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Adoption and Utilization of Integrated Patient Management System in Botswana Public Health Facilities

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ABSTRACT

Information and Communication Technology (ICT) use in the healthcare sector has gained momentum over a period of time. The aim of this study was to evaluate the adoption and utilization of the integrated patient management system (IPMS) in health facilities in Botswana. A mixed-method approach was adopted in this study. The simple sampling procedure was adopted and used among the sample size of four hundred and twenty healthcare workers. The quantitative questionnaire and interviews were used to collect data for this study. The findings of this study showed that IPMS adoption brings about better performance and is very productive for a tiring healthcare setting. The results also show that the use of IPMS helps medical practitioners to deliver quality healthcare service and it benefits the population at large since services become faster and more efficient. This recommends that all health facilities should be provided with enough and relevant resources and support needed to effectively use and reap the benefits of the IPMS. In addition, the Ministry of Health and Wellness and all the concerned education stakeholders need to make sure that ICT adoption and use in healthcare are maintained and encouraged through training and workshops so that the user is well-equipped with the appropriate use of technology to achieve the desired results.

Keywords: *adoption, integrated patient management system, health, utilization*

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INTRODUCTION

The potential of information communications technology (ICT) to support all data reporting systems is being recognized along with the types of information technology (IT) that will be required to accomplish this such as name-based record systems.[1] The efficiency of modern health care and patient safety relies more and more upon a computerized infrastructure, where open distributed information systems have commenced bringing professionals and patients (service users) together at a national and worldwide level. According to Gelinas et. al., IT can help performance measurement initiatives and the electronic medical record (EMR) can automate essential functions, improving quality reporting

[1] Elaine Byrne and Sundeep Sahay, "Participatory Design for Social Development: A South African Case Study on Community-Based Health Information Systems," *Information Technology for Development* 13, no. 1 (2007): 71–94.

and reducing the burden of nurses.[2] As healthcare delivery systems change, more and more nurses use computers in their practice,[3] and IT enables nurses to obtain critical patient information rapidly while delivering care.[4] The aim of this study was to assess the adoption and utilization of the integrated patient management system (IPMS) by medical practitioners in Botswana's public hospitals and clinics. Primary health care delivery is a crucial element of national health care delivery, especially where the majority of the population lives in rural areas and relies on governmental systems of health care.[5]

The Government of Botswana adopted the use of ICT tools as one of the key strategies to accelerate national development. Pursuant to that, a national ICT policy was developed in that it identified priority sectors that must lead in harnessing the benefits of ICT to improve the quality of service delivery to the population. The health system through the Ministry of Health and Wellness was mandated to implement the e-health strategy; a component of the national ICT policy that focuses on the use of ICT in the provision of health services. One of the e-health initiatives that the Ministry of Health undertook as a strategy to improve the delivery of health services was the introduction of a computerized patient management system commonly referred to as the Integrated Patient Management System (IPMS) in 2004. The use of electronic medical records (EMR) has become an important part of medical practice in many healthcare systems around the world.[6] EMR is a computerized medical information system that collects, stores, and displays patient information.[7] Many advantages of using EMR have been cited in literature and include improved quality of services, and enhanced access to patients' clinical information between health providers and health care facilities.[8]

LITERATURE REVIEW

The Ministry of Health and Wellness Botswana introduced the Integrated Patient Management System (IPMS) to move from a paper-based medical record system to a technology-based system that will enhance efficiency and ensure the adequate and secure management of patient information. Concerns have been raised on the use of IPMS and the benefits realization following considerable investment in the system several years back. The IPMS was introduced so that it will enhance efficiency and ensure the adequate and secure management of patient information. Concerns have been raised on the use of IPMS and the benefits realization following considerable investment in the system several years back. Decision and policymakers need to understand factors that influence the users' decision to use or not use IPMS. The technology acceptance model (TAM) was adopted for this study to identify and quantify the impact of different factors on the adoption of IPMS in public hospitals. Perception of the users on the benefits of using IPMS and their ability to use the system will be explored. This information will enable managers to effectively manage these variables to enhance the acceptance and use of IPMS. In the future, this information can also be used in designing other systems, predicting and evaluating the response of the users. Improvement of healthcare at minimum cost whilst ensuring effective patient safety and satisfaction is difficult without the utilization of technology. Health

[2] Ulric J. Gelinas, Richard B. Dull, and Patrick Wheeler, *Accounting Information Systems*, 7th ed. (Boston, Massachusetts: Cengage Learning, 2008).
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[5] Byrne and Sahay, "Participatory Design for Social Development: A South African Case Study on Community-Based Health Information Systems."
[6] Dong-Sheng Tzeng et al., "Effort-Reward Imbalance and Quality of Life of Healthcare Workers in Military Hospitals: A Cross-Sectional Study," *BMC Health Services Research* 12 (2012): 1–9.
[7] B Ortiga et al., "Effectiveness of a Surgery Admission Unit for Patients Undergoing Major Elective Surgery in a Tertiary University Hospital," *BMC Health Services Research* 10, no. 1 (December 22, 2010): 23, https://doi.org/10.1186/1472-6963-10-23.
[8] Ortiga et al. "Effectiveness of a Surgery Admission Unit for Patients Undergoing Major Elective Surgery in a Tertiary University Hospital,"

Information Technology (HIT) is a tool that has emerged to help bridge the information and communication gaps across different components of the health system. Health information technology improves not only individual patient care but also brings many public health benefits including early detection of infectious disease outbreaks around the country, improved tracking of chronic disease management and valuation of health care, especially where there is timely, reliable and efficient and comparative data. In 2007, the system was implemented in four Government hospitals: Princess Marina, Sekgoma Memorial, Nyangabwe Referral, Maun General and 16 satellite clinics around the hospitals. Despite this, very little is known about how information technology has influenced medical practice and the quality of patient care in government hospitals.

User acceptance and user confidence are very important for the development and deployment of new technologies. Many theories have been used to explain and understand the issues of technology acceptance and use. This study opted to use TAM because of its perceived strength of simplicity,[9] which contributes to it being described as the leading model used in explaining and predicting systems use.[10] TAM is a derivative of Ajzen and Fishbein's Theory of Reasoned Action.[11] The intentions/ behavioral intentions are determined by the attitudes towards the behavior and subjective norms. It is mainly used to predict how individuals will behave based on their pre-existing attitudes and behavioral intentions. In technology acceptance research, this theory describes factors that determine technology acceptance and usage behavior.[12]

The premise of TAM is that users adopt technology if they perceive it to be useful - Perceived Usefulness (PU), and easy to use- Perceived Ease of Use(PEU). PU is defined as the extent to which a person believes that utilizing a particular method or technique would enhance his/her job performance. PEU is the extent to which the system is perceived to be easy to use in the process of performing one's job. Modulating the PU and PEU are the individual's behavior intentions towards the use of the technology which translates to actual use. The individual's behavior in turn is influenced by his/ her attitudes toward the technology and its use. Of significance also are external variables or influences that impact the ability to use IT systems. Different researchers have identified and used different external variables in their studies such as user support, organizational and management support, influence, and training and development that may influence an individual's behavior intention, PU and PEU. The characteristics of the IT system such as its usability, functionality, security and privacy and confidentiality are also regarded to have a significant influence on the users' perceptions of system usefulness and their attitudes towards the system.

METHODOLOGY

A mixed methods survey was conducted from November 2019 to May 2020. The setting was public health facilities currently using IPMS. The target population comprised of medical practitioners of all levels and specialties in identified facilities, hospital management being Princess Marina Hospital, Nyangabgwe Referral Hospital, S'brana Psychiatric Hospital, Scottish Livingstone Hospital, Athlone Hospital, Deborah Retief Memorial Hospital, Mahalapye Hospital, Sekgoma Memorial Hospital, Selibi Phikwe Hospital, Letsholathebe II Memorial Hospital, Gumare Primary Hospital, Kasane Primary Hospital, Letlhakeng Primary Hospital, and MOH officers responsible for the rollout of IPMS and oversight on patient care services.

For quantitative data collection, different medical practitioners including doctors, nurses, medical records staff and pharmacies who are the end-users of the IPMS were included in the study. The staff lists of medical practitioners in selected public facilities acted as a sampling frame for the

[9] Sushma Sharma et al., "Sphingolipid Biosynthetic Pathway Genes FEN1 and SUR4 Modulate Amphotericin B Resistance," *Antimicrobial Agents and Chemotherapy* 58, no. 4 (2014): 2409–14.

[10] Mohammad Chuttur, "Overview of the Technology Acceptance Model: Origins, Developments and Future Directions," 2009.

[11] S Priyanka and A Kumar, "Understanding the Evolution of Technology Acceptance Model.," *International Journal of Advance Research in Computer Science and Management Studies,* 1, no. 6 (2013): 144–48.

[12] Manon Bertrand and Stéphane Bouchard, "Applying the Technology Acceptance Model to VR with People Who Are Favorable to Its Use," *Journal of Cyber Therapy & Rehabilitation* 1, no. 2 (2008): 200–210.

quantitative arm of the study. A simple random sample was used to select participants of the study. Quantitative data was collected from a total of 400 medical practitioners using a self-administered questionnaire. The questionnaire consisted of three major components: A) demographic details; B) perceived usefulness, which consisted of 4 questions and a section using a 6-point Likert scale; C) utilization of IPMS. The questionnaire was tested for validity and reliability with a pre-test on 6 medical practitioners at Gaborone Private Hospital prior to main data collection. The language used for the questionnaire was English and Setswana. Five participants were purposively selected, which included different medical practitioners in the study (doctors, nurses, pharmacy and medical records staff). The interview sessions took 20-30 minutes each. The response was recorded and transcribed manually from audio. Quantitative data from the survey was summarized and analyzed using Excel and SPSS. The Chi-Square was used to test the association used of IPMS and other variables including the demographic variables of participants. Qualitative data was analyzed using the content analysis technique.

RESULTS /FINDINGS

Table 1 indicated that with respect to gender, Referral hospitals have more female 114 (51.4%) participants compared to general hospitals whose participants were male 101 (51.0%.) and their mean age was 30.2.

Table 1: Demographic details

Demographic data	**Referral Hospital N= 222 (%)**	**General N=198 (%)**	**x2 test**	**P-values**
Gender				
Male	108 (48.6)	101 (51.0)	0.23	0.635
Female	114 (51.4)	97 (49.0)		
Age, *Mean*	*30.2*	*30.8*		
20 -24 years	17 (7.7)	11 (5.6)	14.47	<0.005
25-29 years	64 (28.8)	40 (20.2)		
30-34 years	64 (28.8)	69 (34.8)		
35-39 years	29 (13.1)	24 (12.1)		
40-44 years	10 (4.5)	25 (12.6)		
45-49 years	18 (8.1)	12 (6.1)		
50-54 years	4 (1.8)	5 (2.5)		
55-59 years	16 (7.2)	12 (6.1)		
Education				
Certificate	12 (5.4)	11 (5.6)	1.89	<0.001
Diploma	159 (71.6)	147 (74.2)		
Bachelor	47 (21.2)	39 (19.7)		
Masters	3 (1.4)	1 (0.5)		
PhD	1 (0.5)	0 (0.0)		
Occupation				
Doctor	10 (4.5)	9 (4.5)	2.44	0.656
Nurse	162 (73.0)	148 (74.7)		
Technical	16 (7.2)	18 (9.1)		
Administration	6 (2.7)	2 (1.0)		
Other	28 (12.6)	21 (10.6)		

Most medical practitioners stated that they spent more than one hour using the computer. For both referral hospitals 98(44.1%) and general hospitals 95(48.0%) almost half of the participants use the computer for more than eight hours which is indicated in figure 1. Generally, referral hospitals are known as the busiest health facilities that's why the results (figure 1) in this study indicate that sixteen point seven percent of the participants use computers in less than an hour as compared to general hospitals.

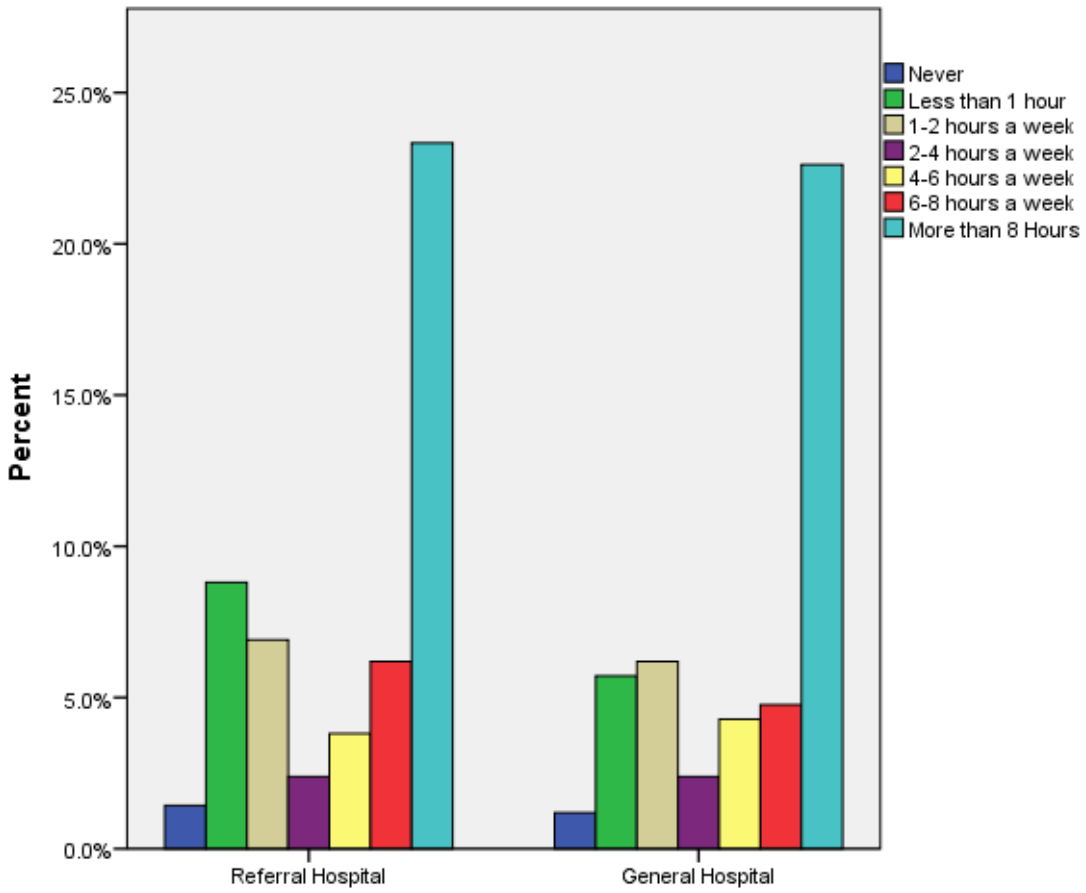

Figure 1: How many hours per week do you use Computer

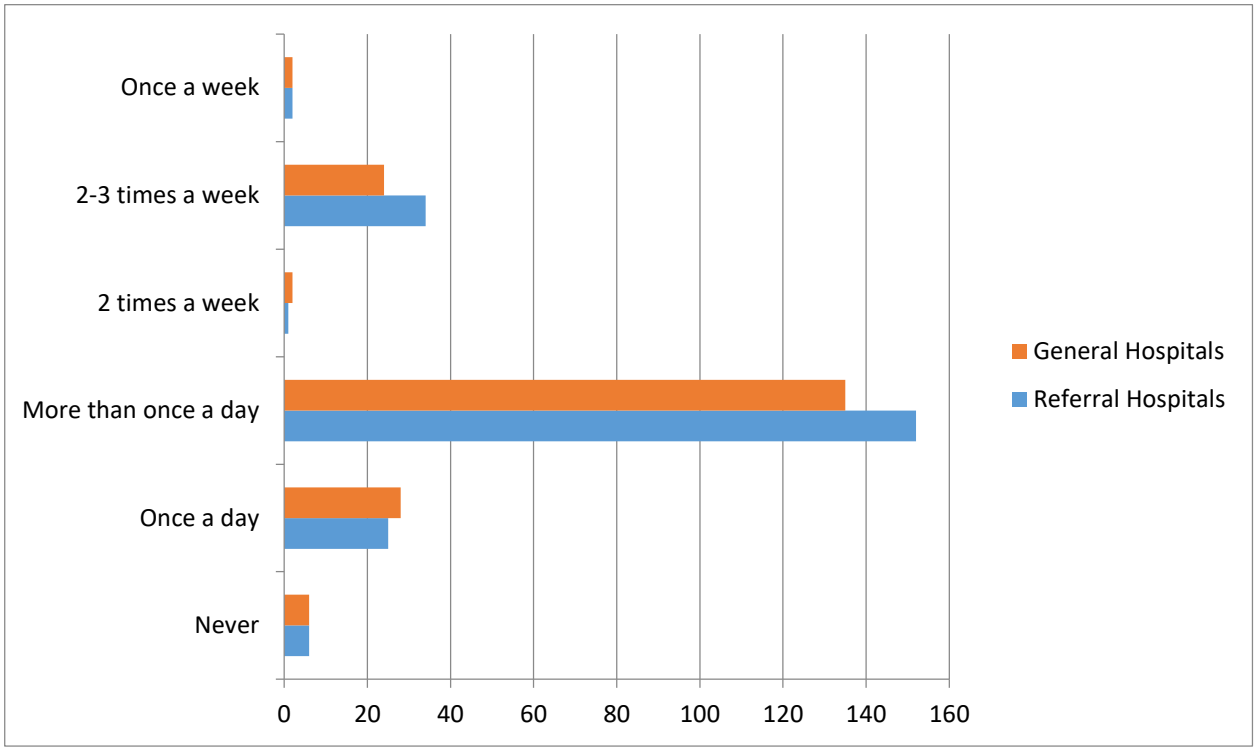

Figure 2: How frequently do you use IPMS

The results in figure 2 show that medical practitioners frequently use Integrated Patient Management Systems. Of the majority of participants who are in referral hospitals, 152 (69.1%) reported using IPMS more than once a day while 135 (68.5%) participants who are in general hospitals reported using IPMS more than once. The study also reveals a few participants who have never used Integrated Patient Management System in their day-to-day activities, 6 (2.7%) in referral hospitals and 6 (3.0 %) in general hospitals.

The results shown in table 2 are the benefit that medical practitioners get when using Integrated Patient Management System.

Table 2: The use of Integrated Patient Management System

Using IPMS	**N**	**Mean**	**Lower 95% CL**	**p-value**
Improves the quality of the work I do	420	22.02	10.21-41.31	0.85
Gives me greater control over my work	420	63.51	35.89-86.40	0.01
Enable me to accomplish tasks more quickly	420	72.27	51.99-92.76	0.02
Support critical aspects of my job	420	33.63	20.89-56.43	0.76
Increases my productivity	420	65.58	60.98-89.90	0.05
Increase my job performance	420	28.50	12.85-30.14	0.95
Allows me to accomplish more work	420	48.52	33.14-53.18	0.88
Enhances my effectiveness on the job	420	15.56	12.09-24.84	0.64
Makes it easier to do my work	420	08.57	02.06-13.72	0.47
Enables decisions based on better evidence	420	34.49	20.33-62.24	0.32
Allows tasks to be done more accurately	420	12.38	05.25-29.32	0.51

Increases chance of getting a raise	420	03.15	01.98-14.30	0.48
Improves patient care and management	420	19.39	13.20-31.10	0.25

*Note: CL Confidence Level; **significant at p<0.01; * significant at p<0.05*

The study indicates that using IPMS gives greater control over day-to-day work, with an average of 63.51% of the time with a 95% confidence interval of (35.89-86.40, p<0.01). The participants also indicate that using IPMS enables them to accomplish tasks more quickly, with an average of 72.27% of the time with a 95% confidence interval of (51.99-92.76, p<0.02). Table 2 also reported that using IPMS increases medical practitioners' productivity, with an average of 65.58% of the time with a 95% confidence interval of (60.98-89.90, p<0.05). This study has also shown that some usage of IPMS is not significant, the participants indicated that the use of IPMS does not improve the quality of the work they do, with an average of 22.02% of the time with a 95% confidence interval of (10.21-41.31, p<0.85). In addition, medical practitioners reported that the use of IPMS does not support critical aspects of their job, with an average of 33.63% of the time with a 95% confidence interval of (20.89-56.43, p<0.76). Also, the participants reported that the use of IPMS does not improve patient care and management, with an average of 19.39% of the time with a 95% confidence interval of (13.20-31.10, p<0.25). Medical practitioners reported that the use of IPMS does not allow them to accomplish more work, with an average of 148.52% of the time with a 95% confidence interval of (33.14-53.18, p<0.88).

Table 3 recorded the adequacy of IMPS Training. Participants were asked if they had received any training on the use of IPMS and how comfortable they were using the system.

Table 3: Attitude toward using IPMS and Behavioral intention

		Profession					**Total**
		Doctor N=19	**Nurse N=310**	**Technician N=34**	**Administrator N=8**	**Other N=49**	
I have received adequate training in order to operate the IPMS Competently	Strongly Agree	2 (10.5%)	45 (14.6%)	0	0	3 (6.1%)	50
	Agree	12 (63.2%)	95 (30.5%)	1 (2.9%)	2 (25.0%)	6 (12.2%)	115
	Neutral	3 (15.8%)	19 (6.1%)	6 (17.6%)	0	10 (20.4%)	38
	Strongly Disagree	0	74 (23.9%)	19 (55.9%)	0	7 (14.3%)	100
	Disagree	2 (10.5%)	77 (24.9%)	8 (23.5%)	6(75.0%)	23 (46.9%)	116
I avoid using IPMS whenever I can	Strongly Agree	1 (5.3%)	16 (5.2%)	0	1 (12.5%)	1 (2.0%)	19
	Agree	0	82 (26.5%)	8 (23.5%)	2 (25.0%)	13(26.5%)	105
	Neutral	5 (26.3%)	20 (6.5%)	0	0	10(20.4%)	35
	Strongly Disagree	0	56 (18.1%)	4 (11.8%)	3 (37.5%)	8(16.3%)	71
	Disagree	13 (68.4%)	136 (43.9%)	22 (64.7%)	2 (25.0%)	17 (34.7%)	190
I believe that my	Strongly Agree	2 (10.5%)	57 (18.4%)	0	1 (12.5%)	2 (4.1%)	62

level of computer literacy is restricting my career development	Agree	14 (73.7%)	186 (60.0%)	28 (82.4%)	6 (75.0%)	33 (67.3%)	267
	Neutral	2 (10.5%)	24 (7.7%)	0	0	1 (2.0%)	27
	Strongly Disagree	1 (5.3%)	21 (6.8%)	5 (14.7%)	0	1 (2.0%)	28
	Disagree	0	22 (7.1%)	1 (2.9%)	1 (12.5%)	12 (24.5%)	36
Given the opportunity, I would like to use IPMS	Strongly Agree	4 (21.1%)	55(17.7 %)	0	0	6(12.2%)	65
	Agree	15 (78.9%)	131 (42.3%)	21 (61.8%)	4 (50%)	20 (40.*%)	191
	Neutral	0	22 (7.1%)	0	0	7 (14.3%)	29
	Strongly Disagree	0	57 (18.4%)	11 (32.4%)	2 (25.0%)	0	70
	Disagree	0	45 (14.5%)	2 (5.9%)	2 (25.0%)	16 (32.7%)	65
I intend to use IPMS in my work.	Strongly Agree	3 (15.8%)	75 (24.2%)	24 (70.6%)	0	3 (6.1%)	105
	Agree	1 (5.3%)	78 (25.2%)	5 (14.7%)	1 (12.5%)	6 (12.2%)	91
	Neutral	2 (10.5%)	20 (6.5%)	1 (2.9%)	2 (25.0%)	7 (14.3%)	32
	Strongly Disagree	12 (63.2%)	68 (21.9%)	1 (2.9%)	3 (37.5%)	17 (34.7%)	101
	Disagree	1 (5.3%)	69 (22.3%)	3 (8.8%)	2 (25.0%)	16 (32.7%)	91
I would prefer using IPMS for recording observations rather than using a paper form	Strongly Agree	3 (15.8%)	24 (7.7%)	0	0	1 (2.0%)	28
	Agree	4 (21.1%)	165 (53.2%)	19 (55.9%)	3 (37.5%)	9 (18.4%)	200
	Neutral	0	26 (8.4%)	1 (2.9%)	1 (12.5%)	3 (6.1%)	31
	Strongly Disagree	0	59 (19.0%)	11 (32.4%)	0	6 (12.2%)	76
	Disagree	12 (63.2%)	36 (11.6%)	3 (8.8%)	4 (50.0%)	30 (61.2%)	85

About half of the medical practitioners 203 (48.3%) reported they have received adequate training to operate the IPMS competently (table 3). In addition, the majority of doctors 12 (63.2%) and nurses 95 (30.5%) have also received adequate training for IPMS. It was, however, disturbing that 77(24.9%) of nurses mentioned that they had not received adequate training which may be the reason why almost more than half of the participants 261 (62.1%) avoided using IPMS in their day-to-day activities. Table 3 above indicates that 13 (68.4%) doctors avoided using IPMS whenever they can. This is followed by 22 (64.7%) professional technicians and 136 (43.9%) nurses who also avoid using the IPMS as much as possible. The study reveals that computer literacy is a problem for most medical practitioners sampled. Only 329 (78.3%) respondents agreed that the level of computer literacy is restricting career development. Almost all the professional technicians 28 (82.4%) indicated that computer literacy restricts them in career development followed by doctors 14 (73.7%) and 186 (60%)

nurses. However, participants are willing to use IPMS if the opportunity is given to them 265 (60.9%) but 12 (63.2%) doctors and 68 (21.9%) nurses have no intention to use IPMS. In addition, 228 (54.2%) respondents would prefer using IPMS for recording observations rather than using a paper form, the only challenge maybe be training as stated by results in table 3.

Table 4 indicated that age and education significantly influence to use of an integrated patient management system as an outcome.

Table 4: Multivariate results - Multivariate linear regression models explaining integrated patient management system.

1.	2.	3. Referral Hospital	4.	5.	6. General hospital	7.
8.	9.	10. OR 11. (95% CI)	12.	13.	14. OR (95% CI)	15.
16.	17. Model 1	18. Model 2	19. Model 3	20. Model 1	21. Model 2	22. Model 3
23. Age	24. 0.47 (0.34-0.68)	25. 0.10 (0.02-0.41)	26. 0.22 (0.14-0.91)	27. 0.12 (0.09-0.26)	28. 0.17 (0.11-0.74)	29. 0.21 (0.08-0.46)
30. Edu	31. 0.23 (0.12-0.73)	32. 0.34 (0.21-0.63)	33. 0.34 (0.21-0.63)	34. 0.29 (0.48-0.93)	35. 0.32 (0.22-1.01)	36. 0.66 (0.55-1.35)
37. Gen	38. 0.38 (0.13-0.82)	39. 0.31 (0.13-0.79)	40. 0.30 (0.19-0.69)	41. 0.21 (0.17-0.46)	42. 0.15 (0.06-0.54)	43. 0.88 (0.71-1.48)
44.	45.	46.	47.	48.	49.	50.
51. LAB	52. -	53. 1.38 (0.60-2.12)	54. 2.40 (1.66-4.10)	55. -	56. 2.62 (1.30-4.15)	57. 1.80 (1.30-2.20)
58. DIS	59. -	60. 0.82 (0.59-1.01)	61. 0.73 (0.68-1.52)	62. -	63. 0.74 (0.58-1.00)	64. 1.32 (0.98-1.82)
65. PRE	66. -	67. 0.90 (0.78-1.33)	68. 1.88 (0.97-2.10)	69. -	70. 1.70 (1.54-2.65)	71. 1.78 (0.60-2.06)
72. ADM	73. -	74. 0.86 (0.58-1.25)	75. 1.04(0.88-1.62)	76. -	77. 1.86 (1.68-2.18)	78. 2.82 (1.64-3.12)
79. TRA	80. -	81. 1.11 (0.88-1.57)	82. 1.05 (0.88-1.25)	83. -	84. 1.30 (1.08-1.65)	85. 1.30 (1.05-1.62)
86. REF	87. -	88. 0.71 (0.43-1.98)	89. 1.27 (0.85-1.90)	90. -	91. 3.05 (1.68-4.92)	92. 2.00 (1.75-3.74)
93. ORD	94. -	95. 2.06 (1.49-2.47)	96. 1.03 (0.88-1.26)	97. -	98. 1.18 (0.88-1.73)	99. 1.09 (0.84-1.46)
100. HIS	101. -	102. 1.26 (1.10-1.99)	103. 1.87 (0.94-3.34)	104. -	105. -	106. 1.07 (0.83-1.42)
107. TRE	108. -	109. 1.19 (0.94-1.67)	110. 4.18 (3.97-7.44)	111. -	112. -	113. 2.68 (1.01-3.28)

114. USA	115. -	116. -	117. 1.83 (1.65-1.02)	118. -	119. -	120. 1.93 (1.68-3.00)
121. ACC	122. -	123. -	124. 1.61 (1.01-2.10)	125. -	126. -	127. 1.58 (1.21-1.99)
128. LOW	129. -	130. -	131. 1.89 (1.68-2.22)	132. -	133. -	134. 2.74 (1.69-3.09)
135. SPE	136. -	137. -	138. 1.05 (0.88-1.55)	139. -	140. -	141. 1.00 (0.98-1.66)
142. RES	143. -	144. -	145. 2.27 (1.75-3.90)	146. -	147. -	148. 1.27 (0.85-1.90)
149. COS	150. -	151. -	152. 2.03 (1.87-3.26)	153. -	154. -	155. 1.07 (0.88-1.92)
156. SEC	157. -	158. -	159. 1.10 (0.94-1.38)	160. -	161. -	162. 1.11 (0.84-1.70)
163. DIF	164. -	165. -	166. 2.18 (1.97-3.44)	167. -	168. -	169. 2.15 (1.73-3.44)

***Note**: Edu- Education, Gen- Gender, LAB-Lab results, DIS- Discharge, PRE- Prescription, ADM- Admission TRA- Transfer, REF- Referrals, ORD- Lab orders, HIS- Health History, TRE- Treatment ,USA- Usability, ACC- Access to computer or internet, LOW- low literacy in computer, SPE- Speed and connectivity, RES- Resistance to change, COS- Cost, SEC- Security and privacy concerns, DIF- Difficulty understanding the technology*

The data in the table shows that the gender, age, and educational backgrounds of the respondents also significantly influence the use of IPMS (OR=0.15; 95% CI 0.06-0.54). In General Hospitals, age is one of the factors that influence the use and utilization of IPMS, with the odds of remaining stable in all two models (OR=0.17; 95% CI 0.11-0.74; OR=0.21; 95% CI 0.08-0.46). Moreover, education is significantly associated with IPMS in general hospitals (OR=0.34; 95% CI 0.21-0.63). When adding utilization of IPMS to model 2, high levels of association were found for reports of admissions as utilization of IPMS (OR=0.86; 95% CI 0.58-1.25)in referral hospitals, while referral of patients was associated with those who are in referral hospitals (OR=0.71; 95% CI 0.43-1.98) and General hospitals(OR=3.05; 95% CI 1.68-4.92). However, the transfer of patients was associated with only referral hospitals (OR=1.83; 95% CI 1.65-1.02). The final model 3 indicated that the adding of factors hinders the utilization of IPMS.

DISCUSSION

Improving the health of individuals in Botswana is crucial to development and poverty reduction. Utilization of IPMS is a key strategy to meet the challenges facing health systems of limited resources, workforce shortages and rising costs. With respect to age, the results show for both referral 64 (28.8%) and general hospital 69 (34.8%) that about three-quarters of the participants were in the age group 30-34 years followed by 25-29 years. In addition, age ($p<0.005$) is associated with integrating the patient

management system. A previous study by Adeleke et. al., indicated that technical acceptance especially digital health services are also relevant among older adults.[13]

The data analysis revealed that using IPMS gives greater control over day-to-day work, with an average of 63.51% of the time with a 95% confidence interval of (35.89-86.40, $p<0.01$). Nevertheless, despite the beneficial outcomes related to IPMS and healthcare services for patients, the previous study by Arvanitis and Loukis, reveals that ICT within healthcare has also impaired healthcare professionals' working conditions, especially for nurses and doctors.[14]

A significant relationship was found between age, education, and the use of IPMS. As expected, access to a computer or the internet is a factor that hinders the utilization of IPMS and gender is highly associated with this factor (OR=0.86; 95% CI 0.58-1.25). A strong relationship exists between education and willingness to shift from paperwork to IPMS. The study also revealed a weak relationship between education and the use of IPMS on the Transfer of patients (OR=1.11(0.88-1.57)). Thus, usability (OR=0.15; 95% CI 0.06-0.54) plays a crucial role in hindering the utilization of IPMS. This confirms data from a previous study by Thapa et al., that gender, age and educational backgrounds affect attitudes toward IPMS and these contextual factors are important and could provide further insights when integrating ICT in the health sector.[15]

RECOMMENDATIONS

Based on the discussion, the study makes some recommendations. This study recommends that officials of the Ministry of Health and Wellness Botswana should train all the healthcare workers across the country on the use and the benefits of the Integrated Patient Management System as its use has been seen to improve the results and aid in effectively and efficiently delivering quality health care service. All hospitals and clinics should be equipped with the appropriate technologies so that adoption can be easy and the benefits accrued speedily. It is also recommended that a data health care center should be established in health centers which will store all the electronic health and medical health records so that it becomes easier for the medical practitioners to track and trace the health records of patients. Health service managers must also be equipped and well-trained in all the technology required so that they can effectively and efficiently run the hospitals.

CONCLUSION

This study has evaluated the adoption and use of the IPMS in Botswana public hospitals. The results showed that there are more benefits linked to the adoption and use of the IPMS in delivering quality healthcare delivery. These results showed that the use of IPMS is key and beneficial to the health sector because it helps healthcare workers do their job effectively. Thus, one can easily track the progress of their patients and give appropriate advice 24/7 with no time limit. Hence, the Ministry of Health and Wellness needs to develop policies, and rope in other stakeholders for consultation in order to achieve the stated objective.

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