Knowledge, Skills and Attitudes (KSA) of University Healthcare Professionals towards Health Information Systems (HIS) Usage: The Case of University of Cape Coast Hospital

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ABSTRACT

Background: The purpose and objective of the research was to investigate health care professionals' perceived Knowledge, Skill and Attitudes (KSA) towards the usage of Health Information System (HIS), in a University health care setting in Ghana, with the University of Cape Coast (UCC) Hospital as a case study.

Methods: A conceptual research model was developed based on Technology Acceptance Model (TAM). A cross-sectional descriptive survey design and a mixed method approach were employed for this study.

Results: It was discovered that the University Health care professionals' level of perceived knowledge, skills, and attitude on the usage of HIS was established to be positive and appreciable. Positive relationships were established among KSA and TAM variables (Perceived Ease of Use-PEOU and Perceived Usefulness-PU) indicating a generally positive character towards the use of HIS in the University health care system.

Conclusions:

The results of this study support the importance of training in the usage of institutional software. Hospital managers must also match skill training levels to role specifications of staff at the facility, and also implement annual training updates on HIS skills and computing competencies for all users of the software. Further studies could look at why differences exist between professional groups regarding their perceptions about HIS, their skill ratings and the use of the system; how accurate these perceptions are; and then how best to address the differential needs of the various professions.Future research could address additional user groups within the same or different healthcare system, such as physicians, nurses, laboratory technicians, administrative assistants or clerical staff.

Keywords: Health Information Systems; Developing country; Technology Acceptance

BACKGROUND

Information Technology (IT) has the extensive potentialto contribute to improving access to care, sinking overall costs, and streamlining operational efficiencies in the health care system ([13]). The need to develop quality Information System (IS) in developing countries has been recognized by the World Health Organization, a body that has increasingly identified Health Information Systems (HIS) as critical for achieving health for all [15]. It is an essential component of any health care system, as it provides the context within which data collection, processing, analysis and reporting of health information takes place, and also facilitates the development of appropriate health care indicators for monitoring and evaluating the performance of the health care system [24].

Despite the growing emphasis on the use of HIS and its potential benefits, the adoption by health care professionals may have serious implications for health care delivery, consideringthe absent mindedness towards users' socio-technological challenges and perceptions associated with HIS [6]. Experts believe that

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some health care professionals reluctantly use HIS at their workstations, due to their attitudes and competences associated withthe usage of the systems [7]. A notch of computer literacy is graduallybeing considered a job requirement in many health care facilities because of socio-behavioural factors associated with the usage of HIS [21]. A great number of IS projects have indeed failed due to the lack of systematic consideration of human and other non-technology issues in the design or implementation process [17]. Thus, factors intrinsic to the health care professional as an adopter and user of HIS remain prerequisite in maximising the benefits obtained from HIS.

The Technology Acceptance Model (TAM) identifies two basic determinants of technology acceptance; Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as factors that influence the decision of users on an IS or a new technology. But according to experts, these factors used in determining users' behavioral intentions toward using a new computer technology seem to be only useful in determining pre-implementation attitudes toward information systems in environments where system use is unrestricted [30].Meanwhile external variables might include individual user attributes or those relating to their job tasks, or even post-implementation attitudes toward information systems usage. These external variables could be socio-technological requirements such as users' Knowledge, Skills, Attitudes (KSA), beliefs and behaviours associated with the usage of HIS and which might constitute external variables related to implementation of HIS do not seem to get much attention. Arguably, it tends to be that no previous research has included Knowledge, Skills and Attitude of health care professionals in a single TAM-based model, even though these variables are relevant in the context of explaining the usage of health information systems.

A good knowledge base that will underpin an understanding of the perceptions of professionals regarding HIS jointly with their Knowledge, Skills and Attitudes (KSA) is very imperative. This has underpinned this research study which is designed to inform user attitudes and their effective usage of HIS within health service delivery.Indeed, in a developing country such as Ghana, a research on the development and practical usage of HIS especially in a university setting is crucial, in order to guide policy and management decisions and for improvement of the existing systems. This area is perhaps one of the brightest, most challenging and most promising fields of research, education, and practice for information systems, with significant benefits and consequences for medical informatics and health care in general. The purpose of the research is therefore to explore the perceived KSA of University health care professionals towards the use of HIS in a Ghanaian Hospital. To this end, the study investigates the type(s) of information System(s) implemented at a Ghanaian Hospital, the perceived KSAof the health care professionals towards the use of HIS, and the relationships among KSA and TAM variables (Perceived Knowledge-PK, Perceived Ease of Use-PEOU, and Perceived Usefulness).

HEALTH INFORMATION SYSTEMS IN DEVELOPING COUNTRIES

2.1 Overview of Health Information Systems

The World Health Organisation defines HIS as an "integrated effort to collect, process, report and use health information and knowledge to influence policy making, programme action and research" [32].Health Information System (HIS) is actually a "system", and like each system, it has an organised set of interrelating components [13], and implies a connected whole or organized process [9]. Other researchers referred to HIS 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" [22]. The system could also be viewed as a comprehensive and integrated information system designed to store, manipulate, retrieve and use information concerned with the management and clinical aspects of a hospital [19]. The system is used to collect, analyze, retain, retrieve and evaluate health information for organisational management [20]. The ultimate goal of the system is not only to present and disseminate data in appropriate formats for all audiences but to produce relevant information that health system stakeholders can use for making transparent and evidence-based decisions for health system interventions [14]. A general approach for describing the HIS in any given country is to consider the dimensions of demand (who needs data and for what purpose), the dimensions of supply (tools and methods available to generate the needed information), and the dimensions of level (the level of the health system at which data are generated and used) [9].

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The usage of HIS offer tremendous opportunities and benefits such as reducing clinical errors, improving access and storage of information, and facilitating access to current scientific information available in decision support systems [19]. HIS further automates sharing of information among providers and patients, directs access and instantupdates of health records, sorts and summarizes data automatically.

2.2 HIS Implementation in Developing Countries

Developing countries have been challenged to improve their HIS to ensure availability of relevant information at all levels of health services, and for local decision-making, planning and management. Countries like Kenya and Tanzania have begun to respond to the challenge with Kenya's establishment of HIS Department that included; computer section, statistical and medical records section, and district health management information system (DHIMS) section [34]. The Tanzania government has implemented a Health Management Information System (HMIS) to supply each level of the health sector with the necessary information in a timely and accurate manner [28]. The Ministry of Health (MOH) through the Ghana health Services (GHS) and the Centre for Health Information Management (CHIM), hasintroduced a revised web based open source software "DHIS 2" to be used by public, private and quasi-governmental hospitals in Ghana for the collection, validation, analysis, and presentation of aggregate statistical data, tailored (but not limited) to integrated health information management activities.

A number of barriers to the implementation of HIS have been identified by few studies and research works. An Evidence Report/Technology Assessment [18]classifies barriers to HIS implementation as situational barriers (including time and financial concerns), cognitive and/or physical barriers (including users' physical disabilities and insufficient computer skills), liability barriers (including confidentiality concerns), and knowledge and attitudinal barriers [18].

2.3 Knowledge, Skills and Attitude (KSA) in HIS Adoption

Studies exploring Information Systems usage have sometimes focused on users' computer skills or knowledge [21], but Zhang, Johnsonand Smith[34] classifies KSA under user analysis, which is also a type of analysis; aside functional, representational and task analyses, that fall under human-centred computing. This explains KSA as the process of identifying the characteristics of existing and potential users of the HIS, and could subsequently help providers design systems that have the right knowledge and information structures to match those of the users.

Knowledge is the internalization of information, data, and experience that can be understood or implied without being stated within the mind, behaviour and perceptions of individual members of the organization [6]. Knowing the general features of the HIS software is crucial for the success of the system within health care organisation. AL-nassar, Abdullah and Osman [5] in a research on the extent of use, perceptions, and knowledge of a hospital information system, revealed that health care professionals are usually not completely aware of all features of the HIS, and that hinders the full realization of system objectives. It has been generally found that hardware availability, content design and user training/education programmes are critical issues that affect healthcare professionals' use of systems in their daily practice or work [32]. Research has shown that training in the usage of an IT system increases system usage and helps users to feel comfortable with its usage and thus indirectly increases its acceptance [3]. Consequently, users' continuous training is a key determinant of the long-term viability of IS in a given organization, given the empirically evidence by Aggelidis and Chatzoglou [3] that training is strongly correlated with three variables including; the system usage and the improvement of decision-making; users' efficiency and effectiveness; and users' satisfaction. Training as a part of capacity development is also an element of awareness because consistent awareness raising and education in the form of better information and training help users of a system to better accept the system [6]. Training programs according to some researchers should educate professionals on how to use the system, and address attitudes and build enthusiasm for doing so. Appropriate techniques, timing and high-quality training materials are also required for successful system implementation in an institution. Given the heavy schedule on today's health care professionals and their relative lack of experience with computing, researchers have indicated that at least older healthcare employees need to be trained on IS by considering theories on older employees training and combining new technologies [23].

Skill is defined as "the ability to use one's knowledge in performance; dexterity in execution of physical tasks" and as "a learned power of doing something competently" [33]. Computer skill is assessed in this context by the users' understanding of the software and its general features, or the basic skills required in the usage of the system in the hospital. It is generally assumed that users with more computer skills and knowledge are more willing to use information systems and have better usage outcomes in terms of time saving through efficient and frequent IS usage [21]. A study by Van der Meijden*et al.*[29] found system usage skills and experience to be the major predictor of acceptance of an IS in a facility, with age being non-significant. Brown and Coney [10] evaluated physician attitudes toward clinical information systems and found computer skills and experience to be predictors of computer acceptance. Some health care professionals may have insufficient computer skills or lack the basic knowledge and training necessary to use a particular system [7]. Others may be unfamiliar with the various types of information technology or the benefits it may provide [34], but a skilled ICT work force is an essential ingredient for the effective use of ICT in healthcare. It is therefore very important to identify the skills present in the organization and the skills which still need to be updated for the purposes of successful IS usage in a facility [11]. Information, computer science and technology are increasingly important to public health practice, research, and learning. Consequently, public health professionals at all levels should be appropriately skilled in the applications of these sciences and technologies to public health [15].

2.4 Attitude in HIS Adoption

Attitude could be defined as a constant propensity to react in a particular way-often positively or negatively – toward any matter, and possesses both cognitive and expressive components [2]. Prior studies have produced mixed findings regarding significant predictors of computer attitudes. Some studies have found age [8,14], computer experience [8,9] and practice [8] to be accurate predictors of attitude as far as the usage of electronic systems are concerned. The complexity of an IS has been found to be negatively correlated with attitudes of users [8]. McCusker [25] indicated that there was a generally positive disposition towards the use of ICT in health care including the EPR, after a study on Knowledge, Skill and Attitude of Northern Ireland Department of Health Social Services and Public Safety (NIDHSSPS) healthcare Professionals towards ICT.

2.5 The Technology Acceptance Model

The TAM model indicates that when users are offered with a new technology, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) influence their decision about how and when they will use the new technology ([16]). Perceived Usefulness (PU) is the degree to which an individual believes a new information system will improve his or her job performance. Perceived Ease of Use (PEOU) is the degree to which an individual believes a system will be effortless and easy to use. The model allows researchers not to only predict, but also explain why a particular system may or may not be acceptable to users [17]. Despite the immense support for the TAM, researchers call for others to explore whether the TAM's belief variables are mediators of the effect of external variables and, if so, which external variables are important [30]. Again, TAM is useful in determining pre-implementation attitudes toward information systems in environments where system use is discretionary, rather than mandated. It suggests that external variables indirectly determine an individual's attitude toward technology acceptance by influencing perceived usefulness and perceived ease of use [16,17]. Meanwhile external variables might include individual user attributes or those relating to their job tasks, or even post-implementation attitudes toward information systems usage. Other external influences may relate to the system development and implementation process, system design characteristics or adequate training and user support [27]. Arguably, previous research has been silent in including Knowledge, Skills and Attitude (KSA) of health care professionals in a single TAM-based model from a developing country perspective, even though these variables are relevant in the context of explaining the usage of health information systems at least before, during and after the implementation processes. Thus, TAM has been modified by adding Knowledge Skill and Attitude of users as external variables to form a conceptual model that explores their relationships with the traditional TAM variables (PU, and PEOU).The performance of the Health Information System is not only linked to technical determinants such as data quality, system design, or adequate use of information technology, but also include behavioural determinants such as the knowledge and skills, attitudes, values, and motivation of those involved in the production, collection, collation, analysis, and dissemination of information, hence the need to explore the Knowledge Skill and Attitude aspect of the technology

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implementation.

2.6 Conceptual Framework

Based on the above literature review, a conceptual model has been developed to explore the perceived KSA of users towards HIS in a University hospital (*see Figure 1*). The proposed research model demonstrates the hypothesized relationships between health professionals' Knowledge, Skills, and the Perceived Ease of Use (PEOU), as well as Attitude and Perceived Usefulness (PU) of the system. Perceived Knowledge covers the awareness of HIS, training on its usage, user manual, basic knowledge for its effective usage, and the knowledge of the general features of the system. The Skills variable includes; patient data entry and analysis, basic skills to store, manage and retrieve information, and frequent usage of the system. Attitude towards HIS usage relates to information system characteristics perceived by its users with respect to health care delivery, such as patient care, and HIS efficiency, etc. The researcher predicts that KSAas external variables could be related to TAM variables Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), and their relationship could generally affect the actual usage of the computerized HIS in an institution or facility. Hence, the model proposes that the efficient use of HIS is affected by the three external variables (KSA). Meanwhile, attitude towards usage and behavioural intention to use, as illustrated in the TAM original figure are not seen in the conceptual figure because the proposed model assumes that they are embodied in the causal relationship between KSA and the TAM variables.

External Variables

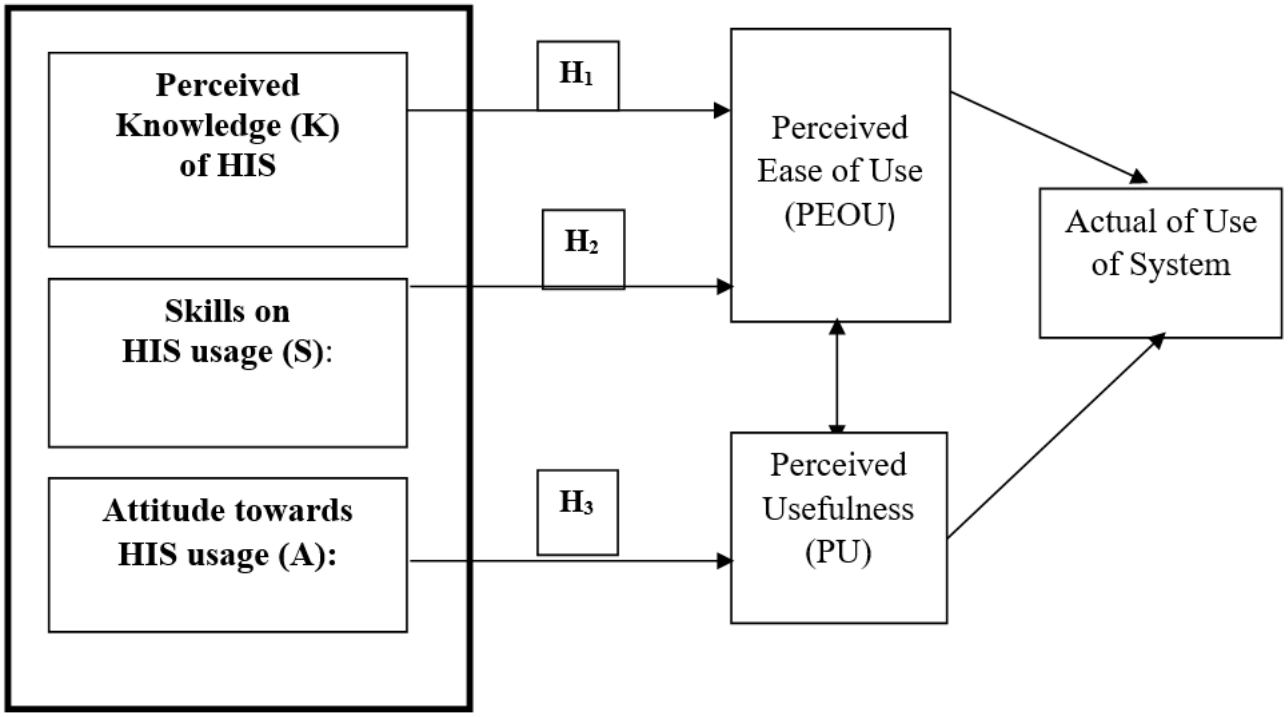

Figure 1: Conceptual model of Technology Acceptance Model (TAM).

A number of hypotheses as illustrated above have been deduced from the theoretical framework to support this conceptual model created for the study. These are thus stated as:

H_1: There is a relationship between Perceived Knowledge (PK) 0and Perceived Ease of Use (PEOU) of HIS: (Perceived Knowledge makes a difference)

H_2: There is a relationship between Skills on HIS usage and Perceived Ease of Use of (PEOU) HIS: (Skills on HIS usage makes a difference)

H_3: There is a relationship between Attitude of health care professionals towards HIS usage and Perceived Usefulness (PU) of HIS: (Attitude makes a difference)

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METHODS

3.1 Research Design

A mixed method approach was employed for this study. There was a documentation of the context of the health sector in Ghana and the profile of the University of Cape Coast Hospital. A cross-sectional, descriptive survey design was used to collect data. Besides using mainly questionnaire, interviewing, and observations the study also relied on secondary documentations such as facility action plan, and reports for case findings and other details of the hospital.

3.2 Context of Study

Ghana is divided into administrative regions and districts, and within these divisions health services are organized, managed and delivered at five levels; community, sub-district, district, regional and national. Services provided at community, sub-district, and district levels constitute Primary Health Care (PHC) and are delivered in the context of a district health system [26]. The regional and district health services have management teams, which oversee managerial and technical aspects of health delivery in all health facilities and their catchment populations throughout the country. The health care delivery systems are classified into four; the public, private-for-profit, private-not-for-profit, and traditional systems [26]. The systems are centralized around the Ministry of Health (MOH), with a hierarchical organizational structure from the central headquarters in the capital city of the country; Accra, to the other regions, districts, and sub-districts. Activities at the regions and districts are coordinated and supported at the national level by the Ghana Health Service (GHS), while the MOH is responsible for overall policy formulation, oversight and regulation, coordination, policy guidance, strategic planning, and resource mobilization, and as well ensures links with other sectors. The MOH is also charged with the responsibility of regulating the entire health sector through its several policies. In formulating such policies or guidelines for regulation, the ministry collaborates with various Ministries, Departments and Agencies (MDA), as well as other partners and stakeholders in the health sector.According to the Second Five Year Programme of Work 2002-2006, the targeted MDs are the Ministries of Education, Environment, Science and Technology, Works and Housing and Local Government and Rural Development. The partners are also made up mainly of bilateral and multi-lateral donors, NGOs and civil society organizations. However, the implementation of the policies and the enforcement of its regulations are carried out directly and indirectly by such MDAs and other institutions working with the ministry [1].Policy implementation is carried out through the public, private and traditional sectors. At the public sector end, the Ghana Health Service (GHS), Teaching Hospitals Board (THB) and the quasi-government institution hospitals (QGIH) are the implementing agencies of the ministry.

The Ghana Health Service (GHS); which was established by the Ghana Health Service and Teaching Hospitals Act 525, 1996 [31], is responsible for the administration and management of state owned-hospitals and other health facilities, but excluding teaching hospitals and quasi-government institutions. GHS (including teaching hospitals) functions as a semi-autonomous government agency collectively responsible for the provision of health services (prevention, promotion, cure and rehabilitation) at the district, regional and national levels. The teaching hospitals also play a key role in teaching and research - offering facilities for the training of physicians and other health professionals, and for medical and public health research. The public health sector is complemented by the private health sector, which provides about 42 per cent of Ghana's health care services. The main providers in the private sector are the mission based providers and the private medical and dental practitioners. The role played by the traditional birth attendants (TBAs) and the traditional healers is also receiving national recognition [31]. Services are delivered through a network of facilities, with health centres and district hospitals providing primary health care services, regional hospitals providing secondary health care, and teaching hospitals at the apex providing tertiary services and responsible for the most specialised clinical and maternity care and also provide the highest level of academic and practical training and research in medicine and related health fields [26].

The Ghana Association of Quasi-Government Health Institutions (GAQHI), are health institutions owned by government or government establishments in the manufacturing, mining and service industries. The service industries include financial and educational institutions, security and law and enforcement agencies. The 37

Military and Police hospitals, Port Health institutions, Social Security and National Insurance Trust (SSNIT) hospital, University Hospitals in Ghana such as; University of Cape Coast (UCC) Hospital, University of Ghana-Legon (UG) Hospital, Kwame Nkrumah University of Science and Technology (KNUST) Hospital (Kumasi), and the University of Education Winneba (UEW) Hospital, are members of the quasi-government health institutions. The MOH oversees the health of the nation and monitoring the performance of GAQHI, is currently an association and not a statutory body backed by relevant legislation, but are responsible for the day-to-day organization and administration of health services in their facilities, and also report directly to the Director-General on technical issues, and further provide support and supervision for regional and district programmes.

3.2 Overview of the University of Cape Coast Hospital

The University of Cape Coast (UCC) Hospital is in the ancient capital of the central region of Ghana. It was established in 1963, initially as a sick bay attached to one of the main halls-Adehye Hall. The academic health care facility which was initially established to cater for the health needs of staff, their dependents and students, now serves the University surrounding communities, the Cape Coast Metropolis and the general public as well. The University Hospital and an Environmental Health Section; whichismandated to cater forall environmental related hygiene practices in the University community-including cleaning, dislodging of faecal waste, spraying and fumigation services; are two sections in the University managed by the Directorate of University Health Services (DUHS) under the University of Cape Coast (UCC) organisational structure.

Existing Units, Departments, or Sections in the University hospital include; Medical Department, Nursing Division, Dental Clinic, Student's Clinic, Laboratory, Pharmacy, X-ray, Administration (General Office), Accounts, Records/Biostatistics/ICT, Maternity- Reproductive/Child Health /Family Planning, Accident & Emergency, Catering Services, Laundry, and Mortuary. For the purposes of this study, the Records and Pharmacy Units were selected considering the fact that they operate the system extensively in the facility. The hospital's range of services included; outpatient and in-patient care, specialized (Dental, ENT), Maternity (Anti-natal, Post-Natal), Pharmacy, HIV/AIDS Counselling, Diagnostic (Laboratory, X-ray, ECG, Ultra Sound Scan), Outreach (RCH, family planning) and "first class mortuary services" as the facility action plan puts it.At the time of this research the sub-district population of UCC hospital for 2012 was 29,459, with the bed state being seventy-five (75) for five (5) main wards including; the Children's ward (Beds and cots), Maternity ward, Surgical ward, Medical ward (Male and female), and Accidents and Emergency (A&E) ward.The staff strength of the facility at the time of the study was 233, with the Records/Biostatistics/ICT and Pharmacy Units forming 7.30% (17) and 5.58% (13) respectively of the total. Categories of staff in the facility according to the university's division of human resource classifications generally include; Senior Members (SM), Senior Staff (SS), Junior Staff (JS), National Service Personnel (NSP), Internship, and National Youth Employment (NYEP). Theses classifications are based on either qualification or long service on the work.

3.3 Study Population and Sampling Strategy

The study population included all health professionals employed by the University of Cape Coast hospital; before and during the time data was collected. The target population was management members, as well as technical staff from the Records and Pharmacy units of the hospital, who were extensive users of the HIS in the facility. They included Biostatisticians, Records clerks, Pharmacy Technicians, and some administrative staff. This was due to the assumption that they were freed from bias in telling about the HIS system used in the facility. The exclusion criteria related to health professional whose work procedures had no link at all to the usage or management of the HIS in the facility during the study period were excluded from the study. For this study, convenient sampling procedure; which is a non-probability sampling technique, was used to select UCC Hospital as the study case setting. The academic health facility is in the context of the study as background information indicates that it recently shifted from using manual systems to using HISs to support the delivery of health care. Moreover, the facility which is located in the central regional capital of Ghana is where the researcher resides, favouring proximity and ability to gain access to the facility and study subjects.Purposive sampling technique; which is also a non-probability sampling technique, was employed in selecting thirty (30) health care professionals from the Records and Pharmacy units who were technical staff and directly associated with the usage of the HIS in the hospital. Sample size in this study depended mainly on what could be done

with available time and resources, and the exclusion criteria as far as the usage of the HIS was concerned. The subdivision of the technical respondents included seventeen (17) and thirteen (13) Records and Pharmacy staff respectively. In addition, five (5) questionnaires were administered on management members of the hospital, including the Director, Administrator, Accountant, Nurse Manager and Pharmacist. Altogether, thirty-five (35) questionnaires were administered on the University of Cape Coast Hospital staff for the purposes of the study.

3.4 Data Collection Instrument and Method

The data collection instrument employed for this study was a questionnaire. It consisted of questions to identify and measure university healthcare professionals' perceived knowledge, skills and attitude, towards the use of HIS in health care delivery and services. The questionnaire instrument contained eight (8) parts; which included socio-demographic characteristics and professional background (Part I), perceived knowledge on HIS usage (Part II), skills and HIS usage (Part III), perceived ease of use (Part IV), perceived usefulness (Part V), attitude towards HIS usage (Part VI), management support (Part VII), and general comments (Part VIII).

All questions; except those in the socio-demographic characteristics and professional background and general comments sections, captured responses via a five point Likert scale with responses ranging from "Strongly Disagree (SD)" to "Strongly Agree (SA)". Questions in the perceived ease of use, perceived usefulness, and attitude about HIS usage sections assessed variables endogenous to the technology acceptance model (TAM).

A pilot test was conducted on health professionals at the University of Ghana Hospital to ensure clarity of the questionnaire, to check face validity, reliability and test-retest reliability. Pilot testing was necessary to determine the average length of time needed to complete the survey, as well as how to manage and analyse the data collected. University of Ghana (UG) Hospital is based in Accra, and is one of the largest healthcare providers in the Ghanaian capital. It is similar to the study population in several ways. Its urban location, types of services provided and academic affiliation make it relatively comparable to the University of Cape Coast Hospital. The pilot site is, however, dissimilar to the study population in some ways. Health professionals practicing in the UG health facility have not been using HIS as part of their everyday practice for many years. Their responses are likely to be different than those received from the study population, as HIS has been implemented within the UCC health facility for a number of years. It was not anticipated that these dissimilarities would impact the outcomes of the final study, as the pilot health professionals were able to accurately evaluate the instrument and provide valuable feedback regarding the survey items.

3.5 Consent and Permission

A letter was sent to Management of UCC Hospital informing them of the research and seeking their support to ensure that all staff members concerned received a communication about the potential to be selected to participate in the exercise. The questionnaire included a covering brief introduction explaining the nature of the study and confirmation that recipients retained full control over the decision to complete the questionnaire or not. Ethical issues were addressed considering various precautionary approaches.

3.6 Data Analysis

Data was organized and processed using Statistical Package for Social Scientists (SPSS) version 16.0. Descriptive statistics including frequency tables, simple percentages, measures of central tendency and dispersions were compiled. The test statistic for the hypothesis testing was Correlation analysis, which is the process of measuring the nature and strength of relationship between variables. There are several correlation coefficients for measuring various types of relationships between different kinds of measurements, but this study used the Person correlation coefficient (r), which is one of the more widely used correlation coefficients according to experts.

RESULTS

4.1 Analysis of Qualitative Results

What type of Information System(s) is/are used in a University hospital setting in provision of information for planning and management of health services?

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Findings revealed that health care professionals in UCC Hospital used two (2) main types of IS as health management information system tools for patient services and hospital management. These included; the Patient Health Information Systems (PHIS), and the District Health Information Management Systems (DHIMS), which were installed and extensively used in both Records and Pharmacy units of the wireless internet based hospital. In reference to the Directorate of the University Health Services (DUHS) 2012 Action Plan, the hospital management installed these systems with the objective of setting up machinery for prompt collection, collation and release of valid data for management decisions, and proper disposal of dormant records. It was also their objective to protect confidential records against loss, damage, unauthorized access, modification or disclosure. The University hospital further aimed at intensifying the use of electronic communication among service units by improving upon existing Local Area Network (LAN) as far these systems were concerned. The facility also planned to use these systems to reduce the waiting time of patients, and sustain quality clinical services in order to increase client and staff satisfaction to about 90%.

4.2 Analysis of Quantitative Results

Socio-Demographic Characteristics and Professional Background

A total of twenty (25) usable responses were obtained from the technical users of the system, resulting in an overall response rate of 83.33%, as two technical staff from the pharmacy unit were on official leave and three (3) others could not help the process. Meanwhile, a 100% response rate was achieved from the five (5) member management members who were given a questionnaire based on management support and the usage of HIS in the hospital. Socio-demographic data collected and descriptively analysed included gender, age, highest educational level, unit/section, and length of experience in practice at the health care facility. The five (5) member management committee comprised male representatives each from Administration, General Office, Nursing and Pharmacy sections. The only lady in the committee was the Accountant. The committee therefore constituted 80.0% male and 20.0% female membership. Regarding the technical users of the system, a high percentage of males (76.0%, n = 19) against females (24.0%, n = 6) were represented within the valid responses, and this was influenced in particular by the gender configuration of the Records staff (48.0%, male staff, n = 12) who were well represented within the sample, against the Pharmacy staff (28.0% male staff, n = 7) where five (5) potential respondents could not be reached due to official reasons. The Medical Records unit obviously had the larger respondents included in the survey (68%, n = 17) with the Pharmacy Unit numerically being the smaller group (32%, n = 8) in the survey. All management members had at most twenty (20) years to retire per the official retirement date of sixty (60) years in Ghana, as they ranged between the ages of forty (40) and fifty-nine (59) years (40-49 years = 80.0%, 50-59 years = 20.0%). In consistent with the hospital profile, the male gender (80.0%, n = 4) dominated the five (5) member management committee of the hospital, that comprised the Director, Hospital Administrator, Nurse Manager, Pharmacist, and the only female Accountant (20.0%, n = 1). For the Records and Pharmacy staff; every age group had at least a male respondent within the survey. The age group 19-29 years was the only one with female respondents, and also recorded the highest respondents for both Female (24.0%, n = 6) and Male (36.0%, n = 9). The 40-49 years and 50-59 years' age groups recorded the least (4%, n = 1). All the management members (n = 5, 100%) of the University hospital were postgraduates, according to the information gathered from the questionnaire completed.On the other hand, majority of the respondents from the Records and Pharmacy units of the facility were undergraduates (54.2%, n = 13) with a greater number from the Records Unit (37.5%, n = 9) compared to that from the Pharmacy Unit (16.7%, n = 4). There was however one non-response for this category, leaving the total respondents as 24.Two members each of the five (5) member management team had worked in the facility for between 5-10 years (n = 2 40.0%), and between 11-15 years (n = 2 40.0%), with only one management member (n = 1 20.0%) from nursing unit (the Nurse Manager) working in the hospital for more than fifteen (15) years. In terms of computer competency, the hospital Director and Administrator considered themselves as *'starting to become well-rounded in computer knowledge and usage'* - General users of computers (40.0%), whiles the other management members from the Pharmacy and Accounts sections indicated that they were *Advance or Experienced and probablywith a formal training in a related area*. The only *advanced beginner* with significant expertise on the computer knowledge and usage was the Nurse Manager (20.0%). On the other hand, majority of the technical users (37.5%) were beginners with limited skills and privileges (Novices), with the records unit having the higher percentage (29.2%) against the pharmacy unit which recorded the same percentage (8.3%) as either Novice-beginners with limited skills and privileges, or starting to become well-

rounded knowledgeable (General), or usually have completed formal training in a related area (Advance or Experienced).

4.3 Analysis of Model

The following is a descriptive summary of the responses and analysis for each variable in an attempt to answer the research question which is to investigate health care professionals' perceived Knowledge, Skill and Attitudes (KSA) towards the usage of Health Information Systems (HIS), in the provision of information for planning and management of health services in a University health care institution in Ghana.

Five (5) different set of questionnaire statements each for Perceived Knowledge (PK) on HIS usage, Skills on HIS usage, Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and Attitudes towards HIS, were structured with the same likert response set ranging from Strongly Disagree to Strongly Agree (1 – 5) with 5 being the optimal score. Mean scores were obtained for each of the levels; PK (ranged from 2.56 to 4.60); skills on HIS usage (ranged from 3.64 to 4.44); PEOU (ranged from 2.12 to 5.72); attitude towards HIS usage (ranged from 2.96 to 4.20); and PU (ranged from 4.00 to 4.24); as indicated in *Table 1.* Thegeneral mean scores were also obtained for the variables; PK (3.512), Skills on HIS usage (3.920), PEOU (3.584), attitudes towards HIS (3.528), PU (4.120), and management support (3.592).

Table 1: Mean Responses for Variables

Variables	PK	Skills	PEOU	Attitude	PU	Management Support
Item 1 (Mean)	4.60	4.44	4.16	4.16	4.24	4.20
Item 2 (Mean)	2.56	3.64	4.08	3.80	4.04	2.96
Item 3 (Mean)	2.60	3.68	3.44	2.96	4.24	3.08
Item 4 (Mean)	4.12	3.88	2.12	2.76	4.08	3.88
Item 5 (Mean)	3.68	3.96	4.12	3.96	4.00	3.84
General Mean	3.512	3.920	3.584	3.528	4.120	3.592

Majority (Mode = 5) of the respondents strongly agree that they are aware of the HIS in their facility, and have the basic knowledge necessary to use the HIS effectively(Mode = 4). Respondents (Mode = 4) also agree that they know all the features of the HIS software, and can operate it as required. Given the mean score of 3.512 *(Table 1)* achieved on a likert scale of 1 to 5 for all responses on Perceived Knowledge, it is clear that health care professionals' level of perceived knowledge on HIS is positive and appreciable, irrespective of their disagreement (Mode = 2) of having had employer or management organized training on the usage of the system.

For skills on HIS usage in the facility, most of the respondents strongly agree (Mode = 5) that they could make patient data entry using HIS software, perhaps due to the claim that they have the basic skills necessary to store, manage and retrieve patient/clinical history/ information using the HIS software (Mode = 4). They could also make data analysis using HIS software (Mode = 4). These outcomes coupled with a mean score of 3.920 *(Table 1)* achieved on a likert scale of 1 to 5 for all responses on skills clearly indicates that health care professionals' level of skills on HIS usage is positive and convincing, even though they were neutral (Mode = 3) on seeking information and running reports using the HIS search engines.

On Perceived Ease of Use (PEOU), respondents clearly agree (Mode = 4) that the system is clear and understandable, its usage makes job/task easier to perform (Mode = 4), and indeed they expect each other to be familiar with the usage of HIS in their work/task (Mode = 4). They also completely disagree (Mode = 2) that the system in the UCC hospital is difficult to use. Therefore, considering a mean score of 3.584 (*Table 1*) achieved on a likert scale of 1 to 5 for all responses on PEOU, the level of perception of the usage of the system is above average and also positive, though they remained neutral (Mode = 3) about the easiness in the usage of the general features of the software.

In relation to Perceived Usefulness (PU), most of the respondents clearly agree (Mode = 4) that using HIS does not only improve the quality of their work or task, but also gives them greater control and allow them to

accomplish their tasks more quickly. The respondents also agree (Mode = 4) that the system simplifies workday, improves productivity by prioritizing workload, expediting visits and eliminating paperwork. Majority of the staff of the university health facility also agree (Mode = 4) that the HIS software provides the tools healthcare providers need to document clinical encounters, monitor and improve their workflow and produce reports and analysis. Indeed, with a mean score of 4.120 (*Table 1*) achieved on a likert scale of 1 to 5 for all responses on PU, it is clear that the level of usefulness perceived by the health care professionals is very good.

In the case of attitude towards HIS usage, most of the respondents agree (Mode = 4) that they needed the HIS technology to enhance their work qualitatively, and are satisfied with the usage of the system software in their job or task (Mode = 4). The users (Mode = 4) of the system also agree that overall, their attitude towards HIS usage is positive, and that is consistent with the mean score of 3.528 (*Table 1*)achieved on a likert scale of 1 to 5 for all responses on Attitude. This therefore indicates that the level of attitude towards HIS usage is good and appreciable, despite the claim of being neutral (Mode = 3) about not being in consensus regarding their attitudes towards HIS adoption, and whether the HIS results in multiplicity of forms that further over-burdens the already overloaded paperwork.

The perception of management members towards their support as far as the usage of HIS in the facility was also captured in the research. Majority of the managers of the hospital agree (Mode = 4) that they provide the training needed to use the HIS effectively in the facility, though the technical staff neither agree nor disagree (Mode = 3) that management provides the training needed to use the HIS effectively in their work/task. Again, the managers of the hospital agree (Mode = 4) that they involve users in the implementation of the HIS, countering the position of the technical staff who remained neutral (Mode = 3) about their full involvement by the hospital management in the implementation of the HIS. The management members of the hospital strongly agree (Mode = 5) that HIS is important to the Hospital board, that they are all in positive consensus regarding their attitudes towards HIS adoption and sustainability, and as well strongly (Mode = 5) expects the technical staff to use the HIS efficiently and effectively in the hospital.

They however disagree that (Mode = 2) the HIS still does not provide the tools healthcare providers need to document clinical encounters, monitor and improve their work flow, and produce reports and analysis. Further, management strongly disagree (Mode = 1) that the HIS is not a strategic investment project and does not improve productivity in their facility.Meanwhile, the technical staff had other ideas concerning the support management offers towards the HIS usage in the hospital. Here, majority of the respondents agreed (Mode = 4) that the HIS project is important to the hospital management or their employers, who expected them to use the HIS efficiently and effectively in the hospital. The users of the system also agreed (Mode = 4) that staff of the facility were in positive consensus regarding their attitudes towards HIS adoption, but remained neutral (Mode = 3) about their full involvement by the hospital management in the implementation of the HIS.

Again, they neither agree nor disagree (Mode = 3) that employers or management of the hospital provides the training needed to use the HIS effectively in their work/task.Generally, health care professionals' level of perceived knowledge on HIS, skills on HIS usage, perception of ease of usage, perceived usefulness of the system, and attitudes were all established to be positive based on the descriptive statistics results achieved. However, they expressed reservations on the commitment of management in organising training and fully involving them in the implementation of the HIS, though management strongly expects them to use the HIS efficiently and effectively in the hospital. Meanwhile, management members were in positive consensus regarding their attitudes towards the system's adoption and sustainability, and strongly think that HIS is important to the Hospital board.

Hypotheses Testing

The hypotheses testing was to confirm or otherwise any associations between each of the two sets of variables; Perceived Knowledge (PK) and Perceived Ease of Use (PEOU); Skills and PEOU; and then Attitudes and Perceived Usefulness (PU) with respect to the usage of the HIS. The null and alternative hypotheses for each set are stated below. The test statistics employed was Pearson correlation coefficient (r), with a decision rule of rejecting the null hypothesis (H_0) if the coefficient of correlation was not zero ($r \neq 0$) given a significance level.

H_1: There is a relationship between Perceived Knowledge (PK) and Perceived Ease of Use (PEOU) of HIS (Perceived Knowledge makes a difference).

Hypothesis 1 (H_1) tested for the relationship between Perceived Knowledge (PK) and Perceived Ease of Use (PEOU) of the HIS.With the aid of the SPSS, a correlation matrix was obtained to test the above hypotheses to confirm or otherwise a relationship between Perceived Knowledge (PK) and Perceived Ease of Use (PEOU) of the HIS by the health care professionals in the facility.

Questionnaire items each for Perceived Knowledge (PK) and Perceived Ease of Use (PEOU) of the HIS were correlated to obtain a general correlation coefficient. Positive Pearson correlation coefficients of 0.54^{*} and 0.579^{**} were realised between the questionnaire items, with the single(*) and double (**) asterix next to the values indicating that correlationswere statistically significant at the 0.05 level (2– tailed) and at the 0.01 level (2– tailed) respectively.The correlation coefficientsare not zero ($r \neq 0$), and with p-values of 0.017and 0.009beingless than 0.05 ($p \leq 0.05$) the null hypothesis of the correlation testis rejected with the conclusion that there is a relationship between Perceived Knowledge (PK) and Perceived Ease of Use (PEOU) of HIS (Perceived Knowledge makes a difference).The outcome indicates that an increase in the awareness of HIS in the facility, results in a higher overall expectations of the usage of the system with ease, by the health care professionals. Moreover, an increase in the basic knowledge necessary to use the HIS effectively results in an increase in the overall expectations of the usage of the HIS with ease by the professionals in their work. This means that Perceived Knowledge makes a difference on PEOU of HIS, and hence, the perception of the ease of use of HIS by healthcare professionals at the University hospital only comes with better sensitization and higher basic knowledge necessary to use the HIS effectively. Users therefore need to be made aware of the system adequately and further offered the basic knowledge necessary to use the system, in order to create a better perception of ease of use of it.

H_2: There is a relationship between Skills on HIS usage and Perceived Ease of Use (PEOU) of HIS (Skills on HIS usage makes a difference)

Hypothesis 2 (H_2) also tested for the relationship between Skills on HIS usage and Perceived Ease of Use (PEOU). Again, with the aid of the SPSS, a correlation matrix was obtained to test the above hypotheses to confirm or otherwise a relationship between Skills on HIS usage and Perceived Ease of Use (PEOU) of HIS by the health care professionals in the facility. Questionnaire items each for the two variableswere correlated to obtain a general correlation coefficient. Positive Pearson correlation coefficients of 0.46^{*} and 0.57^{**} were realised between the questionnaire items, with the single(*) and double (**) asterix next to the values indicating that correlationswere statistically significant at the 0.05 level (2– tailed) and at the 0.01 level (2– tailed) respectively.

In all, the positive Pearson correlation coefficients established are not zero ($r \neq 0$) and their corresponding p-values of 0.021and 0.015less than 0.05 ($p \leq 0.05$), therefore correlation coefficient between Skills on HIS usage and Perceived Ease of Use is statistically significant. The null hypothesis is rejected with the conclusion that there is a positive relationship between skills on HIS usage and Perceived Ease of Use (PEOU) of HIS. Skills on HIS usage therefore make a difference on PEOU of the HIS as far as the users of the system are concerned. This means that an increase in the basic skills necessary to make entries, store, manage and retrieve patient/clinical history/information on the HIS software influences better understanding and usage of the system, and reduces the difficulty associated with the software, and then subsequently makes job/task easier to perform.

H_3: There is a relationship between Attitude towards HIS usage and Perceived Usefulness (PU) of HIS (Attitude towards HIS usage makes a difference)

Hypothesis 3 (H_3) looked for the relationship between Attitude towards HIS usage and Perceived Usefulness (PU).A general correlation matrixwas also obtained to test the above hypotheses to find out whether there existed a relationship between attitude towards HIS usage and Perceived Usefulness (PU) of the HIS by the health care professionals in the facility, given the available data or evidence.

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The correlation matrix output resulted in a statistical significance at 0.05 level (2-tailed)for all item combinationswith positive Pearson correlation coefficients of 0.51^{*} and 0.61^{**}, and corresponding p-values of 0.031and 0.028less than 0.05 ($p \leq 0.05$).It follows then that, the more health care professionals need the HIS technology to enhance their work qualitatively, the stronger they believe that it will improve the quality of their task/work. The system also hold promise to allow them to accomplish tasks more quickly and also simplify their workday by improving productivity and prioritizing workload. Their desire for the system also holds a stronger believe that it will provide the tools healthcare providers need to document clinical encounters, monitor and improve their workflow, and produce reports and analysis.Overall, the Pearson correlation coefficients established are not zero ($r \neq 0$) and their corresponding p-values areless than 0.05 ($p \leq 0.05$), and that indicates that the correlation coefficient between Attitude towards HIS usage and Perceived Usefulness is statistically significant. Hence the null hypothesis is rejected with the conclusion that there is a positive relationship between Attitude towards HIS usage and Perceived Usefulness of HIS. Attitude towards HIS usage therefore make a difference on Perceived Usefulness of the HIS as far as the users of the system are concerned. An increase in health care professionals' positive attitude towards HIS usage results in an improved quality of task/work., considering the results illustrated.

The table below provides a summary of the hypothesis and their outcome.

Table 2. Hypothesis Tests

	Hypothesis	
H_1:	There is a relationship between Perceived Knowledge (PK) and Perceived Ease of Use (PEOU) of HIS.(Perceived Knowledge makes a difference)	Accepted
H_2	There is a relationship between Skills on HIS usage and Perceived Ease of Use (PEOU) of HIS (Skills on HIS usage makes a difference)	Accepted
H_3:	There is a relationship between Attitude towards HIS usage and Perceived Usefulness (PU) of HIS (Attitude towards HIS usage makes a difference)	Accepted

DISCUSSIONS

Valid responses received covered five (5) management members and twenty-five (25) technical staff (Records and Pharmacy) of the University hospital under study. All respondents indicated that the facility uses the *Patient Health Information Systems (PHIS)* for patient services and management. Surprisingly, only two (2) respondents; the Records Unit Head and a National Service Personnel in the same office, knew about the other HIS; the *District Health Information Management System (DHIMS),* which was installed at the records section for data analysis and reportage. None apart from them knew about DHIMS, probably because they usually worked with the system, or the widely non-operational nature of the DHIMS.

The Director of the University Health Directorate enjoys the usage of the HIS in the facility because of its perceived ease of use, as he indicated that *"It makes data entry capture and retrieval very convenient for all staff and management" (Director, DUHS).* The Nurse Manager's response also echoed the perceived ease of the use of the system. He likes or enjoys the system because of its ease of use, and puts it that *"HIS has made information retrieval as well as storage very simple and easy."* However, the Hospital administrator had some reservations about the HIS usage in the facility. He felt that some operational deficiencies and terminologies of the software did not make him support the implementation of the system in the hospital. He indicated that the system causes *"unnecessary delays and has technical terms which deter users and the technical staff"* (Hospital Administrator, DUHS). The response of the only female member of the hospital management committee was also on operational deficiencies of the software, which made her not enjoy the usage of the HIS in the facility as far as patient information was concerned. She claimed that *"no provision is made to allow change of patient's information where necessary"* (Accountant, DUHS). Her comments leave the perception that the system created duplications of patient information and that could probably be the result of the delays expressed by the administrator. When the Pharmaceutical Scientist of the facility was asked the same question he resorted to lack of adequate human expertise to handle the system efficiently in times of emergency, which results in either no work or much pressure on the few capable human resources regarding the usage of the HIS. He probably did not enjoy the system operations because *"a few technicians could manage the HIS, and in*

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their absence, nothing works. The facility is dependent heavily on the few."(Hospital Pharmaceutical Scientist, DUHS).

It is clear from the responses of the management members that majority (3/5) of them had reservations and probably did not like or enjoy the implementation of the HIS because of either operational deficiencies of the software or lack of adequate skilled personnel to handle the system efficiently in the hospital. The other two members however enjoyed the system because of its Perceived ease of use and convenient for all staff associated with its usage.The Hospital Administrator suggested that IT specialist should be responsible for the ease of use of the software and information dissemination, and all staff should be involved in the usage of the system. He has been quoted as saying that *"IT specialist should make IT information available and easy to understand and use. HIS should be for all staff of health care facilities to encourage usage."* The Pharmaceutical Scientist of the facility felt that "*users need to be adept (very skilled or proficient) at using the HIS, and if possible trained to modify the information provision to suit their reporting style*, and that was consistent with the Nurse Manager's suggestion that *"there is the need to provide and extend training of more staff to sustain the benefits of HIS in our institution".*

Regarding the technical users of the system, majority (28%)of them indicated that they enjoy using the system because it limits their workload and saves time. Other respondents (12%) claimed that though they enjoy using the system, they still needed more technical training on the software, whiles others (8%) felt that they like the HIS because it serves as database for research work, helps to measure productivity and also monitor quality control in their facility. The remaining respondents did not enjoy the system because HIS did not have enough prompt to check the validity of data entered (6.7%), and caused delay while working on patient details (6.7%). The respondents also claimed that some portions of the system were not functioning properly (6.7%) and that affected their likeness for it, though it limits their workload and saves time.Majority (20%) of technical users of the system (Records and Pharmacy staff) suggested that management should improve on the organisation of training of staff on the operations and management of the system in the Hospital. Others (12%) felt that damaged computers must be repaired to make the work at the hospital effective. The same number of group of respondents (8%), suggested that; the HIS regrettably was not designed in line with the type of data collected at the facility and that should be corrected, that the internet should be made readily accessible, available and perhaps affordable to aid connection to the Country Health Insurance Offices and probably other Hospitals networks.

Consistent with the assertion of Archangel[6] that various types of IS are used worldwide as health management information system tools in the health care industry, the findings revealed that health professionals in UCC Hospital use two (2) main types of IS as health management information system tools for patient services and hospital management. These are; the *Patient Health Information Systems (PHIS)*, and the *District Health Information Management Systems (DHIMS)*, which were installed and extensively used in both Records and Pharmacy units of the wireless internet based hospital. The PHIS deals with all the information related to patients such as; patient data, patient billing, patient treatments, patient prescriptions, etc., and manage clinical information of the health facility such; whiles the DHIMS takes care of reproduction & child health services, disease control, clinical care, financial management, district baseline information, special reports and queries. Information gathered therefore by these systems at the hospital could be classified under health status information, health service information andhealth management information, which are consistent with the broad categories indicated by Matshidze and Hanmer [24] in terms of national HIS policies. The introduction of HIS in the UCC Hospital was however inconsistent; in terms of internet usage, with the assertion of Almunawar andAnshari [4] that the system is normally introduced by service providers to fully utilize especially the Internet in providing better healthcare and management. This is because users of the system at the UCC hospital never had an internet service, let alone fully utilise it.

Despite the claim that they have not had any employer or management organized training specifically on the usage of the systems, the university health care professionals' level of perceived knowledge on HIS was established to be positive and appreciable, considering their positive responses on awareness of the HIS in their facility, basic knowledge necessary to use the HIS effectively, and the claim that they knew all the features of the HIS software, and could operate it as required. This positive result probably emanated from their level of education, where majority of them were either post-graduates or undergraduates with good computer literacy

they brought to bear on their work.Majority of the respondents could make patient data entry using HIS software as they had the basic skills necessary to store, manage and retrieve patient/clinical history/ information. They were however not sure as to their ability to seek detailed information and run analytical reports using the HIS search engines, though they could make data analysis using the system. Nevertheless, the level of skills of the university health care professionals on HIS usage given the level of operations of the hospital was satisfactory. These findings suggest that continuing education and training in the usage of IS for health care professionals is very necessary to enhance users' skills in acquiring appropriate operational and analytical skills on the software. A positive relationship (positive Pearson correlation coefficient *r*) was realised among all the stated hypothesis including;Perceived Knowledge (PK) and Perceived Ease of Use (PEOU), skills and Perceived Ease of Use (PEOU), Attitude and Perceived Usefulness (PU) of HIS by health care professionals in the hospital, with all p-values less than 0.05 ($p \leq 0.05$).

CONCLUSIONS

To provide the best possible care as Archangel [6] has indicated, Health care professionals in the University of Cape Coast (UCC) Hospital use two (2) main Information Systems (IS); the Patient Health Information Systems (PHIS), and the District Health Information Management Systems (DHIMS), as health management information system tools for patient services and general hospital management. The Patient Health Information System (PHIS), which is still in the implementation process, was adopted by the hospital in 2007, and installed by Daviran Computers Limited; a software solutions group based in Accra. The District Health Information Management System(DHIMS) is Microsoft Access platform software developed by the Centre for Health Information Management (CHIM) to address some weaknesses and strengthen the processes of data collection, analysis and utilization at the facility (UCC Hospital), sub-district, and district levels for efficient and effective health service delivery. The DHIMS was also set-up to generate standard reports and analysis by level of service delivery, as well as type of facility and ownership. The hospital management installed these systems with the objective of setting up a mechanism for prompt collection, collation and release of valid data for management decisions, and proper disposal of dormant records. It was also their objective to protect confidential records against loss, damage, unauthorized access, modification or disclosure. Further, the University hospital aimed at intensifying the use of electronic communication among service units by improving upon existing Local Area Network (LAN) as far these systems were concerned. They also planned to reduce the waiting time of patients, and sustain quality clinical services in order to increase client and staff satisfaction to about 90%, counting on these electronic management systems.

University Health care professionals' level of perceived knowledge, level of skills on HIS, and level of attitude towards the usage of HIS were established to be positive and appreciable. Users' level of perceived of ease of use and perceived usefulness of the system were also positive. This was evident in their claim of being in positive consensus regarding their attitudes towards HIS adoption, and management's strong positive attitude towards the system implementation. However, the technical users of the system had some reservations about management's commitment towards the provision of training needed to use the HIS effectively in the hospital. Nevertheless, they still think that the HIS is an important project to the hospital management and their employers, and this is consistent with the five (5) member management team's claim that the system is important to the Hospital board, and that they were all in positive consensus regarding their attitudes towards its adoption and sustainability. Meanwhile, the management team of the hospital strongly expects the technical staff to use the HIS efficiently and effectively in the hospital as far as the objectives for which it was set-up was concerned. Further, management strongly thinks that the HIS is a strategic investment project and does improve productivity in their facility, because it still provides the tools healthcare providers need to document clinical encounters, monitor and improve their work flow, and produce reports and analysis.

By a statistically significant correlation result, a positive relationship was established between Perceived Knowledge and Perceived Ease of Use (PEOU) of HIS by health care professionals in the University of Cape Coast Hospital. Perceived Knowledge therefore makes difference on PEOU of the HIS as far as the healthcare professionals in the University facility are concerned. This means an increase in the Perceived Knowledge necessary to use the HIS software effectively results in an increase in the overall perception of the ease of use of the system by the University health care professionals in their work. An increase in users' awareness of HIS and higher basic knowledge necessary to use the software, results in a better perception of ease of use of the

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system. Another statistically significant positive correlation result was obtained between Skills on HIS usage and Perceived Ease of Use (PEOU), indicating a positive relationship between skills on HIS usage and Perceived Ease of Use (PEOU) of HIS. Skills on HIS usage therefore make a difference on PEOU of the HIS as far as the users of the system are concerned. Hence an increase in the level of Skills on HIS usage results in an increase in the Perceived Ease of Use (PEOU) of the system. As far as University health care professionals are concerned, an increase in the basic skills necessary to make entries, store, manage and retrieve patient/clinical history/information on the HIS software results in a better understanding and usage of the system, and further makes job/task easier to perform as the difficulty associated with the software reduces. A positive relationship between attitude towards HIS usage and Perceived Usefulness (PU) of HIS was also established based on the statistically significant positive correlation; hence the attitude towards HIS usage makes a difference on Perceived Usefulness of the HIS as far as the users of the system are concerned. This means that an increase in the attitude of university health care professionals towards HIS usage results in an increase in their perception of the usefulness of the system. Hence an increase in health care professionals' positive attitude towards HIS usage results in an improved quality of task/work.

Finally, although improvements in the measurement questionnaire (e.g. increasing the number of items) are needed for further investigations, the current results could serve as indicators for further training or education programmes, as well as strategic planning for implementing information systems in a university health care setting in Ghana or even elsewhere.

6.1 Implications for Education and Training

The results of this study support the importance of training in the usage of institutional software. This could lead to the development of standardised, efficient, and effective training initiatives for users of the software in such health care setting. The IS software in the hospital ought to be intended to; meet the organizational requirements and particular needs of the different professional users, and incorporate a common core curriculum or content to meet the base line HIS skills required by all grades of health care practitioners, including where appropriate the particular needs of groups who perceive themselves as being less familiar with ICT technology.In order to have smooth implementation processes, the employers or management of the hospital may need to first of all promote a 'two-tier' approach to training with multi-specialized approaches concentrating on basic training for all staff, and with professional training specific to meeting the needs of particular professional groups or specialties. Hospital managers must also match skill training levels to role specifications of staff at the facility, and also implement annual training updates on HIS skills and computing competencies for all users of the software.

6.2 Implications for Future Research

KSA was established to be influential external variables on the TAM variables (Perceived Ease of Use and Perceived Usefulness). The results suggest that the integrated HIS conceptual model could be an appropriate model for examining user knowledge, skills and attitudes of HIS. The proposed model provides a structure for future research with different user populations and settings.This project highlights areas requiring further study. For example; first, why differences exist between professional groups regarding their perceptions about HIS, their skill ratings and the use of the system; how accurate these perceptions are; and then how best to address the differential needs of the various professions. Second, how can we best introduce increasingly sophisticated systems such as HIS into the workplace without alienating staff? Answers to such questions will be vital to ensure the successful and efficient implementation of seamless and user friendly HIS integrated across the entire University Hospitals and the country.In addition, this research was conducted with focus on two technical user groups (Records and Pharmacy Units) with the management members of a University hospital in Ghana. Future research could address additional user groups within the same or different healthcare system, such as physicians, nurses, laboratory technicians, administrative assistants or clerical staff. A follow up study might also examine health care professionals' perceptions regarding how well they think HIS is capturing data at the appropriate level. Further study might compare types of HIS software used in other non-academic public health care facility with respect to KSA of the users involved. The results would be useful to HIS vendors, as well as other healthcare systems that are working through data collection and analysis challenges.

A further study could be conducted on HIS to support the call by Chiasson and Davidson [12], on the need for increased research in this area, as they recognized that information systems theory is unfamiliar to many clinicians, and the healthcare context is unfamiliar to many information systems researchers. The HIS conceptual relationship model might be tested in other case settings or context, to determine if the relationship between KSA and TAM variables (PEOU and PU) vary by facility settings. It might be applied with non-academic health care populations or in settings where HIS involvement will be mandated.The study examined KSA of users as they implemented the HIS. A post-implementation study on actual system use could be performed to determine if KSA of users as they implement the system accurately predicted true behaviours. Some of the most interesting findings that emerged from this study were related to the relationships between perceived knowledge and ease of use of the system, between skills and perceived ease of use of the system, as well as between attitude and perceived usefulness of the HIS efficiency. These concerns are intricate in nature and provide a variety of opportunities for future research. Post implementation usability studies could be conducted to gain a better understanding of the HIS overall impact on the health care professionals' workflow and productivity.

6.3 Implications for Professional Practice

The results of the study indicate generally positive character toward the use of HIS in the University health care system. This should be recognised and acknowledged, and built upon with a change management strategy that is designed to capitalize on the existing perceptions and perceived levels of skills currently available within the hospital, and to address deficits through training where it is required.Respondents in this study expressed concerns about their non-involvement in the HIS adoption and implementation processes in the hospital. Managers of the health facility should engage users of the software system in planning, requirements specifications, implementation testing, and maintenance. By working closely with the health professionals or users, health information system management plans and procedures could be developed to support user needs and facilitate workflow, while meeting accreditation and regulatory documentation requirements. Again, by the assessment of the information needs of users of the HIS, management could help develop criteria for evaluating and selecting HIS unique to their users' and community needs.Professional leadership could also be crucial to the successful implementation of the HIS, but management must be able to allocate physical resources, such as hardware, software and workspace. Sufficient technical support will be required for sustainability of the system; hence facility IT professionals must consistently work in harmony with other health care professionals or fellow users in order to promote long-term system adoption. In particular, it is essential to provide HIS usage support on a 24/7 basis in order to ensure the effective and efficient use of existing resources and services.

DECLARATIONS

Abbreviations

CHIM Centre for Health Information Management

DHIMS District Health Information Management Systems

DUHS Directorate of University Health Services

ECG Electro Cardio Gram

ENT Ear Nose and Throat

GAQHI Ghana Association of Quasi Health Institutions

GHS Ghana Health Service

HIS Health Information Systems

IT Information Technology

JS Junior Staff

KNUST Kwame Nkrumah University of Science and Technology

KSA Knowledge Skills Attitude

LAN Local Area Network

MOH Ministry of Health

NSP National Service Personnel

NYEP National Youth Employment Programme

PEOU Perceived Ease of Use

PHC Primary Health Care

PHIS Patient Health Information Systems

PK Perceived Knowledge

PU Perceived Usefulness

RCH Reproductive and Child Health

SM Senior Members

SS Senior Staff

TAM Technology Acceptance Model

TBA Traditional Birth Attendants

THB Teaching Hospitals Board

UCC University of Cape Coast

UDS University for Development Studies

UG University of Ghana

Ethics Approval and Consent to Participate:

A letter was sent to Management of UCC Hospital informing them of the research and seeking their support to ensure that all staff members concerned received acommunication about the potential to be selected to participate in the exercise. Ethical issues were addressed considering various precautionary approaches.

The University of Cape Coast Institutional Review Board gave ethical approval (**UCCIRB/EXT/2019/11**) for the study. Permission was obtained from the administrators of each hospital before study was conducted. All respondents gave informed consent.

Consent for Publication:

Not Applicable

Availability of Data and Materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing Interest:

The authors declare that they have no competing interests

Funding

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Author's Contributions

RB was a major contributor in writing the manuscript, with very effective supervisory role.

MNAanalysed and interpreted the patient data, and was very instrumental in the survey and methodological processes

EA was a major contributor in editing and reorganising the manuscript for publications

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FIGURE LEGENDS

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