data 3-4 years ago. Therefore, timely information is necessary and needs to be accessible to the Director, Dental Services.

4. Discussion

This study was aimed at identifying the gaps in the recording and reporting system of OPDC in RDHSK. Domains of De Lone and Mc Leans model were used to assesss the information system which allows an extensive assessment. The assessment was carried out in 13 institutions including 3 BHs and 10 DHs. The results revealed gaps in system design, system delivery and system outcome. Gaps in system design were identified in information quality such as incompleteness, poor accuracy and timeliness. The completeness of a PR on average was 90%. The average completeness of returns was 58% even though Murage states that the completeness was 75% (Murage C, 2012). This value indicates that nearly 40% of the return is empty. The average accuracy of the register was 89% and the return was 84% (Table4.2). Lack of a guideline to fill the PR was an identified contributing factor. The timeliness of the monthly return was 79%, which was far better than the results of the study done by Murage which was 36.5% (Murage C, 2012). The average time taken for the MR to reach the MSU was 62 days from the average time the DS sends it to the RDS (Table 2). The service availability of the paper based system was satisfactory as most of the components of the system were available for the past 12 months prior to assessment (Table 4). Among the institutions assessed 54% used a CR book as a register and the other 46% used various formats because a standard register was not available (Table 5). The number of data elements varied from 6 to 10 (Table 6). Standard formats are important to maintain consistency, conformity and discipline of a system. As Griever mentions data quality and reliability are two fundamentals in a good HIS (Greiver et al, 2012). Furthermore, DAMA states that design of the form improves accuracy (DAMA, 2018). Therefore, the gap of a standard PR was evident.

The majority of DSs perceived that the system used was user friendly even though gaps existed and many suggestions were made for improvement. The socio demographic features suggest a very experienced staff of over 15 years of

service. The computer literacy levels and exposure suggests poor status which is a concern for the development of staff but all DSs were literate to correspond through emails (Table 7).

Assessing the domain of system delivery majority of the DSs (83%) and DSAs (57%) perceived dissatisfaction with the system used (Table 8).

Using the information gathered and receiving feedback are important components of an information system that is poorly addressed. Information gathered was mostly used for the purpose of only filling the return (72%) and only1 response was received for using the data for analysis (Table 9).

The system outcome was assessed by the KII and the responses revealed that poor timeliness causes delays in analysis and interpreting data as well as unavailability of timely data for planning and decision making. Suggestions were made to improve the information system especially improving the register and the timeliness of the monthly return (Table 10).

5. Conclusion

The assessment found gaps in the system design, system delivery and system outcomes of the information system. The system design gaps were pertaining to incompleteness, poor accuracy and timeliness. The system delivery gaps showed dissatisfaction among the staff and the outcome gaps showed a link of poor design to poor outcomes. This study could be considered as an assessment for the improvement of the information system of OPDC and further studies need to be conducted in different settings of out patient dnetal clinics in order to identify the generalisability of these findings.

Declarations of interest: None

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