



WJMER

World Journal of Medical Education and Research

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Reflective Analysis of Cleft Lip and Palate Management in a Tertiary Hospital in South India: Is There Room for Improvement?

Education in Communicating Methods - An Effective Tool for Improving Interpersonal Relationships Between Health Care Professionals and Patients

Awareness and Use of Antibiotics Among Jordanian Mothers for Treating Upper Respiratory Tract Infections

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Organizational Factors Influencing the Adoption of the District Health Information System 2 in Uasin Gishu Sub County Hospitals, Kenya



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Introduction

The World Journal of Medical Education and Research (WJMER) (ISSN 2052-1715) is an online publication of the Doctors Academy Group of Educational Establishments. Published on a quarterly basis, the aim of the journal is to promote academia and research amongst members of the multi-disciplinary healthcare team including doctors, dentists, scientists, and students of these specialties from around the world. The principal objective of this journal is to encourage the aforementioned, from developing countries in particular, to publish their work. The journal intends to promote the healthy transfer of knowledge, opinions and expertise between those who have the benefit of cutting edge technology and those who need to innovate within their resource constraints. It is our hope that this will help to develop medical knowledge and to provide optimal clinical care in different settings. We envisage an incessant stream of information flowing along the channels that WJMER will create and that a surfeit of ideas will be gleaned from this process. We look forward to sharing these experiences with our readers in our editions. We are honoured to welcome you to WJMER.

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WELCOME

We are pleased to bring you the twenty-second edition of the World Journal of Medical Education and Research (WJMER). It comprises of several intellectually-stimulating articles which discuss pertinent topics and highlight the notable research that is being conducted throughout the world.

The opening article by Panikkar assesses the standards of cleft lip and/or palate treatment in the Amrita Institute of Medical Research and Sciences Hospital in Kochi, India, considering possible strategies to optimise treatment. The article compares and contrasts two healthcare systems to highlight the challenges faced by healthcare professionals working within resource constraints.

The second article by Lakshmikantha et al. considers medical professionals' lack of interpersonal communication skills in India. It aims to identify where communication becomes essential within a healthcare setting and how improving such skills as part of the medical school curriculum can overcome issues encountered as a result of poor communication.

Samara reflects upon the way in which Jordanian mothers use antibiotics to treat upper-respiratory-tract infections and whether they are able to differentiate between viral and bacterial infections. The findings established that Jordanian mothers are unable to differentiate between bacterial and viral infections and, as such, administer antibiotics inappropriately.

While the Clinical Maternal Death Review (CMDR) is a widely accepted method of maternal death attribution, post mortem examinations are the gold standard. Mohamed et al. aim to identify the level of concordance between the two methods. They find that a high number of cases are reported as having an unknown or undetermined cause. This results in difficulties in assigning a cause of maternal death using CMDR, which subsequently leads to the underestimation of disease burden to the detriment of maternal mortality prevention policies.

The final article by Kuyo et al. seeks to assess the use of the District Health Information System (DHIS) data to aid decision making at the Uasin Gishu Sub County Hospitals, Kenya. They establish that, while the level of knowledge regarding the use of DHIS2 is fair throughout the six Sub County Hospitals, its utilisation by County Health Managers to assist decision making is low.

We sincerely hope that you find each article in this edition informative, interesting, and enjoyable to read.

Ms Karen Au-Yeung
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Ms Rebecca Williams
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Reflective Analysis of Cleft Lip and Palate Management in a Tertiary Hospital in South India: Is There Room for Improvement?

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Abstract

The management of Cleft Lip and/or Palate requires a complex multidisciplinary team approach to provide integrated care to patients and their families. Orofacial clefts can cause significant long term psychological and functional effects on patients if not treated in a timely and effective manner. These include poor dentition, hearing impairment, speech disorders and difficulty forming social relationships. Robust evidence exists exploring the epidemiology, post-operative outcomes and timing for each surgery, however, there appears to be a lack of qualitative research evaluating current management strategies in the developing world. In this report, I aim to explore the standards of Cleft care delivered at the Amrita Institute of Medical Research and Sciences Hospital in Kochi, India and reflect on possible strategies to establish an optimal treatment regimen for patients. I was also able to compare and contrast two healthcare systems to highlight the challenges faced by healthcare professionals working within resource constraints.

Key Words

Cleft; Lip; Palate; Management; Kochi

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Introduction

Cleft Lip and/or Palate (CL+P) is the most common congenital cranio-facial abnormality, affecting approximately 1 in 700 live births worldwide and 1 in 413 in the South Indian population^{1,2,3}. The aetiology is thought to be multifactorial with both genetic and environmental factors impacting head organogenesis⁴. This complex developmental process is sensitive to disruption at various stages. An untreated CL+P can be a highly debilitating condition affecting speech and feeding as well as increasing perinatal mortality^{5,6}. Many developing countries lack the appropriate resources to provide holistic care to CL+P patients, causing a lifelong functional and psychological impact.

Management

The management of cleft deformities is centred around a multidisciplinary approach and continues throughout the first 20 years of a child's life. Specialties involved include maxillo-facial and plastic surgeons, orthodontists, speech and language therapists, ENT surgeons, psychologists, paediatricians, paediatric dentists and geneticists. Whilst no official clinical guidelines currently exist for India, their CL+P management is loosely guided by the UK's NICE guidelines, though adapted according to resources and surgeon's preference⁷. Treatment aims include repairing the birth defect,

ensuring normal development of hearing, speech and language, proper feeding and good dentition whilst preventing and treating psychological issues.

The main components of CL+P treatment are highlighted in this timeline:

A study conducted on 80 CL+P patients in Chennai, another South Indian city, revealed that 35% of patients suffered from periodontal disease, highlighting the discrepancy between treatment aims and reality⁸. Another study assessing dental health in 4-6 year olds conducted in North India highlighted significant differences in over-bites, caries and gingival health between cleft and non-cleft patients⁹. A nationwide survey conducted with 293 Cleft Surgeons in India suggested that there is currently a lack of interdisciplinary communication between specialties which may compromise quality of care¹⁰. Another relevant finding comes from a three-centre Indian study which concluded that there is a lack of uniform protocol when caring for patients with CL+P, resulting in a large variation in quality of treatment¹¹. Finally, a study in Thailand looking at patient Quality of Life after Cleft surgery showed that patients were most concerned about the psychological impact they had faced and with reducing the size of their surgical scars¹². Though this research begins to uncover some of the main

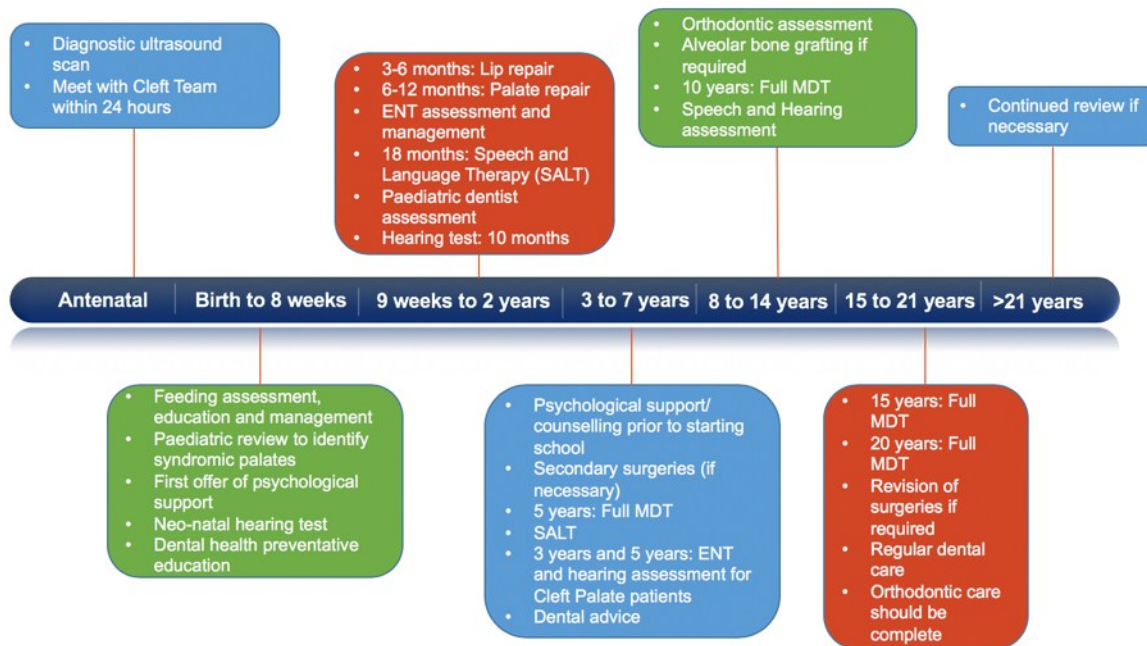


Figure 1: Timeline of Cleft Lip and Palate Management as per NICE Guidelines (2)

issues cleft patients in developing countries face post-operatively, it doesn't give an indication of which services are being provided and whether this adheres to clinical guidelines. There are also some aspects of management that little evidence exists for e.g. feeding assessment and management.

In this report I aim to use a reflective approach to evaluate CL+P management at AIMS Hospital in Kochi and use existing relevant literature, and my experience as a UK medical student, to highlight potential areas of improvement.

Methodology

I conducted my reflection using qualitative data from clinical observation. I used Gibbs's Reflective Cycle (1988) to allow me to analyse each stage of my experience and draw conclusions¹³. I initially considered a quantitative analysis. However, I realised this would limit my time in theatre, associated learning of surgical skills and the opportunity to interact with patients from a different part of the world.

Reflection

On a daily basis, I accompanied a surgeon on their post-operative ward round which they undertook alone. These consultations were brief, with the surgeon usually spending less than a minute discussing each case. Owing to greater financial pressures and serving a larger population, the wards were much larger than those in the UK with beds

only a few metres apart, often with no wall/curtain separating patients. The majority of the time was spent conversing with the nurse to assess the patients post-operative progress and care. The consultant finished by asking a few questions to the patients' family usually about the patient's wellbeing, their knowledge of post-operative care and when they could return home. These experiences prompted me to reflect on the General Medical Council's Duties of a Doctor, in particular the importance of "working in partnership with patients" and "respecting patients' right to reach decisions with you about their care and treatment²⁰." I speculated if external pressures, be they financial, social or political, were forcing these principles to become a lesser priority in order to maintain equality of patient care in an environment where the doctor-patient ratio is extremely demanding. Furthermore, I considered if a comparatively lower socio-economic and educational status of families may have impacted on the immediate population's ability to comprehend a Doctor's scientific explanations. It may be the case therefore that the expeditious and content-light nature of the ward round was actually an evolution of 'doctor behaviour' to ensure time is not wasted on actions that did not positively impact upon patient care. It could also be argued that it is unfair to expect high levels of comprehensive care delivery under significantly differing circumstances; a fairer comparison could be with the standard of care delivered in surrounding hospitals. Despite that,

these hospitals often emulate their guidelines from NICE publications, therefore assessing their adherence to these guidelines seemed relevant.

Case 1: During one of these ward rounds, I met patient A, a 4-month-old female who had undergone surgery for an isolated cleft lip. Her mother explained that she had recovered well from the operation and she was very pleased with the result. When discussing the next stage of her treatment plan, the surgeon mentioned that she would need a follow up appointment in a month to review her progress/functionality and assess her wound. He also offered a SALT assessment alongside the follow up, but the patients' mother declined explaining that "her daughter can't talk yet anyway" and was concerned about additional costs. He finished by reminding her that she could switch from spoon feeding to breast feeding as patient A now had the appropriate anatomical mechanisms in place.

In the UK, SALT assessments can be conducted at any point between 9 weeks and 2 years of age, though usually conducted at 18 months after speech has developed. Though I thought that accepting the mother's refusal perhaps embodied the GMC "respecting patients' right to reach decisions with you about their care and treatment"¹⁴, I noted that it may have been a good opportunity to educate the patient's mother on the importance of this assessment, and reassure her that the earlier patients begin SALT the greater chance of success¹⁵.

After the ward round, I spoke to Patient A's mother to validate what she had been told regarding her care over the next few years and to understand any concerns she may have. She explained that the SALT assessment had been previously mentioned but she wasn't convinced it was necessary at this time. She wasn't aware that patients with cleft deformity were more susceptible to poor dental health or hearing problems. Her greatest concern by far was the psychological impact her daughter would face in later life particularly when arranging a marriage. The nurse accompanying me explained that in many rural villages, such as the one Patient A had travelled from, people believed that congenital abnormalities were a punishment from God for parents' poor behaviour in a past life, leading to many parents exercising constraint on their child's social interaction. A study conducted in rural India by a charitable organisation confirmed this stating 84% of people ascribed their child's cleft to "God's will." This study also stated that marriage prospects were a major concern for parents from this socioeconomic background¹⁶. Overall, Patient A's mother was very pleased with the level of care her daughter had received at the hospital. This afforded me the opportunity to reflect on the challenges

confronting the NHS in the face of a general population with a greater degree of scientific literacy on average, or with greater access to information on various forms of available care.

In this scenario, patient A's mother's primary concern was the aesthetic outcome of her daughter's surgery, and the psychosocial impact this would have in later life. Whilst a natural concern, I believe the significance of functional recovery could have been better highlighted to her. Patients can only reach decisions in their best interests when they are fully informed. I do not think that the present challenges faced by the Indian healthcare system would negate the need for this to be a top priority; nor would the conscientious doctors themselves want it to be. Furthermore, this drive for complete patient education is unlikely to come from patients themselves, due to the doctor-centred nature of the predominantly privately-funded healthcare in India: I often found that the respect patients and their families hold for doctors reduces their likelihood to contest their advice.

Case 2: Patient B was a 4-year-old male, born with a unilateral cleft palate. He was brought in by his parents for a hearing assessment prior to him starting school. His mother had noticed that he was slow to respond to her instructions which she initially attributed to behavioural issues but had begun to wonder whether it was related to his cleft palate surgery. His father was a doctor at a nearby hospital so understood the importance of making sure his son attended all of his assessments. His parents had received feeding advice prior to his birth and had even purchased a specific bottle designed for infants with cleft palates. Patient B's palate repair took place when he was 8 months old, after which he received SALT, an ENT assessment, paediatric dental assessment and more recently he was offered a counselling session to help him cope with any stigma he would face at school. His parents were very impressed with the care he had received but later revealed that they did have a relative who was well known to staff. The doctor then went on to examine Patient B's hearing. On clinical examination, he did show some signs of conductive hearing loss for which he was referred to ENT for further assessment. In this case, his parents greatest concern was him not being able to concentrate at school and his education being affected as a result.

I believe this consultation is a very good example of the high-quality holistic care provided at AIMS to many patients. Patient B was provided all the recommended assessments and advice at the correct times in accordance with UK NICE guidelines. Another key issue, that is evident when comparing this case to Case 1, is the financial strain



Figure 2: Specialties involved in Multidisciplinary Care¹⁸

families are under in private healthcare systems, as suggested by a study conducted in another South Indian state: Andhra Pradesh¹⁷. When considering the cumulative expense of these assessments and consultations alongside travel costs, parents may not be able to afford treatments beyond primary surgery. I was both surprised and impressed that the patient's mother was aware of the feeding bottle and asked the consultant whether that was something that is routinely advised or provided to patients. He explained that he routinely advises patients to cut an X in the teat of their bottle to enlarge the hole, allowing milk to flow more easily. However, his first meeting with a patient is often a few weeks before their surgery so parents who have used a 'spoon feeding' technique may not feel the need to change their feeding method. He highlighted that the lack of well-structured evidence-based guidelines, such as those produced by NICE, affected key aspects of care delivery; such as feeding aid education being omitted, either by human error or due to the assumption that rurally-located patients would be deterred by the extra costs. A 2016 study conducted in New Delhi by the Indian Council of Medical Research highlighted a lack of interdisciplinary approach in the majority of Cleft care centres¹⁸. I suggest this may be the reason behind the occasional variation in quality of treatment that I witnessed among patients in my daily interactions at AIMS.

Case 3: In my last week of placement, I informally interviewed a surgeon from the Plastics team to understand their awareness of the care they provide. He summarised what he believed to be optimum care for CL+P patients and mentioned that the department based their approach on NICE and American guidelines. This included surgeries, ENT and SALT assessments, Orthodontic and dental care, genetic assessment and psychosocial support. He felt that in his experience, each of these elements of care are delivered to a high standard and the majority of patients are very pleased with their outcomes. He highlighted that AIMS is the only unit in Kerala that provides comprehensive care for CL+P and therefore there is additional strain on doctors. He believed that this is the main reason quality of care can occasionally fall to sub-optimal levels. When asked about the interaction between different specialists he explained that, in his experience, the effectiveness of the multidisciplinary approach was perhaps understated amongst his colleagues, and moving towards considering it essential to patient care, would be beneficial. As each day is incredibly busy, small but critical steps that can improve continuity of care for patients can get missed. However, having worked in a number of hospitals in India, he felt the Cleft care provided at AIMS is the most comprehensive and patient-centred. The department is very aware that many families are concerned about the psychosocial impact of their child's condition and therefore

ensure all patients are operated on in a timely manner to meet targets, improving functional and aesthetic outcomes. Additionally, at AIMS, every child is assessed for Nasoalveolar moulding devices to assess whether these would be of benefit. Overall, he felt that the healthcare professionals at AIMS are very capable of running a highly-efficient, patient centred service. However, they may benefit from more structure, perhaps by developing their own regional/national guidelines, and an increased effort to improve interdisciplinary communication.

It was reassuring to hear that he was familiar with the NICE guidelines and that the majority of his management plan and aims were in line with this. I was pleased to learn that the majority of patients felt satisfied with their treatment, though I felt that a more quantitative data collection on this could validate, and also provide a baseline for, auditing exactly which treatments are offered to patients and which aspects of care need more promotion. It was interesting to note that the department's response to learning that psychosocial impact was their patients' greatest concern, was to adopt a preventative approach by ensuring surgeries were done on time. I also believe it is important to supplement this with a counselling service. A useful addition to this could be to offer an outreach programme to enable families living in rural locations the opportunity to access and benefit from this service.

Discussion

Undertaking this analysis and evaluation of the CL+P care delivered at AIMS has enabled me to witness the impactful work carried out by their healthcare professionals and begin to appreciate some of the challenges that arise when delivering a complex multifaceted management plan. This reflective process revealed that without national/regional guidelines, it is easy for healthcare professionals to miss important steps in the management plan. Additionally, financial and logistical pressures have fostered a system which stands to benefit from a greater focus on patient education and interdisciplinary communication, as well as a more significant role for the patient in deciding treatment options. Limited research exists highlighting to what extent CL+P management plans are adhered to, indicating a need for more quantitative research. Patient education and involvement could be introduced at the diagnosis stage to allow for an open conversation with parents, to help raise awareness of the condition and formulate a management plan for the first 20 years of their child's life. Though the principles behind effective Cleft management are universally applicable, the identified areas for improvement are specific to this hospital. Another limitation of my project is that I

was unable to assess the quality of each component of the management plan to investigate the standard of care in this regard, again suggesting a need for further research.

I also understood the potential impact that local culture, socioeconomic factors and the financial infrastructure underpinning healthcare systems can have on delivery of high-quality care. Moreover, consistent systems that support clinical governance can make current standards of care obvious to those providing and receiving it so that actions can be taken to continuously improve it. Interestingly, I also observed very high levels of clinical leadership, motivation, commitment and morale amongst staff both at personal and team levels with less of a focus on targets and completion of documentation. The system operated at high levels of efficiency and utilisation, with minimal waste of resources and non-value-adding steps; something I noticed the more developed healthcare system in the UK is continually striving to achieve.

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Education in Communicating Methods - An Effective Tool for Improving Interpersonal Relationships Between Health Care Professionals and Patients

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Abstract

Curriculum established for any professional program plays an important role in enhancing the academic knowledge related to etching a 'career path' for a person, and a Medical professional is no exception. Like in other fields, a professional in the medical field, in this era of technological explosion, can take accurate decisions with the help of advanced gadgets and knowledge related to suitable softwares. However, these technological innovations cannot replace the human interactions which, probably is the essence of the healthcare service sector. Aristototle observes that the communication process is supported with three elements called ethos, logos and pathos. When we take a close look at the communication process, the application of ethos, logos and pathos is predominantly seen in all communication that occurs between the source and receiver, and is predominantly observed and essentially practiced between a doctor and patient. Pathos plays an important role in relieving a patient of the pain along with medical treatment and prescription, which can be classified under logos and ethos. Interestingly, interpersonal communication skills, an important life skill for a medical professional, are only included in recent years as part of their curriculum, which is not complete. Arrival of technology has minimized human interactions further. But, the gradual increase in reports about the physical attacks on medical professionals by the relatives of patients makes one ponder about the lack of communication skills of the medical professionals. Indeed it is true that communication was never considered as part of medical curriculum and medical professionals were accorded the status of God by the patients. In this era of technology, it is important to remember that, like the doctor, the patient of today is also well aware of the services before hand. Since this is not just a technological but also competitive world, knowledge of the patient and method of treating him/her cannot be sidelined. To ease out the situation, learning human communication skills before beginning to practice, appears essential. This paper tries to identify the area where communication becomes an essential tool in a hospital situation from the time of arrival to the exit of a patient and how education can iron out issues which otherwise are considered complicated. At the juncture where communication is being seriously considered for inclusion as part of the curriculum in India, this paper earns significance. The paper follows an analysis of secondary source of information.

Key Words

Medical Education; Communication; Interpersonal Communication; Professional Skills; Ethos Logos and Pathos

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Introduction

Role of Communication in Health Sector

Communication is as much a part of today's world as the air we breathe. Communication, particularly in the area of health, can be at its best when there is effective exchange of information between the source: the physicians and the receiver – the patient. This process of communication, where there is exchange of maximum information, can result in bringing change in the health behavior of a

country. This is because "When people communicate, they make predictions about the effects or outcomes of their communication behaviour; that is, the sender will predict about the person from whom he/she is receiving the message and respond suitably"⁹. Communication is one of the most concentrated factors in relation to patient contentment and assessment of quality of care. Communication, the process of sharing useful information between two parties in a compassionate way, is one of the important

precedents to patients' participation, contentment, entanglement and understanding the health care procedure¹⁵.

Applying this thought to the process of communication between patient and health care provider, where the sender ushers in behavioral change among patients by giving suitable information using interpersonal communication skills, can be attributed as an essential tool of health communication. The outcome of communication between patient and healthcare provider can be attributed to the concept of responding to stimuli that was observed by Bandura in his Social Cognitive Theory. "People learn through observing others behavior, attitudes and outcomes of those behaviours"¹. In a hospital situation, the patients or their relatives watch clinicians and other staff of the hospital closely they understand the behavioral pattern and get mentally ready to reflect and reacts accordingly. This behavioral pattern found among living beings will lead to aggressive situations in hospitals if the patient or his relative feel the hospital administration is not treating them suitably. With the increasing unrest among people regarding hospitals and particularly against doctors who were largely accorded the status of God, it is important to examine if training the health providers in their communication skills will reduce or minimize the conflict situations. Even though it is a matter of routine for health care providers to see patients in pain, but it is important for the source-clinician to understand the pathos i.e need of empathy while treating the receiver – patient. This is because the patient, who is already a victim of cognitive dissonance due to the pain, cannot understand the occupational hazards of a health care professional.

The violent reaction of a patient or relative towards health care professionals also could be due to the comparison made while treating the patients based on their economical stature, competition between hospitals and opinion framed about the hospital based on the reviews. Unless it is a case of an emergency people these days gather information regarding their health and have already developed a preconceived notion about the method of treatment. More than all of this the patient is in a traumatic state of mind primarily due to the pain and are therefore psychologically weak¹⁹.

Since training received aftermath the intervention of Human Communication skills as part of curriculum will enable not only pacify the patient from the entry level to exit level. The interpersonal communication will enable them to understand the importance of maximizing interaction with the patient, thus enabling result oriented treatment. Communication skills being an essential tool that

can play an important role in not only building relationship but also in maintain the holistic atmosphere of the hospital, if included as part of academic skills, will achieve self-directed change.

Internal Communication in Hospitals

Hospital communication is not communicating with the patient; it also includes the communication between staff members. Internal communication plays a big role in any organisation and especially in hospitals³. The researchers in their study on Socially Responsible Internal Communication? Analysing the Combined Effect of CSR and Internal Communication on Employees' Affective Bond to Organization quote Henriette Boneu (1990) who observes that the exchange of information and communication produces organizations and assures the winning of an institution. For the smooth operation of an institution, especially for organizations in which the customer is offered service irrespective of his financial status, "internal communication becomes a key activity and overpowers the barriers of interpersonal communication"⁸. As identified by the researchers, internal communication is a primary measure, particularly in hospitals as an effective internal communication system can provide an established "linkage between the actions and communications of an institution".

The importance of internal communication in a hospital has been justified for several reasons. As observed by researchers, it promotes the implementation of organization benefitting communication tactics²², it lays down two-way and crossways communication, it supports patient care (which is the base service hospitals such as this), it has a positive effect on the organization and it also helps the institution to adjust to changes. The main objective of internal communications are to scrutinize, synchronize, mentor, notify, sort and tutor^{17,16}. The intention of internal communication suggests that the purpose of communication is directed to attain four main objectives: create and supervise the internal image of an institution, encourage judicious campaigns promoted by the company; give assistance for general data; examine the results of communication actions. Like any other organization, hospital administration also needs to provide many suggestions to employees, managers, patients and the entire hospital organisation as identified by¹⁷. In this competitive era, we cannot forget employees: they are crucial for any institution on whose knowledge of the brand and institution decides the performance of the institution⁷.

Talking about the intervention of technology in communication, R Sethuraman, observes that in recent times IVR communication has become more

beneficial and requires less human labour than all other reminder techniques. Hospital communication is usually unilateral and hence IVR has proved to be useful. It has been noticed that while using automated systems like cloud telephony, the systems fail to have proper pattern recognition algorithms and solutions that had been constructed to work in diverse situations. Based on the patient details, the calls made by the system are personalised. The patient-hospital communication has been altered and amplified by the proposed system because it consists of an account of patient-information and the communication technique that is easily adapted to human beings coupled with discovery that take into account all the possible scenarios that could happen at the user end. Innate language can be used to make these IVR calls to ignorant patients in order to communicate with them. The unfamiliar thing about the system is that it helps hospitals with screening, examining and giving precautionary solutions and also helping in the treatment process as observed by²³.

Need for Interpersonal Communication Skills

Communication has an essential role in any action that aims at improving health and the first important concept about communication lies in its process¹⁷. Communication in hospitals that begins at the time of entry into the hospital ends only at the time of exit. At times, the process continues if the patient is advised for a regular follow up. Though Artificial Intelligence has replaced direct human interventions at many stages of treatment, the patient will not be satisfied unless he/she gets a message from the health professionals directly. "In today's world though most of the hospitals use various software for the easy movement of files and provide best infrastructural facilities to the patients, it is finally the humane touch that brings comfort to the patients, particularly in situation where one-on-one communication has been replaced by technology driven communication"²⁴. Understanding the cognitive disturbance of the patient and his/her attender who is in tremendous pain, interpersonal communication, should be at its best. Since the purpose of communication is to bring in the change, the effectiveness of the process comes to fruition when the audience accept the message sent by the source and change their behaviour pattern in accordance with the constructed message¹.

Interpersonal communication by its nature encourages maximum interaction between two people. Optimum utilization of ethos, pathos and logos for effective communication as identified by Aristotle can be observed at an interpersonal level of communication. In the communication held between a patient and health professional, a health

professional, without crossing his boundaries of professional ethics-ethos and principles of practice logos, has abundant scope to conduct the entire communication with empathy-pathos, the feeling which will result in reducing the patient's psychological burden. Maximizing communication plays its best not only while handling the person who is in pain but also his/her relatives who have accompanied the patient to the hospital¹⁷.

Interpersonal communication skills play a vital role in all critical situations that arise in hospitals, particularly in case of eventualities or, if the case is not handled appropriately by the members of the hospital, the situation may turn unpleasant and sometimes violent. According to health context, a doctor's style of communicating with the patients and other employees effects not only patients' entanglement in health care but also knowledge and contentment with concern and faithfulness⁸. This is because communication between health providers and patients has three purposes: exchanging news, closing at decisions in relation to treatment and building definite mutual relationships¹⁷. If the communication in any one of these area creates a gap then it can be considered as a crucial reason. Lack of interpersonal communication can also lead to lack of exchange of information and may lead to wrong diagnoses and continued negligence towards gathering information, which could lead to death of the patient. How we talk and what we discuss mutually influences each other and both are effected by what is communicated²⁴. "It includes vital content of the health system's essential data 'pathology', but often seems to go missing in our thought process"⁷. Good communication skills have a vital role in improving the doctor-patient relationship and leads to improved patient compliance, satisfaction with care and benefits to the physical and mental health of patients^{10,11}. Better communication skills of healthcare providers has been linked with more effective healthcare delivery, patient and provider satisfaction and fewer numbers of lawsuits¹².

It is important to note here that The 7 Cs of communication need to be followed even in hospitals. The researchers explain the consequence of communication skills of the hospital staff on the revisit motto of patient by organizing a survey of Indian and International audiences. A questionnaire-based survey was conducted of fifteen respondents considering 7 Cs of communication. A 7 Cs based question bank formed the ground of the changes, which supported the survey organized. Further, logistic relapsing analysis helped to check whether the communication made by the support staff played an important role in the decision of revisiting the hospital by the patients²⁰.

Medical Professionals as a Source of Information

Despite Indian doctors having performed many challenging medical experiments including complicated brain and heart transplantations, the Indian Health Index continues to remain at 149 among 179 countries on Board. The governments both at the state and center have initiated several health schemes to promote health, but a majority of the population continues to remain ignorant. This is largely because the doctors who are considered as the primary source of information for patients do not take the messages effectively to their patients¹⁷ is the next reason why medical professionals should be taught about the essence of human communication. It is important to note that one who has the power of communication can bring about a vast difference between failure and success in all regions of living¹⁷. Proper communication between the employees of the hospitals and the patients is not only important but also valuable as it plays a critical role in providing safe healthcare to the needy observes⁷, probably holds good as it is they who can take health schemes proposed by the government to the needy. Though information regarding health can be accessed through various sources, patients consider a doctor as their primary and trustworthy source of information. Anganwadi workers and ASHA workers are considered only later¹⁷. A medical professional should be a good communicator as they are going to play an important role in treatment and the follow ups. The study of Sethuraman et. al looking into Multi-Channel Communication Systems for Healthcare Domain observed that information and clinical help is an ongoing process for the patients, can be solved using technology, where communication can be sent using IVR machines²³. However, although taking appointments can be done using technology, follow up has to be manual, as cure of any ailment seeks human touch. The treatment for this illness not only seeks medical but also human intervention in 'pain management'.

The patient's entry level is at the Reception. The communication process should strike the right strings starting from here. A hospital has to be courteous to the visiting patient or his relatives. "Reception should advise the patients to visit concerned clinics and diagnostics centres in the hospital suitably and as quickly as possible without making them wait unnecessarily⁶. The staff in the hospital organisation should have the correct code of conduct in attending the patients, failing which may act as a hindrance to admit the patient. The study observes nursing and paramedical staff should have the patience to listen to the patients' problems empathetically and try to resolve them to gain their confidence¹⁰. However it is relevant and imperative

in a hospital to develop and practice effective communication as it leads to effective patient relationship, which ultimately results in a satisfied patient.

Communication that takes place in between the health care workers leads to a major flow of information in the health industry and the rising documentation portrays that deficiencies in such communication gives birth to clinical despair and fatality¹⁴. Observations demonstrate that the colleagues fulfilled half of the hospital information, rather than by documented sources. Another study talks about the effects of internal and external satisfaction of the customer. Whereas no studies clarified the basis for the communication done individually or the total result of those choices on medical teams or on the organizations widely. "An exceptional study said, 22 researchers who observed that the communication behaviours of individuals in hospital teams are often individually inefficient or unsuccessful and, when taken as a whole, result in an interrupt-driven environment in the organization⁹.

Worldwide studies have been undertaken to understand the effectiveness of communication in hospital departments. In a study conducted¹² among the patients of admitted in the emergency wing in an Australian hospital on the communication pattern between doctors and patients, it found that "the communication that takes place fails in an extremely stressful and in critical situations of the health care that require emergency checks." For clinician-patient communication, emergency departments are greatly becoming a challenging healthcare topic. The unpredictability of patients' appearance and the unfamiliarity between the patients and clinicians is a determining and worldwide characteristic of emergency department care. Patients will appear as strangers to emergency departments since there would not be any pre-existing medical records readily available nor would there be any pre-existing relationship with the clinician who would be treating them⁴. Thus, more than any other section in the healthcare system, emergency medicine is totally dependent on eloquent spoken communication between patients and clinicians as the patients vocalize their symptoms and concerns and the doctor decides to carry out a complete physical examination and detection and deals with the treatment. Demand for emergency department services is increasing around the world, which often results in overcrowding and the inability of a hospital to admit new patients due to lack of available beds. These pressures have placed severe time constraints on clinician-patient interactions, as observed by the authors of Communicating Health in Emergency Departments⁷.

Coronial Inquest in her work quotes Smith (2007) & Garling (2008) who in their case study observe that communication error and breakdowns along with other factors, resulted in the death of a 16 year old school-girl named Vanessa Anderson. Vanessa had been struck on the side of her head with a golf ball and had arrived at the emergency department by an ambulance. She died weeks later in the hospital after suffering from a respiratory arrest². Vanessa's death could have been avoided had there not been communication failures between clinicians and between clinicians and Vanessa's family, clinical errors, poorly written records and understaffing, as revealed in the Coronial Inquiry. The case study details how a commission was established which arrived in its report that the clinicians had failed to introduce themselves to patients or their carer's and did not involve patients in discussions of their care. Supporting the cases of failure of communication Diana Slade et.al in their book *Communicating in Hospital Emergency Department* provides carrier stories of experiences of unsatisfactory care that arised from poor communication between clinicians, patients and their families. There are many such instances across the world, and interestingly only few have come to the limelight. All such instances make it evident that communication skills should be part of the academic curriculum. The least expected could be to provide training in human communication skills to every employee on a regular basis⁴.

Communication as Part of the Curriculum in Medical Schools

Several researchers, teachers, medical curriculum planners have always shown concern in the medical student attitude towards the building of the doctor-patient communication that takes place during a treatment or consultation. The attitude has three main components: affective (the way we feel), cognitive (the way we think) and behavioral (the way we act) towards a particular entity²¹. The Indian Medical Council, going by the increasing violence against doctors and health care providers, state it is now essential that Indian medical education include communication skills as part of their curriculum. "The curriculum has a course called Attitude, Ethics, and Communication (AETCOM) which will run across years. Students will be assessed for how they communicate with patients, how they counsel people for organ donations or other challenging procedures; how sensitively do they often care and obtain consent. All these things will count along with competencies and skills" observes Dr. V K Paul, Chairman of the Board of Governors. This recent change in the Indian Medical Education is a welcome as other countries where medical education is popular have already incorporated it.

Due to the speeding technological revolutions in all fields including the medical field, the doctor patient relationship building is falling apart and with time can lose its existence. Looking to it from an Indian perspective where the doctors, particularly in hospitals which are run by the public trust and government, are experiencing the pressure and demand of overflowing patients and utilization of the new technologies, will reduce the burden of communication from professional's perspective. However, that positive physician-patient relationship is a critical part of the healing process¹⁹; a physician has the perfect opportunity to develop a positive relationship with the patient during the initial clinical encounter, and the quality of this relationship influences the flow of further dialogue that leads to a harmony of understanding, which is so necessary for successful medical therapeutics²⁰. Although concerns are often raised that practice conditions may not allow clinicians the time to give attention to these issues, clear evidence indicates that time given to attend to patients' feelings, ideas and values actually saves time^{5,18}. Going by rules of interpersonal communication, which provides maximum scope for feelings by virtue of not only words but also eye contact and touch, can play an important role in good business practice and leads to greater patient satisfaction. It also helps in improved clinical outcomes and increased patient compliance^{13,22}. Patient-perceived physician empathy is shown to significantly influence patient satisfaction and compliance via the mediating factors of information exchange, perceived expertise, interpersonal trust and partnership²³. Studies that demonstrate poor patient adherence make it clear that patients frequently disagree with physicians' diagnosis and treatment plans; this leads to unfilled prescriptions, partially used medications, lack of follow-up with referrals and return visits and poor outcomes²⁴. The physician who can communicate in a direct and compassionate manner will not only help the patient to cope but also strengthen the therapeutic relationship. This kind of a relationship is likely to endure and further extend the healing process^{4,24}. It is important to note that knowledge of communication skills is also important while communicating bad news. That is probably the reason why effective communication with patients has been stressed by different accreditation agencies as an important outcome of undergraduate medical education. Since learning of communication skills involves various aspects of the social sciences including the knowledge of development of attitude, it may assist medical students while handling resistance from patients^{13,14}.

Among the countries that include communication skills as part of the medical curriculum, the

Caribbean Medical Schools model can be considered for study purposes. The primary reason being Caribbean hospitals, have great Indian connection and host quite a lot of Indian students who have enrolled in their program and the other reason is “the competition for admission to medical schools in the United States is extremely strong, many applicants consider attending medical school in the Caribbean. In fact, many bright and talented applicants are now opting to obtain their medical education in the Caribbean⁷. A close look at the curriculum followed in three islands of the Caribbean that includes Guyana, Suriname, Trinidad & Tobago will highlight on the need for including communication skills in the curriculum. XUSOM is an offshore Caribbean medical school and follows an integrated organ system-based curriculum. Early clinical exposure (ECE) has been introduced to the students^{15,16} during the third semester when they are posted to a tertiary care hospital for a total of 16 hours. Medical students' pre-clinical primary health care centre visits not only influence their attitudes towards primary health care work in the early semesters, but is also believed to help medical students to develop appropriate attitudes towards their profession and improve their communication skills. The regional studies in the Caribbean about their curriculum in medical sciences also show that clinic staff-client communication plays a major role in patient satisfaction and quality of life²⁴.

Conclusion

Communication is one of the most concentrated factors in relation to patient contentment and assessment of quality of care. Communication, the process of sharing of useful information between two parties in a compassionate way, is one of the important precedents to patients' participation, contentment, entanglement and understanding in the health care procedure. According to the health context, doctor's style of communicating with the patients and other employees effects not only patients' entanglement in health care but also knowledge and contentment with concern and faithfulness⁹. The communication between health maintenance providers and patients has three purposes: exchanging news, closing at decisions in relation with treatment and building definite mutual relationships. The communication gap is considered to be one of the crucial reasons of information gap in health systems.” “It includes vital content of the health system's essential data ‘pathology’, but is often missing in our thought process. It also tends to be the maximum of the information in the clinics that is acquired and presented”. Doctors are the primary responsibility holders for delivering a remedy and healing, assuring that the rest of the infrastructure of the concerned organisation is intact and playing their individual roles, their

individual roles as the hospital support staff. The support staff consists of a team receptionist, manager, medical superintendent, laboratory assistants, attendants, chemists, housekeeping staff, cleaners and other service vendors. The author considers that, “the concerned staffs are liable to play their particular roles assigned to them during patient interaction, for they are known to be the staff that supports directly in the hospitals”. The non-scientific staff are also hoping to communicate with patients until they have been discharged or exist in the hospital. The entire method of communication is important and to be followed here like any other communication scenarios.

Many a times, the word communication provokes people to think about exchanging ideas and information by the medium of words but such kind of verbal communication, is merely a small part of communication proceedings observes. Sound medical care depends on productive communication between the patient and the healthcare providers. Improper diagnosis and delayed or wrong medical treatments are the obvious results of ineffective communication. Inefficiencies such as, hearing problems and, limited proficiency of the language used by the health care providers may require other services to help communicate effectively. Improving effective communication is now an essential step by many of the hospitals. However, hospitals are increasingly facing challenges to accommodate the communication necessities of a rising different community. In order to support the hospitals with these challenges; OCR is preparing knowledge, assets, and mechanisms available to healthcare organizations to help people with minimal knowledge over the English language and with people who are hard of hearing or have speech impairments.

The Study Recommendation

This study recommends to implement the professionalism and communication ethics during the study.

The comparison between the medical study culture between Indian and the Caribbean countries pull across a huge scope of learning and improvements for Indian medical education.

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Awareness and Use of Antibiotics Among Jordanian Mothers for Treating Upper Respiratory Tract Infections

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Abstract

Aim: We sought to evaluate the awareness and use of antibiotics among Jordanian mothers for treating upper-respiratory-tract infections.

Methods: A cross-sectional design was used for this research, involving a questionnaire sent to 300 Jordanian mothers by the Internet who were selected from a Facebook group. Two hundred and seventy responded; their ages were between 23 and 47 years old. The questionnaire measured respondents' awareness and use of antibiotics in treating upper-respiratory-tract infections in their children.

Results: A large number of participant mothers did ask physicians to prescribe antibiotics for their children. Most mothers also used antibiotics even without prescription and without differentiating between viral and bacterial infections, despite antibiotics only being useful in the latter. A significant number of mothers thought that antibiotics improved their children's symptoms.

Conclusion: Jordanian mothers cannot differentiate between bacterial and viral infections and did not use antibiotics properly. National campaigns are needed to support a positive public attitude toward the usage of antibiotics.

Key Words

Knowledge; Antibiotics; Mother; Children

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Introduction

Upper-respiratory-tract infections (URTIs) are more commonly known as the "common cold." The common cold may be caused by several virus families, including mostly by rhinoviruses, and usually is self-limiting. URTIs are one of the most common causes of morbidity in children requiring visits to the physician. Since URTIs are caused by viruses, there is no evidence that antibiotics (AB) would be useful in such infections^{1,2}. The use of AB is only required when secondary bacterial infection is suspected. However, the improper use of AB in treating the common cold is widely implemented worldwide.

The wide inappropriate use of AB can be attributed to either improper prescription for viral infections or self-medication by parents due to the availability of purchasing AB without a prescription in most Arab countries and specifically Jordan³⁻⁸. This in turn has contributed to the wide spread of AB resistance along with clinical and economic consequences⁹. There are several studies that support the direct association between the overuse or the improper use of antibiotics and the occurrence of AB resistance^{10,11}.

Some studies have reported that the overuse of AB is associated with parents' beliefs. These studies suggest that most physicians prescribe AB for children with URTIs just to meet their parents' expectations. On the other hand, other research postulates that physicians don't respond to parents' pressure for prescribing AB but rather their decisions are based on their own beliefs^{2,12,13}.

Epidemiology

Jordan, more specifically known as the Kingdom of Jordan, is an Arab country populated by around 10 million citizens. Jordan is located in the western part of Asia.¹⁴ Of every 100 Jordanians, there are at least 82 Jordanians with medical insurance and 11 with double insurance. Insured Jordanians have access to high-quality primary health care¹⁵.

As mentioned before, antibiotics are readily available in community pharmacies within Jordan and anyone can purchase them without prescription at low prices. These factors have contributed thus to the overuse of antibiotics and, hence, increased bacterial resistance. Our study sought to evaluate the awareness and use of antibiotics among Jordanian mothers in URTIs.

Methodology

Three hundred Jordanian mothers were randomly selected from a Facebook group for mothers and contacted through direct messages and consent signed from 1/03/2019 to 17/10/2019. Of these, 270 mothers responded to our message and agreed to participate in our cross-sectional study. A

questionnaire was sent to the respondent mothers to fill out online. The questionnaire consisted of two parts: the first part collected general information about the participant, while the second one assessed the level of awareness regarding antibiotics use in URTIs. The questionnaires are available in Tables 1 and 2.

Table 1: Questionnaire about the awareness regarding the use of antibiotics in URTIs

When you visit your doctor to treat a URTI in your children, do you ask them to prescribe antibiotics no matter the cause?	Yes
	No
Do you use antibiotics in your children without a doctor's prescription?	Yes
	No
In your opinion, do antibiotics improve symptoms of URTIs?	Yes
	No
Can you differentiate between viral and bacterial URTIs?	Yes
	No
Do you agree that antibiotics overuse leads to decreased effectiveness in the future?	Yes
	No

Table 2: Participants' answers to the general characteristics questionnaire

		Number	%
Age (years)	< 20	0	0
	20–29	149	55.1
	30–40	96	35.6
	> 40	25	9.3
Mother's education	Less than high school	19	7
	More than high school	251	93
Father's education	Less than high school	2	0.7
	More than high school	268	99.3
Mother's occupation	Medical field	45	16.7
	Non-medical field	188	69.6
	Housewife	37	13.7
Number of children	1	14	5.2
	2–3	129	47.8
	4 or more	127	47
Health insurance	Insured	195	72.2
	Not insured	75	27.8
Monthly family income	< 500	94	34.8
	500 or more	176	65.2

Table 3: Participants' answers regarding awareness about the use of antibiotics in URTIs

		Number	%
When you visit your doctor to treat a URTI in your children, do you ask them to prescribe antibiotics no matter the cause?	Yes	116	43
	No	154	57
Do you use antibiotics in your children without a doctor's prescription?	Yes	69	25.6
	No	201	74.4
In your opinion, do antibiotics improve symptoms of URTIs?	Yes	111	41.1
	No	159	58.9
Can you differentiate between viral and bacterial URTIs?	Yes	59	21.9
	No	211	78.1
Do you agree that antibiotics overuse leads to decreased effectiveness in the future?	Yes	233	86.3
	No	37	13.7

Result

A total of 270 mothers participated in our survey, all of whom were aged above 20 years old. More than 90% of the participating mothers were highly educated. Most of the participants were working mothers but only a small percentage of them worked in the medical field. More than half of the participants were insured and had a family income of 500 or more Jordanian dinars. The full characteristics of the participants are shown in Table 3.

By reviewing the participants' answers, it was found that a little less than half of Jordanian mothers (43%) have asked their children's doctor to prescribe antibiotics each time they had cold symptoms. Also, a good percentage of them (> 25%) have used antibiotics even without getting back to the physician. One hundred and eleven mothers thought that antibiotics actually improved their child's symptoms, while the rest did not think so. In total, 78% of the mothers who responded found it difficult to differentiate between viral and bacterial infections. Surprisingly, 233 mothers noticed that antibiotics didn't retain their effectiveness in treating their child's infections after being used several times. The full list of participant mothers' answers is shown in Table 4.

Conclusion

Jordanian mothers are not adequately aware of the differences between viral and bacterial infections. Most of them believe that antibiotic use is necessary for any URTI. This has led to the overuse of antibiotics and the development of bacterial resistance, rendering antibiotics noneffective in treating bacterial infections. This problem is increasing worldwide, making education about

antibiotics essential for health promotion. The performance of national campaigns targeting Jordanian mothers is recommended to boost positive attitudes towards the usage of antibiotics.

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Clinico-Pathologic Discrepancies in Diagnosis of Maternal Mortality at Moi Teaching and Referral Hospital, Eldoret, Kenya

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Abstract

Background: Accurate attribution of causes of maternal mortality is critical in determining the circumstances surrounding maternal death and informs policy changes in standards of care. Clinical Maternal Death Review (CMDR) is a widely accepted method of attribution of cause of maternal death although post-mortem (P.M) examination is regarded as the gold standard. The level of concordance between CMDR and P.M has been shown to vary in different facilities thereby questioning the accuracy of the CMDR process. Objectives: The objective of the study was to determine the concordance between CMDR and P.M attributed causes of maternal mortality as well as the causes of death as attributed by CMDR and PM.

Methods: A descriptive retrospective review of all maternal deaths occurring at MTRH between 1st January 2011 and 31st December 2016 was conducted. Data on demographics, medical and obstetric history, circumstances surrounding death and attributed cause of death was collected from CMDR reports and filled into a data collection form. In patient numbers were then used to match CMDR reports to corresponding P.M reports from which autopsy attributed cause of death was identified. Standardization of diagnoses was done using International Classification of Disease and Health Related Problems 10–Maternal Mortality (ICD10-MM). All data was then entered into STATA for analysis. Categorical data was summarised using frequencies and proportions. Kappa statistic was used to measure concordance.

Results: A total of 200 maternal deaths were reported within the study period. Of these, 162 underwent CMDR with 25 cases having a corresponding PM report and were subjected to concordance testing. Most maternal mortalities 81 (51.9%) occurred in patients aged between 21–30 years, in multi gravid women 44 (49.4%) and at gestations of 22 – 36 weeks 42 (45.2%). The leading causes of death as per CMDR were obstetric haemorrhage 27 (16.7%), non-obstetric complications 24 (14.8%) and hypertensive disorders in pregnancy 23 (14.2%). The cause of death was unknown/undetermined in 45 (27.8%) cases during CMDR. Overall concordance of CMDR to PM was moderate (k statistic: 0.57). Very good level of concordance was seen in the diagnosis of pregnancy with abortive outcomes, obstetric haemorrhage, pregnancy related infections and other obstetric complications. Discordance was seen in the diagnosis of hypertensive disorders in pregnancy, unanticipated complications of management and non-obstetric complications. Unknown/undetermined causes of death during CMDR largely contributed to discordance in diagnoses.

Conclusion: There are difficulties in assigning cause of maternal death during CMDR as demonstrated by the high number of cases reported as having an unknown/undetermined cause. This may lead to underestimation of actual disease burden hence affecting maternal mortality prevention policies.

Recommendations: A systematic approach in conducting CMDR, including the use of formal reporting tools based on the current recommended ICD10-MM should be adopted. Other methods of attribution of underlying causes of death such as Confidential Enquiry into Maternal Death (CEMD) should be explored.

Key Words

Maternal Mortality; Post-Mortem; Confidential Enquiry; ICD MM

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Introduction

The United Nations (UN) made a conscious decision in 2002 to include maternal and child mortality reduction as a target for its Millennium

Development Goals (MDGs) (MDG Report, 2011). Maternal mortality is high in developing countries. Globally, more than 289,000 women die annually due to pregnancy-related complications, with half of

these deaths occurring in Sub-Saharan Africa¹.

Globally, the maternal mortality ratio (MMR) stands at 210 per 100,000 live births. When this is categorised by region, Africa has the highest with MMR of 546 per 100,000 live births, with Southern Asia, Oceania and the Caribbean, each registering 190 maternal deaths per 100,000 live births; Latin America at 68 per 100,000 live births while Commonwealth and Eastern Europe and the Commonwealth of Independent States (CEE/CIS) encounter 25 maternal deaths per 100,000 live births². In a study at Nigeria's Adeoyo Teaching Hospital MMR was found to be 963 per 100,000 live births³.

In Kenya, the national mortality ratio remains high with an MMR of 510 per 100,000 live births in 2015⁴. Furthermore, the MMR vary in various regions or health facilities with Kenyatta National Hospital (KNH) recording 992 per 100,000 live births in 2004⁵. Kilifi district hospital recorded 250 per 100,000 live births between 2008 and 2010⁶. A retrospective study on maternal mortality at Moi Teaching and Referral Hospital for the period January 2004 – March 2011 found that the MMR stood at 426 per 100,000 live births; however, the study found wide variations in MMR during the period as it was lowest in 2010 (290 /100,000) and 580/100,000 in 2004⁷.

The Tenth Revision of the International Classification of Diseases (ICD-10) defines a maternal death as the death of a woman while pregnant or within 42 days of termination of pregnancy, where the adverse event or events is or are not related to accidental or incidental causes⁸.

The ICD - MM recommends that maternal death should be classified into two main groups: direct obstetric deaths which result from obstetric complications of the pregnancy state (pregnancy, labour and puerperium), from interventions, omissions, incorrect treatment or a chain of events resulting from any of these. Indirect obstetric deaths result from previous existing disease or disease that developed during pregnancy and are not as a direct result of obstetric causes but was aggravated by the physiological effects of pregnancy. Most indirect maternal deaths are not reported and often reported as non-maternal and these vary significantly in different countries. During the period of 1992-1993, only half³³ of the over 60 countries reported vital registration figures for causes of maternal death. No indirect causes of death were reported in the period 1997-1999; a confidential

inquiry on causes of maternal death in the United Kingdom found that indirect deaths accounted for more maternal deaths than direct causes⁹.

Analysis of the burden of obstetric mortality and morbidity that address direct causes of death is important. Indirect causes account for 20% - 25% of maternal deaths and are attributable to illnesses aggravated by pregnancy. They include anaemia, malaria, HIV/AIDS or diseases of the heart, lung, liver, or kidneys. Physical violence and accidents are not included in this group.

This study therefore seeks to elucidate the causes of maternal death at Moi Teaching and Referral Hospital. Information on Clinical Maternal Death Review (CMDR) and post-mortem examination attributed causes of death will be collected. Concordance between the attributed causes as per CMDR and post-mortem (PM) diagnosis will be determined.

Determination of the probable cause of maternal death in most African countries is a great challenge. Post-mortem examination, which is the gold standard in the diagnosis of maternal mortality, in our region is hindered by cultural and religious beliefs. The Clinical Maternal Mortality Death Review (CMDR) is therefore relied upon to attribute causes of maternal death. Lack of standardized approaches to CMDR coupled with inadequate clinical records may lead to skewed attribution of the causes of maternal death. Currently, no audit has been conducted to determine the concordance between CMDR and P.M diagnosis at MTRH. It is therefore prudent to bridge this dearth in knowledge so as to enable reliable maternal mortality (MM) reporting.

Materials and Methods

Study Setting

The study was carried out at the reproductive health and pathology departments of Moi Teaching and Referral Hospital (MTRH). MTRH is the second largest public hospital in Kenya and serves as a referral facility with a catchment population of 40 million comprising western Kenya, some parts of Eastern Uganda, South Sudan and Tanzania.

Study Design

This was a descriptive retrospective study. Data on maternal deaths that occurred from 1st January 2011 to 31st December 2016 was collected. Patient records were reviewed for demographic characteristics, medical and obstetrical history and causes of death.

Study Population

The study population were all cases of maternal mortality at MTRH. The target population comprised of expectant mothers of up to 42 days post-partum who died at the Reproductive Health Department, Accidents and Emergency Department and ICU/CCU of Moi Teaching and Referral Hospital.

Sampling Technique

Purposive sampling was used to review records of all cases of maternal mortality

Sample Size

The sample size involved all cases of maternal deaths with clinical and post-mortem diagnosis for the probable cause of death during the period 1st January 2011 to 31st December 2016.

Data Collection

All pregnant women who had died while receiving care at the hospital were identified from the in-patient database and farewell home records. Patients were also identified from maternal mortality review files. This was done so as to ensure most cases of maternal mortality had been

captured. For those who underwent a post-mortem examination, the report was matched to a patient file.

Review of CMDR and P.M Reports

Clinical maternal death reports were reviewed. Data variables collected included socio-demographics (age), Obstetric history (gravidity, parity), pre-existing medical conditions, diagnosis at time of admission, diagnosis at the time of death and attributed clinical cause of death.

Names and dates of all maternal mortalities identified from CMDR were then matched to autopsy reports. For those found, data on autopsy diagnosis was recorded. Both CMDR and PM attributed causes of death were standardized using ICD MM. Results were grouped in different categories based on the primary reported cause of death. When more than one diagnosis was identified, the different diagnoses were classified as: (a) Primary/underlying cause of death; (b) Immediate cause of death; (c) Contributory conditions. The study mainly focused on the primary/underlying cause of death (category a).

Table 1: ICD-MM Maternal Mortality Standardization Tool

Summary of ICD-MM Group Diagnoses		
Groups of underlying causes of death during pregnancy, childbirth and puerperium in mutually exclusive, totally inclusive groups		
Type	Group Name/Number	Examples of Potential Causes of Death
Maternal Death: Direct	1. Pregnancy with abortive outcome	Abortion/miscarriage, ectopic pregnancy and other conditions leading to maternal death and a pregnancy with abortive outcome.
Maternal Death: Direct	2. Hypertensive disorders in pregnancy, childbirth and puerperium	Oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and puerperium
Maternal Death: Direct	3. Obstetric haemorrhage	Obstetric diseases or conditions directly associated with haemorrhage
Maternal Death: Direct	4. Pregnancy-related infections	Pregnancy related, infection-based diseases or conditions
Maternal Death: Direct	5. Other obstetric conditions	All other direct obstetric conditions not included in groups 1-4
Maternal Death: Direct	6. Unanticipated complications of management	Severe adverse events and other unanticipated complications of medical and surgical care during pregnancy, childbirth and puerperium
Maternal Death: Indirect	7. Non-obstetric complications	Non-obstetric complications: <ul style="list-style-type: none"> • Cardiac disease (including pre-existing hypertension, RHD) • Endocrine conditions • Gastrointestinal conditions • Central nervous system conditions • Respiratory conditions • Genitourinary conditions • Autoimmune diseases • Skeletal diseases • Psychiatric conditions • Neoplasms • Infections not directly associated with pregnancy
Maternal Death: Unspecified	8. Unknown/Undetermined	Maternal death occurring during pregnancy, childbirth and puerperium where the underlying cause is unknown or was undetermined.
Death during pregnancy, childbirth and puerperium	9. Coincidental causes	Death during pregnancy, childbirth and puerperium due to external causes

Data Analysis and Presentation

Descriptive statistics were used to explore and summarize the data. Numeric (continuous/discrete) data such as age was summarised using measures of central tendency (mean) and dispersion (standard deviation). Categorical data was summer sided using frequencies and proportions. Summaries were presented in tables. Level of agreement was used to measure concordance.

Ethical Considerations

All patient information was kept confidential. Only the primary investigator has access to identifiable patient information. Forms used to extract data

from patient files were stored in locked cabinets and databases were password protected.

Results

There were 200 maternal deaths that occurred between January 2011 and December 2016, of these, 162 CMDR reports were available for review. There were 56 cases of maternal mortality that underwent post-mortem examination during the time period. However, only 25 cases had both CMDR and PM reports. These were then used to assess the concordance between PM and CMDR attributed cause of death.

Table 2: Demographic Information

Variable	Category	Frequency	Percentage
Age (n=156)	< 20 years	19	12.18
	21 – 30 years	81	51.92
	31 – 40 years	49	31.41
	>40 years	7	4.49
		156	100.0

The majority 81 (51.92%) of women who died were aged between 21-30 years. The age of the mothers ranged from 14 to 49 years with a mean of 28.3 (SD 7.3).

Table 3: Obstetric Characteristics

Variable	Category	Frequency	Percentage
Gravidity (n=89)	Primi gravida (<2)	24	26.97
	Multi gravida (2-4)	44	49.44
	Grand multigravida (5-7)	15	16.85
	Grand grand multigravida (>7)	6	6.74
Gestation age (n=93)	<22 weeks	13	13.98
	22 – 36 weeks	42	45.16
	> 36 weeks	38	40.86
Abortion history (n=135)	Yes	29	21.48
	No	106	78.52

Most maternal mortalities occurred in multigravida women 49.44% (44) and at gestations of 22 – 36 weeks 45.16% (42). The ones with a history of abortion accounted for 21.48% (29).

Table 4: Timing of Death

Variable	Category	Frequency	Percentage
Timing of death (N = 162)	Early pregnancy	19	11.7
	Antenatal 20+ weeks	26	16.0
	Intrapartum	18	11.1
	Postpartum	92	56.8
	Unknown	7	4.3
Referred (N = 162)	No	76	46.9
	Yes	86	53.1
PM request (N = 162)	No	55	33.9
	Yes	97	59.9
	Not indicated	10	6.2

Underlying Causes of Death per CMDR

This section presents the causes of death as summarized from the Clinical Maternal Mortality Review (CMDR) reports. The total number of clinical maternal mortality review reports was 162.

PM Attributed Causes of Maternal Mortality

In order to obtain PM attributed causes of maternal mortality, corresponding PM results for CMDR reports were searched for.

Of the 162 cases that had undergone CMDR, recorded request for PM was identified for 97 of the case files. Of these, only 25 cases had a corresponding PM report.

Demographic Data of Cases That Underwent PM

Most cases that underwent PM examination were those of women between the ages of 21 and 30 years.

Table 5: Timing of Death

Cause	Frequency	Percentage
Direct Maternal Death	85	52.5
Indirect Maternal Death	25	15.4
Unknown/Undetermined Deaths	45	27.8
Not Indicated	7	4.3
Total	162	100.0

Table 6: CMDR Attributed Primary Causes of Maternal Death

Diagnosis	Frequency	Percentage
Group 1 - Pregnancy with Abortive Outcomes	13	8.0
Group 2 - Hypertensive Disorders in Pregnancy, Childbirth and Puerperium	23	14.2
Group 3 – Obstetric Haemorrhage	27	16.7
Group 4 – Pregnancy Related Infections	15	9.3
Group 5 – Other Obstetric Complications	7	4.3
Group 6 – Unanticipated Complications of Management	1	0.6
Group 7 – Non-obstetric complications	24	14.8
Group 8 – Unknown	45	27.8
Not Indicated	7	4.3
Total	162	100.0

Table 7: Age Distribution of Cases That Underwent PM

Variable	Frequency	Percentage
Below 20 Years	2	8.0
21-30 Years	13	52.0
31-40 Years	9	36.0
Above 40 Years	1	4.0
Total	25	100.0

Obstetric Characteristics of Cases that Underwent PM

Most reports of cases that underwent PM were of women who were primi-gravida at the time of death (56.0%) and most were between 22 to 36 weeks pregnant.

Timing of Death of Cases That Underwent PM

The majority (44.0%) of cases that underwent PM were those of women who were at the antenatal phase of pregnancy at time of death.

Table 8: Obstetric Characteristics of Cases That Underwent PM

Variable	Category	Frequency	Percentage
Gravidity (n=89)	Primi gravida (<2)	14	56.0
	Multi gravida (2-4)	6	24.0
	Grand multigravida (5-7)	3	12.0
	Grand grand multigravida (>7)	2	8.0
Total		25	100
Gestation Age (n=93)	<22 weeks	7	28.0
	22 – 36 weeks	12	48.0
	> 36 weeks	6	24.0
Total		25	100

Table 9: Timing of Death of Cases That Underwent PM

Variable	Frequency	Percentage
Early Pregnancy	6	24.0
Antenatal 20+ weeks	11	44.0
Intrapartum	5	20.0
Postpartum	2	8.0
Unknown	1	4.0
Total	25	100.0

Immediate Cause of Death of Cases That Underwent CMDR

The main causes of maternal mortality among the cases that underwent PM were attributed to hypertensive disorders in pregnancy (28.0%), other obstetric complications (24.0%), and pregnancy with abortive outcomes (16.0%) and non-obstetric complications (16.0%).

Comparison Between CMDR and PM-Attributed Underlying Cause of Maternal Death

In comparison to CMDR, PM attributed more underlying causes of maternal mortality to hypertensive disorders in pregnancy (28% V/s 16%), unanticipated complications of management (8% V/s 0) and non-obstetric complications (16% V/s 8%).

CMDR could not attribute an underlying cause of death to 28% of cases in comparison to PM which was able to make a diagnosis in all cases.

Table 10: Immediate Cause of Death of Cases that Underwent CMDR

Group	Frequency	Percentage
Group 1 – Pregnancy with abortive outcomes	4	16.0
Group 2 – Hypertensive disorders in pregnancy, childbirth and puerperium	7	28.0
Group 3 – Obstetric haemorrhage	1	4.0
Group 4 – Pregnancy-related infections	1	4.0
Group 5 – Other obstetric complications	6	24.0
Group 6 – Unanticipated complications of management	2	8.0
Group 7 – Non-obstetric complications	4	16.0
Total	25	100.0

Table 11: Comparison between CMDR and PM Attributed Underlying Cause of Maternal Mortality

ICD-MM Group	Underlying Causes of Maternal Mortality Attributed by:			
	CMDR		PM	
	Frequency	Percentage	Frequency	Percentage
Group 1 – Pregnancy with abortive outcomes	4	16	4	16
Group 2 – Hypertensive disorders in pregnancy, childbirth and puerperium	4	16	7	28
Group 3 – Obstetric hemorrhage	1	4	1	4
Group 4 – Pregnancy-related infections	1	4	1	4
Group 5 – Other obstetric complications	6	24	6	24
Group 6 – Unanticipated complications of management	0	0	2	8
Group 7 – Non-obstetric complications	2	8	4	16
Group 8 – Unknown/ Undetermined	7	28	0	0
Group 9 – Coincidental causes	0	0	0	0
Total	25	100	25	100

Table 12: Comparison between CMDR and PM Primary Groups of Underlying Cause of Maternal Mortality

	CMDR Primary Cause of Maternal Mortality	PM Primary Cause of Maternal Mortality
1	Group 8) Unknown	Group 2) Hypertensive Disorders in Pregnancy, Childbirth and Puerperium
2		Group 2) Hypertensive Disorders in Pregnancy, Childbirth and Puerperium
3		Group 3) Obstetric Haemorrhage – <i>Rupture of the uterus before onset of labour</i>
4		Group 5) Other Obstetric Complications – <i>Obstetric Embolism</i>
5		Group 6) Unanticipated Complications of Management – <i>Complications of Anaesthesia</i>
6		Group 7) Non-Obstetric Complications – <i>Infectious disease (HIV complications)</i>
7		Group 7) Non-Obstetric Complications – <i>Cardiac disease</i>
8	Group 3) Obstetric Haemorrhage – <i>Rupture of the uterus</i>	Group 2) Hypertensive Disorders in Pregnancy, Childbirth and Puerperium
9	Group 5) Other Obstetric Complications – <i>Obstetric embolism</i>	Group 6) Unanticipated Complications of Management – <i>Complications of Anaesthesia</i>

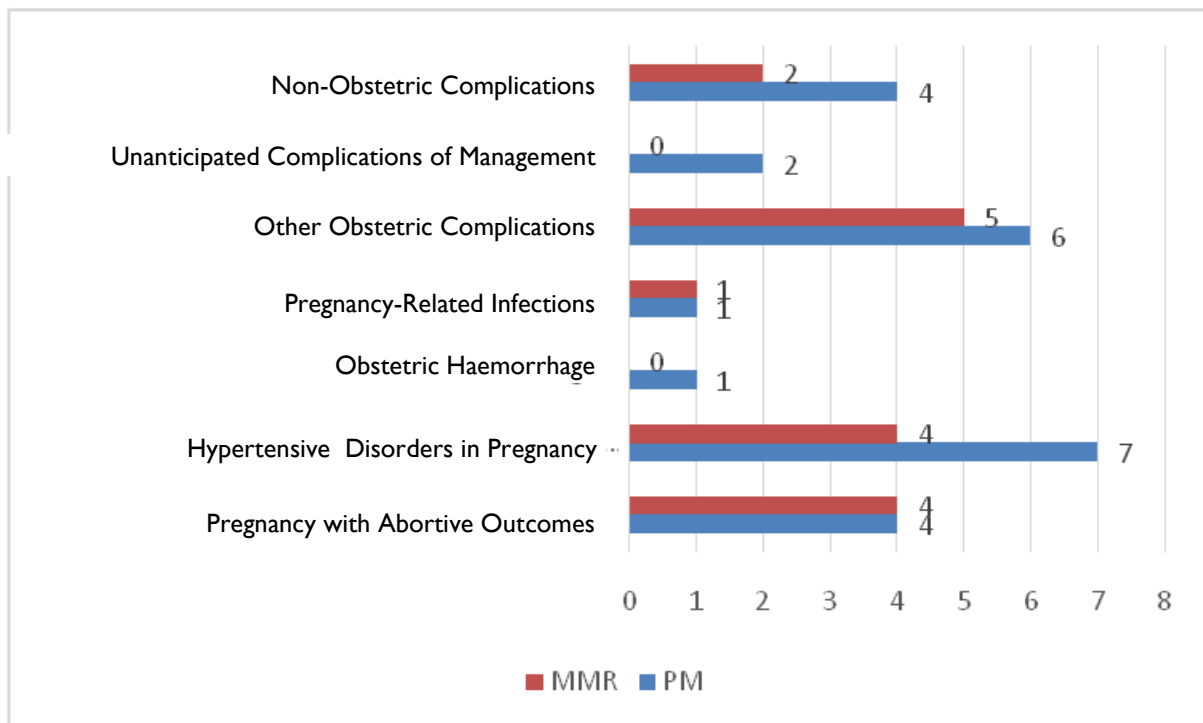


Figure 1: Level of Agreement of CMDR to PM Attributed Causes of Maternal Death

The above figure and table indicates the level of agreement between the clinical and PM diagnosis. Assuming that the PM diagnosis was the gold standard (correct diagnosis) with n=25, the number indicated under MMR indicates the number of cases that had a CMDR diagnosis that was similar to that attributed by PM.

The highest level of agreement was seen in the

diagnosis of pregnancy with abortive outcomes and pregnancy-related infection. Discordance was seen in the diagnosis of hypertensive disorders in pregnancy (4/7 (57.1 %) cases diagnosed correctly), Non-obstetric complications (2/4 (50%) cases diagnosed correctly) and other obstetric complications (5/6 (83.3%) cases diagnosed correctly). Overall, concordance was seen in 16/25 (64%) of all cases.

Table 13: Level of Agreement of CMDR to PM Attributed Causes of Maternal Death

CMDR * Post Mortem Cross Tabulation									
Count									
		Post Mortem							Total
		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	
CMDR	Group 1	4	0	0	0	0	0	0	4
	Group 2	0	4	0	0	0	0	0	4
	Group 3	0	1	0	0	0	0	0	1
	Group 4	0	0	0	1	0	0	0	1
	Group 5	0	0	0	0	5	1	0	6
	Group 7	0	0	0	0	0	0	2	2
	Group 8	0	2	1	0	1	1	2	7
Total		4	7	1	1	6	2	4	25

Table 14: Comparison of PM and CMDR Groups of Primary Causes of Death

Symmetric Measures					
		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Measure of Agreement	Kappa	.579	.101	7.622	.0005
N of Valid Cases		25			
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					

Table 15: Interpretation of Kappa

Interpretation of Kappa						
	Poor	Slight	Fair	Moderate	Substantial	Almost Perfect
Kappa	0.0	.20	.40	.60	.80	1.0
Kappa	Agreement					
<0	Less than chance agreement					
0.01 – 0.02	Slight agreement					
0.21 – 0.40	Fair agreement					
0.41 – 0.60	Moderate agreement					
0.61 – 0.80	Substantial agreement					
0.81 – 0.99	Almost perfect agreement					

The Cohen's kappa (κ) is .579. A kappa (κ) of .579 represents a moderate strength of agreement of CMDR attributed cause of maternal mortality to PM. Furthermore, since $p = .000$ (which actually means $p < .0005$), our kappa (κ) coefficient is statistically significantly different from zero as such the diagnoses are not by chance.

Discussion

Demographic Characteristics

This study has shown that the highest proportion of maternal deaths occurred in women aged 22- 30 years of age, in women who had had 2 to 4 prior pregnancies and were at a gestation age of 22 to 36 weeks. These findings are in line with countrywide statistics that put the incidence of maternal mortality to occur between 20 to 29 years ("Kenya 2014 Demographic and Health Survey," n.d.) as well as studies conducted at MTRH where most women who died were found to be multigravida and were at pregnancy gestations under 37 weeks (Yego et al., 2013).

CMDR-Attributed Causes of Maternal Death

Obstetric haemorrhage, non-obstetric complications and hypertensive disorders in pregnancy were the main causes of death as per CMDR. The underlying cause of most of the obstetric haemorrhage cases were post-partum haemorrhage (PPH) and ruptured uterus. The highest proportion of deaths that occurred as a result of non-obstetric complications were due to cardiac disease in pregnancy and infectious disease. This highlights the growing burden of cardiac disease as a major contributor to maternal morbidity and mortality (Mocumbi, Sliwa, & Soma-Pillay, 2016). Eclampsia was diagnosed in 19 out of the 23 cases of maternal death grouped as occurring due to hypertensive disorders. Eclampsia is a severe complication of pre-eclampsia and has been sighted as a leading cause of hypertensive related maternal death at MTRH (Yego et al., 2013).

PM-Attributed Causes of Maternal Death

The highest proportion of cases that underwent PM examination were of women who were primigravida and were at the antenatal period of pregnancy at the time of death (Jashnani, Rupani, & Wani, n.d.). Given that the women die at what is considered a young age and in their first pregnancy, a lot of questions are raised in the family and a PM may be considered a good solution to gain closure.

The leading cause of death attributed to the cases that underwent PM were hypertensive disorders in pregnancy, childbirth and puerperium in 7 cases (28.8%) and other obstetric complications in 6 cases (24.0%). The main cause of other obstetric complications was obstetric embolism.

Possible reasons as to why these cases underwent post-mortem examination may be due to complications in diagnosis of a cause of death during CMDR necessitating a request for PM for more clarification. In the cases of other obstetric complications where obstetric embolism was the main cause, sudden onset of severe symptoms followed by death in a previously asymptomatic woman raises questions by relatives of which a PM can confirm, refute or elaborate the clinical diagnosis (Lucas, 2008).

Concordance Between CMDR and PM Attributed Causes of Maternal Death

Percentage concordance of CMDR to PM attributed cause of mortality was 64%. The calculated kappa score was at 0.57. Both scores indicate moderate agreement of CMDR diagnosis to PM. The highest concordance was in the attribution of pregnancy

with abortive outcomes. This may be explained by the fact that any woman within the reproductive age presenting with per-vaginal bleeding receives a pregnancy test and a pelvic ultrasound to identify the cause of bleeding. Such improvements in access to medical imaging devices and improved clinical skills have led to a decrease in cases of misdiagnosis (Sonderegger-Iseli et al., 2000).

Obstetric embolism, classified under other obstetric complications, was also accurately attributed as a cause of maternal mortality during CMDR. Recognition of the sudden onset of symptoms such as respiratory distress, cough and hypotension may have led to correct diagnosis. There is however little literature of the burden of obstetric embolism as a cause of maternal mortality in Kenya. Countries such as France, the United States of America and Ethiopia report obstetric embolism as major causes of maternal mortality (Morau, Proust, & Ducloy, 2017). Although mortality rate as a result of obstetric embolism is high, there has been a decrease in case fatality rates in recent times which is attributed to early diagnosis as well as better resuscitative care (Kaur et al., 2016).

Discordance between CMDR and PM attributed causes of maternal mortality was seen in the diagnosis of hypertensive disorders in pregnancy, non-obstetric complications and unanticipated complications of management. Discordance in attributed cause of death was largely due to an unknown/undetermined diagnosis during CMDR. Misdiagnosis of the underlying cause of death during CMDR was seen in two cases. One case of hypertensive disorder in pregnancy was diagnosed as uterine rupture while another of complications of anaesthesia was diagnosed as pulmonary embolism. Delay in presenting to a facility for care is one of the major contributors to maternal mortality as it leads to advancement of the disease state (Thaddeus & Maine, 1994) which can lead to masking of the primary underlying cause by multi-organ failure leading to misdiagnosis or inability to diagnose.

Undiagnosed cardiac disease in pregnancy was in some cases misdiagnosed as acute collapse of unknown cause during CMDR. The case in point was that of a woman referred in for New Born Unit (NBU) services for her premature twins. Having no history of underlying medical conditions as well as an uneventful labour and delivery, thorough examination was not conducted. She later collapsed and died. A PM was conducted and attributed cardiac disease in pregnancy as the cause of death. Studies conducted in LMIC's have shown cardiac disease in pregnancy to be the most important non-obstetric cause of maternal mortality with high rates

of adverse outcome being attributed to late diagnosis as a result of a lack in systematic approaches to screening for disease (Mocumbi et al., 2016). The importance of thorough examination of all patients presenting for care to rule out salient underlying medical conditions can therefore not be overemphasized. Establishment of joint obstetric – cardiac clinics may also significantly reduce maternal morbidity and mortality (Sliwa et al., 2014).

Complications of anaesthesia during obstetric surgical procedures was also missed during CMDR. Acute collapse was mainly attributed at CMDR as the cause due to the sudden deaths. Complications of anaesthesia in our region is under-estimated as a cause of maternal mortality and often not mentioned in vital statistics. Systematic reviews of studies conducted in Sub-Saharan Africa have however shown that anaesthesia related complications to be a contributor to maternal mortality with estimated prevalence rates of between 5.2 – 9.8 death per every 1000 anaesthetics (Sobhy et al., 2016). Recognition of complications of anaesthesia as a contributor to maternal mortality as well as pre-operative determination of risk factors for anaesthetic complications and intra-operative close monitoring of fluctuations in vital parameters are necessary in order to reduce the incidence of maternal mortality related to anaesthetic complications.

Seven cases of the 25 that underwent PM had an unknown/undetermined cause of death during CMDR. The diagnoses as per PM were hypertensive disorders in pregnancy, obstetric embolism, haemorrhage due to ruptured uterus, anaesthetic complications, cardiac disease in pregnancy and respiratory tract infections. These cases may have been undiagnosed during CMDR due to masking of underlying cause of disease as a result of late presentation or due to sudden collapse in an asymptomatic patient (Thaddeus & Maine, 1994).

Missed diagnoses at CMDR may have important implications on future research. Most countries in Sub-Saharan Africa base policies on vital statistics on prevalence rates of the main causes of maternal mortality. In our case where the rate of uptake of post-mortem examination is low coupled with findings that the CMDR process did not attribute or misdiagnosed the underlying cause of maternal mortality for a number of cases leads to a conclusion that we may be under-estimating actual disease burdens. Research questions on the impact of missed diagnoses on vital statistics and alternative methods of attribution of cause of maternal mortality may prove beneficial in generating an evidence base for future policies.

Conclusion

Maternal mortality remains to be a major problem at MTRH. A comparison between PM and CMDR attributed causes of maternal mortality puts obstetric haemorrhage, hypertensive disorders in pregnancy, pregnancy with abortive outcomes and pregnancy related infections to be the leading causes of maternal death respectively. Although the CMDR process is relatively reliable, there are difficulties in assigning a cause of maternal death as demonstrated by the high number of cases grouped as having unknown/undetermined causes. Efforts should be made to improve on the overall maternal mortality review cycle. This may be done by adopting a more structured approach in conducting CMDR such as developing a formal reporting tool based on the current recommended ICD10-MM including training of staff on the same (Owolabi et al., 2014). Emphasis on thorough reporting on social demographic characteristics should also be made. The use of a standardized tool both within the hospital and at the national level will also aid in comparison of statistics from different regions thus positively impacting overall maternal mortality reporting.

Limitations

1. Data on social demographic history was not adequately reported on in CMDR and PM reports.
2. Due to the small sample size, the findings are not representative and inference to the population cannot be made.

Recommendations

1. Adoption of a structured and systematic approach in conducting CMDR including the use of formal reporting tools based on the current recommended ICD10-MM should be adopted.
2. Other methods of attribution of underlying causes of death like the Confidential Enquiry

into Maternal Death (CEMD) should be explored.

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Organizational Factors Influencing the Adoption of the District Health Information System 2 in Uasin Gishu Sub County Hospitals, Kenya

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Abstract

Sound and reliable information is the foundation of decision making across all health system building blocks that include: service delivery; health workforce; health information; medical products, vaccines and technology; financing; leadership and governance. This study is built on the health information system pillar. The aim of this study was to assess the use of District Health Information System data in decision making in Uasin Gishu Sub County Hospitals. The specific objectives were to determine the level of knowledge, organizational, technical and behavioral factors that influence the use of DHIS2 data in Uasin Gishu Sub County Hospitals. The study was conducted in Uasin Gishu Sub County Hospitals. The study employed both quantitative and qualitative approaches using cross-sectional research design. A questionnaire was used to collect quantitative data from 283 health workers who were selected randomly while 10 key informants were selected purposefully from this sample for in-depth interviews. The quantitative data was coded and analyzed using R Software for descriptive, bivariate and multivariate logistic regression. Thematic analysis was used to analyze qualitative data using Qualitative Data Analysis (QDA) software. Bivariate association between the independent variables and the dependent variable was assessed using Pearson's Chi Square test and fishers exact test where chi square assumptions were violated. Multivariate analysis was done using logistic regression to assess for predictors. A P value of 0.05 was considered as significant. The results of the quantitative data were presented in the form of graphs, tables and charts, while the results for qualitative data were presented in the form of themes. Approval to conduct the study was obtained from the KeMU Scientific Ethics Research Committee (SERC) and from National Commission for Science, Technology and Innovation (NACOSTI). Consent was sought from participants for the study. The study found that 68.4% of the participants reported good, very good or excellent competence levels in data management using DHIS2 while use of information in DHIS2 to inform policy and operational decision making was reported as good, very good, and excellent by only 37.3%, 18.9%, and 8.0% respectively. A half of the participants (50.0%) acknowledged that there are adequate finances to run DHIS2, the main champions promoting use of DHIS2, information for decision making in the County were county health records and information officers (56.2%). Moreover, 61.7% of the participants agreed or strongly agreed that age influences the way health workers adopt and use DHIS2 in the hospitals while 65.4% of the participants were dissatisfied with the IT support received from the Ministry of Health. Although 80.9% of the participants had log in credentials, only 24.2% had difficulty with logging into the DHIS2. Furthermore, 79.5% had low or moderate level of training in DHIS2 but 15.0% had never trained and this could be the reason why only a third of the participants had some confidence in handling a task using DHIS2. The study concludes that the level of knowledge regarding the use of DHIS2 information is fair across the six Sub County Hospitals in Uasin Gishu County but utilization of DHIS2 information by county health managers for decision making is low. It also concludes that the main funder of the DHIS2 system is the County Government while support from National Government is minimal, while age influences the way health workers adopt and use DHIS2 data in Uasin Gishu Sub County Hospitals. Lastly, the level of training on DHIS2 is generally low while utilization of information on DHIS2 in facilitating evidence-based decision making in the Sub County Hospitals range from moderate to low. Consequently, the study recommends that the County scales up utilization of DHIS2 information and generates policy measures to ensure utilization of DHIS2 information to facilitate decision making at the County.

Key Words

Organizational Factors; District Health Information System; DHIS2; Uasin Gishu County

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Introduction

Globally, health information systems are critical for achieving universal health coverage. Information is vital for public health decision-making, health sector reviews, planning and resource allocation and programme monitoring and evaluation¹. Organizations have to make complex choices amidst uncertainty, trade-offs and broad consequences, but responding to such situations in rational ways can be hampered by individual decision-makers' cognitive limitations². Quality information is thus the foundation to health system improvements; however, health programmes frequently fall short of efficient use of data to inform decisions. Too often, data linger in reports and databases, and are not sufficiently used to inform programme development and improvement, policy development, strategic planning, or advocacy. Part of the reason for the breakdown in the process is that HIS are fragmented, complex, and do not fully respond to information needs. As a result, decision-makers are often unable to access the data they need in a timely manner to inform their upcoming decisions³.

The Health Information System in Kenya covers five key areas⁴:

(i) Information generation – the different forms of information and how they are collected, and stored; (ii) Information validation – the process of reviewing the information to improve its accuracy and representativeness; (iii) Information analysis – the process of understanding what the information is saying; (iv) Information dissemination – the process of sharing the emerging information from the analysis with relevant stakeholders, and (v) Information utilization – the process of ensuring information available is informing the decision-making process. These areas are all interlinked and, together, form the continuum of the Health Information System in Kenya. A number of organizational issues mediate on the decision-making process in Uasin Gishu Sub County Hospitals. These issues include: policies and procedures, organizational hierarchy and organizational politics. Counties have formalized policies and procedures that are designed to resolve common problems and to guide health managers when making decisions. These policies and procedures are in the form of documented disciplinary regulations which guide managers through a process of resolving issues with staff members.

Moreover, organizational hierarchy, which is the management structure in every county level government, is characterized by different levels of leadership which carry with them different degrees of authority. The degree of authority directly impacts on the nature of the decisions an individual

can make. For example, a County Health Records and Information Officer cannot make decisions about the overall goals of the County. However, the County Health Records and Information Officer can make decisions about how their department contributes to the achievement of the County's goals. See and Clemen posit that perceived threat to managerial value and control is a key barrier to decision process innovation and thus there is a tendency for managers to perceive such innovations as threats to their own value, discretion and control².

Organizational politics refers to behaviour displayed by individuals and groups which is designed to influence others on use of health information systems. Individuals and teams will often use politics to advance their careers and advance their interests and ideas on health information technology adoption. This applies to Uasin Gishu Sub County Hospitals². Organizations like Uasin Gishu Sub County Hospitals and its Departments are made up of individuals with different beliefs, values and interests. These differences are often the driving forces behind organizational politics that can influence use of DHIS2 data. For example, the County Health Records and Information Officer may well use politics to influence the County Director of Health to allocate more funds for Health Information Technology in their Department among other competing demands in the County. Top management support has long been conceived as an important factor in the success of Information System⁵. According to Loonam et al., a number of approaches are available for use by top managers in organizations to facilitate Information System (IS) activities. These include maintaining a positive attitude, building an effective and powerful coalition group, creating an inclusive steering committee, developing a strong vision for IS, aligning the IS strategy with the corporate strategy, communicating the IS initiative across the entire organization, and providing sufficient resources for the IS initiative⁶.

Environmental issues are among the external factors that influence the affairs of an organization. Some of these external factors are: the market in which the organization operates, the economy, government legislation, customers' reaction to the organization's products and services with respect to use of DHIS2². Studies have been conducted in Kenya to assess the performance of HIS and various efforts have been implemented to improve the systems' efficiency. However, after years of investment in HIS, the Government of Kenya still struggles to provide quality and timely data for healthcare decision-making. This is particularly evident at the sub-national levels where there is a lack of systems to improve data access, synthesis, communication

and interpretation, all of which are inhibiting districts from making decisions about key service delivery issues³. Nutley and Reynolds further report that an assessment of the health management information system conducted between 2006 and 2007 described the existing routine HIS as fragmented and vertical with stand-alone systems at the national level. The paper-based, vertical systems resulted in data being “largely unavailable for effective planning, monitoring, and evaluation of the health system at all levels.” The National Health Information Strategy, developed in 2009, identified additional gaps related to insufficient use of data in decision-making. The health information strategy addressed these needs by calling for the elimination of the vertical nature of the routine HIS and the integration of existing data sources into one data warehouse. The DHIS2, an open-source, web-based health management information system, was identified as a key solution to the health information strategy and was implemented beginning in 2010. It was envisioned that the introduction of the DHIS2 would improve data use at all levels of the health system³.

See and Clemen posit that organizational culture is also key, in addition to managers’ individual attitudes towards change, since their perception of the organization’s ability to change is expected to play a role in innovation adoption². They suggest that for innovation to occur and be successful there must be a perception among managers and other users that the organization can adapt to and implement the new processes. The PRISM framework assumes that if organizations promote a culture of information, they will also improve their competence in conducting RHIS tasks, thus improving their self-confidence to carry out RHIS tasks. If the work environment does not promote key RHIS attitudes and values, health workers may not internalize the values required to generate, maintain and improve the information system⁷.

The starting point in adopting e-health is the development of coherent national e-health policies and strategies. These requirements are in tune with national development plans, national ICT policies and with buy-in from healthcare workers – the users. The government of Kenya, in partnership with the private sector, has made important strides towards creating an environment suitable for the uptake of e-health. The efforts include the release of Standards and Guidelines for Electronic Medical Records (EMR) in Kenya (2010), Strategic Plan for Health Information Systems (HIS) (2009-2014), Kenya ICT Policy (2006) and the Kenya Communications Act (2009), all of which mark important milestones in the creation of an environment with legal and regulatory framework conducive to the development and adoption of e-health in Kenya⁸. The reasons

advanced for the introduction of these systems were: health facilities collected information haphazardly and irregularly; information collected was incomplete and unreliable with limited analysis and use at the point of collection, and too much data was collected rendering analysis impossible⁹. Odhiambo-Otieno continues to point out that all the systems within the DHSs in Kenya are characterized by a lack of integration, and are disjointed and widely dispersed, with no effective central co-ordination to ensure that the information they contain is readily available to other systems. The Kenya Health Sector Strategic and Investment Plan (KHSSP) of July 2013-June 2017 notes a number of problems, among them: the lack of comprehensive systems in place to ensure and monitor evidence-based policy making; the absence of systems to generate data demand and knowledge management, and limited use of information on vital events to guide decision-making⁴.

The national, county and facility healthcare levels lack effective referral monitoring systems to promote appraisal, feedback and accountability for provider actions. As an integral part of the healthcare system, referrals must be included in the health sector performance M&E system. Therefore, a system for maintaining records and information should be mandatory. The current routine Ministry of Health (MOH) registers do not provide for the collection of referral data. Where data are collected, the quality is poor and the data rarely used. The system needs standardized referral tools to communicate referrals and capture referral data. These tools would include referral forms, referral registers, data collection and update forms, patient tracking forms, feedback forms, and a directory of services. Currently, accountability is absent and referral data collection is not a priority at the facility level¹⁰. Another concern that has been raised by HIS experts is that most developing countries lack an information culture which would focus on strengthening the supervision, feedback and support aspects for the overall HIS. Feedback constitutes an integral component of the health information cycle as this is necessary for keeping communication lines open to discuss and resolve problems in the system leading to improvements in the entire HIS. However, health workers collating and transmitting health data in developing countries hardly ever receive any feedback, and when such feedback is received it is mostly of the kind that is negative, marked by long delays and is not very constructive¹¹⁻¹⁴.

The HIS policy states that “while the records (the documents or disks) are unequivocally the property of the practitioner or institution, the data is not.” Data is not capable of being owned, and many different people have an interest in it, including and especially the person to whom it relates. In addition,

all the health and health related data and information shall belong to the Government of Kenya (GoK)¹⁵. Another problem commonly cited with HIS systems in developing countries is the lack of data ownership occasioned by health workers' perception that the purpose of a HIS is simply to enable submission of reports to the higher levels, leading to a situation where there is no incentive for health workers at levels below the national level to analyse, use and interpret health data^{13,16,17}.

An improved and harmonized health reporting system is critical for health system strengthening since it can generate timely information for proper planning, monitoring and evaluation of service delivery at all levels of the health system. However, in most developing countries, particularly in the sub-Saharan Africa, health reporting has been dominated by paper-based data collection and storage systems that tend to generate incomplete and inaccurate reports. Evidence shows that the continued use of paper-based systems contributes to poor data quality in terms of reliability, availability, timeliness and completeness of reporting, all of which could compromise health service delivery. In Malawi, for instance, Makombe et al. have found that the use of paper-based health facility reports to generate national summaries has resulted in a 12% underreporting of persons on first-line antiretroviral treatment because many sites did not submit accurate data to the national level¹⁸. Effective monitoring and supervision of healthcare programmes depends on complete, accurate and timely flow of data between primary healthcare facilities, hospitals and a central information hub. However, data routinely collected at healthcare facilities and submitted to district offices is commonly described as being unreliable¹⁹.

A study has been conducted in South Africa to explore and describe staff experiences in managing data and/or information when utilizing the DHIS2 as a support mechanism for data quality improvement, including the strengths and weaknesses of current data management processes. The findings highlighted the strengths, weaknesses and key barriers as experienced by the staff. The strengths, such as having data capturers and DHIS2 software at most if not all facilities, were highlighted. The weaknesses and key barriers highlighted included staff shortages of both clinical and health management information staff, shortage of resources such as computers and Internet access, poor feedback, training needs and data quality issues. Most of the weaknesses and key barriers called for further and proper implementation of the DHMIS policy, the Standard Operating Procedures (SOPs), the e-health strategy and training of the staff, since there were reported gaps between the

policy and the reality and/or practice at the facility¹⁴.

A health system needs internal mechanisms to develop performance targets, track progress as well as create and manage knowledge for continuous improvement. PRISM allows countries to assess the casual pathways of the determinants for RHIS performance and how they affect systems prior to implementing interventions to improve the quality of the data and use of information, and to later evaluate the change brought about by the interventions. As such, it creates opportunities for improvement by identifying the strengths and weaknesses of the health information system⁷. An efficient and effective healthcare delivery system must have a proper linkage of the six pillars on which it is founded. However, little attention has been given to the Health Information Pillar as the critical component that glues together the other pillars making up the health system¹. Public hospitals face challenges in collecting, analysing, evaluating and interpreting critical health data and information to guide evidence-based decision-making⁷. Incomplete, incorrect and inconsistent data affect managers' confidence to use data.

Hospitals still lack the necessary capacity to use of information in DHIS2 for decision-making at the various tiers²⁰. Knowledge gaps among the users of DHIS2 on how to use information to facilitate evidence-based decision-making in Uasin Gishu Sub County Hospitals, coupled with critical shortages of human resources, continue to affect the quality of data generated and used. Consequently, inadequate use of data and information in DHIS2 could affect management of workload in specific areas to inform, for instance, justification for additional health workers to address critical shortages, or their redistribution, interventions and better management of communicable and non-communicable diseases, including service access and availability, e.g. where to place new facilities. In addition, it may affect the referral system of patients from the community level. Through the cases referred, the County health managers would miss out on very important data to determine if such cases qualified to be referred and whether or not there was need to improve local facilities and staffing to handle such cases and thus decongest referral hospitals. Failure to use data and information in DHIS2 may also affect budgetary allocation adversely.

There is emphasis on improving maternal, neonatal and child health indicators, the primary target in the SDG 3. Progress has been hindered by poor policy implementation and weak health systems, which do not engage with, or respond to, community needs. This results in poor access and utilization of preventive and curative health services²¹. Therefore,

the researchers sought to determine the organizational factors influencing the use of District Health Information System (DHIS2) data in Uasin Gishu Sub County Hospitals with a view to recommending better ways of using information in DHIS2 for sound decision-making and health care improvement.

Participants and Methods

A cross-sectional descriptive research design employing both qualitative and quantitative approaches was used in the study. The study was conducted in Uasin Gishu County which has six Sub-County Hospitals. The County has a population of 894,179 people with a growth rate of 3.6% based on the 2009 Population and Housing Census, and it is located on a plateau with a cool and temperate climate²². The total health workforce in Uasin Gishu County was 1061 at the time of study. The target population for the study comprised all healthcare providers in the study area. A simple random sampling technique was used to select the participants in the study, but 10 members of the CHMT were purposively selected for in-depth

interviews. The formula for proportions, $\{n_0 = Z^2 pq / e^2\}$, was used to determine the sample size of 385 and was adjusted to small population using the formula below.

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

The sample for each cadre of health workers was calculated in proportion to the total population for each group using the following formula: $n_x = x / N_0 * n$; where n_x is the sample for specific cadre of health workers; x is the total number of the health workers in a specific cadre; N_0 is the total number of health workers in the study area while n is the sample size. Using the formula, each cadre of health workers included in the study is shown in the table below.

Table 1: Population Sample Size Distribution

S/No	Staff Cadre	Sample Size (n _x)	Total Population (x)
1	Health Records and Information Officers	8	31
2	Nurses	150	563
3	Clinical Officers	22	82
4	Pharmacists	17	65
5	Laboratory Technologists	22	81
6	Radiographers	2	8
7	Nutritionists	6	22
8	Medical Doctors	8	29
9	Public Health Officers	43	160
10	Physiotherapists	2	8
11	Occupational Therapists	1	5
12	Hospital Administrators	2	7
	Total	n=283	N₀=1061

Only participants who had worked for the Ministry of Health for a period of more than six months at the time of the study were enrolled. Trained assistants collected data using structured questionnaires and an interview schedule for in-depth data. Tape-recorders and field note books were used to record the proceedings during the in-depth interviews. Participation in the study was completely voluntary. The collected data was checked for accuracy and completeness. Thereafter, direct data entry were done using Excel spread sheets. Descriptive statistics was used to analyse quantitative data. The tape recorded information

was transcribed into transcripts in Ms Word. The transcripts were then imported into the Qualitative Data Analysis (QDA) Software and coded into themes for thematically analysed. Ethical clearance and approval to conduct the study was sought from the Scientific Ethics Research Committee (SERC) of the Kenya Methodist University (KeMU) and the National Commission for Science and Technological Institutions (NACOSTI). The researchers further sought informed consent from all participants of the study and permission from other respective institutions within the research site.

Table 2: Socio-Demographic Characteristics

Variable	N	n (%)
Site		
Ainabkoi		49 (22.3%)
Kapseret		41 (18.6%)
Kesses	220	24 (10.9%)
Moiben		32 (14.5%)
Turbo		45 (20.5%)
Ziwa		29 (13.2%)
Age (Years)		
18-24		11 (5.1%)
25-30		72 (33.2%)
31-40	217	81 (37.3%)
41-50		41 (18.9%)
51-60		12 (5.5%)
Male	212	76 (35.8%)
Education Level		
Certificate		21 (9.7%)
Diploma	217	150 (69.1%)
Degree		43 (19.8%)
Masters		3 (1.4%)
Years Employed		
1-5		85 (41.3%)
6-10		49 (23.8%)
11-15	206	31 (15.0%)
>15		41 (19.9%)

A total of 10 key informants, 8 males and 2 females, drawn from the County Health Management Team (CHMT) were approached for interviews. However, one of them, a female, declined. One hundred and seven (50.0%) of the participants acknowledged that there were adequate finances to run DHIS2. Of this number, 92(86.0%) responded when they were asked about the financiers of DHIS2. Of the 92, 72(79.1%) and 11 (12.0%) said that the County Government and donors, respectively, financed DHIS2. Three-quarters (75.6%) agreed or strongly agreed that there was adequate support on matters of DHIS2 from the Sub-County or County Health Records and Information Officer. Table 3 below summarizes the main champions of DHIS2 information use for decision-making at the County.

Table 3: Champions of DHIS2 Information Use to Facilitate Decision Making in the County

Champion(s)	N	n (%)
County Governor	210	28 (13.3%)
Deputy Governor	210	3 (1.4%)
County Director of Health	210	61 (29.0%)
Medical Superintendent	210	27 (12.9%)
County Health Records and Information Officer	210	118 (56.2%)
Sub County Health Records and Information Officer	210	82 (39.0%)

The main champions of DHIS2 information use to facilitate decision-making were the County Health Records and Information Officers (56.2%), and the Sub-County Health Records and Information Officers (39.0%). The determinants of use of DHIS2 information were mainly availability of computers (67.0%), availability of network and internet services (53.0%), and presence of trained staff (53.0%).

Table 4: Factors Favouring DHIS2 Information Use to Facilitate Decision-Making

Variable	N	n (%)
Availability of computers	215	144 (67.0%)
Network and internet services	215	114 (53.0%)
Power backup	215	65 (30.2%)
ICT support supervision	215	94 (43.7%)
Conducive policy and legal framework	215	53 (24.7%)
Trained staff	215	114 (53.0%)
Management support	215	89 (41.4%)
Organizational politics	215	24 (11.2%)

Up to 78.5% agreed or strongly agreed that organizational hierarchy influenced the use of DHIS2 data and 80.8% agreed or strongly agreed that there was improved staff performance due to utilization of DHIS2. Eighty-two (38.0%) participants thought that the ownership of the data rests with the national government and 87(40.3%) thought that it rested with Uasin Gishu County government. Only 2(0.9%) thought that the patient owned the data (Table 5). The external factors influencing the use of DHIS2 included the government legislation (54.8%) and customer reaction to DHIS2 services (28.1%).

Table 5: Ownership of the Data and External Factors Influencing Use of DHIS2

Variable	N	n (%)
Owners of the Data		
National Government	216	82 (38.0%)
Uasin Gishu County Government	216	87 (40.3%)
Department	216	55 (25.5%)
Patient	216	2 (0.9%)
External Factors		
Market	219	14 (6.4%)
Government legislation	217	119 (54.8%)
Customer reaction to DHIS2 services	217	61 (28.1%)

The major challenges experienced in the use of information in DHIS2 for evidenced-based decision-making in Uasin Gishu Sub County Hospitals included lack of management support (34.3%), poor skills among the users (48.6%), lack of adequate computers (36.7%), and unreliable internet connectivity (47.1%) (Table 6). Others included lack of power backup (27.6%) and resistance to change (21.0%).

Table 6: Challenges in the Use of DHIS2 Information for Evidenced-Based Decision-Making

Variable	N	n (%)
Lack of management support	210	72 (34.3%)
Poor skills set among users	210	102 (48.6%)
Lack of adequate computers	210	77 (36.7%)
Unreliable internet services	210	99 (47.1%)
Lack of power backup	210	58 (27.6%)
Lack of antivirus software	210	34 (16.2%)
Resistance to change	210	44 (21.0%)
Lack of accurate and quality data	210	57 (27.1%)

They key informants highlighted the following as the main factors that determine the utilization of data in organization:

- i. Demand for information: Demand for information was highlighted as among the organizational factors that influenced use of the DHIS2 system. The respondents explained that the information should be availed to all those in need, especially the health professionals. Participant 01 explained this point as follows: “Eh....one is the need for information — for all to be able to access... so that demand or information....” (Personal Communication, Participant 01).
- ii. Teamwork: Additionally, Participant 01 highlighted the importance of teamwork thus: “..... it is also the issue of teamwork.... unlike previously where it was a preserve of HRIOs (laughter) where only one person was the main player. Whereas all of us are need of information and create the same. You cannot be told that you can take this food but you cannot enter the hotel.”
- iii. Hierarchical utilization of data: It was also reported that utilization of data within the DHIS2 system has been affected by the hierarchical arrangement which limits access to the system in favour of senior officers in the organization. This was vividly explained as follows: “Utilization of data and..... and DHIS2

- varies with levels top sub-county and County level managers use the data more than lower level staff” (Personal Communication, Participant 05).
- iv. Policy: The presence of strong policies was also highlighted by Participant 05 who explained that policy influences the use of the DHIS2 system: “Policies also influence use of data in DHIS2” (Personal Communication, Participant 05).
 - v. Interest in utilization of data: The respondents also said the utilization of DHIS2 data could be influenced by the individual interest of top level management. Therefore, if they are really interested in it the rest of the system will certainly embrace DHIS2: “... if top management is interested in/our data obvious by this will improve data use” (Personal Communication, Participant 05).
 - vi. Internal and external factors: Internal factors such as staff knowledge and external factors like management support and provision of adequate servers to the staff reportedly influenced the utilization of DHIS2 data. Participant 05 explained this point as follows: “External and internal factors such as staff knowledge and management support, server affects as also” (Personal Communication, Participant 05).
 - vii. Political interference: The respondents also said political interference tended to influence how reports were made from the DHIS2 system data. This point was expressed in the following words: “Political really affects legal, e.g. report requests” (Personal Communication, Participant 05).

Table 7: Association between organizational factors influencing the use of DHIS2 and departments level of DHIS2 data use.

Variable	N	Department Level of Data Use in DHIS2			P-value	OR (95% CI)
		Low	Moderate	High		
There is adequate financial support for the running of DHIS2 functions in the County						
Disagree		49 (62.8%)	36 (42.4%)	14 (36.8%)		Reference
Agree	201	29 (37.2%)	49 (57.7%)	24 (63.2%)	0.008	2.26 (1.33, 3.84)
There is adequate support on matters of DHIS2 from your Sub County or County Health Records and Information Officer						
Disagree		29 (38.7%)	15 (17.4%)	4 (10.0%)		Reference
Agree	201	46 (61.3%)	71 (82.6%)	36 (90.0%)	<0.0001	3.52 (1.84, 6.75)
Organizational hierarchy influence use of DHIS2						
Disagree		24 (32.4%)	12 (14.0%)	5 (12.8%)		Reference
Agree	199	50 (67.6%)	74 (86.0%)	34 (39.0%)	0.006	2.80 (1.41, 5.56)
Use of DHIS2 has improved staff performance						
Disagree		24 (32.0%)	12 (14.0%)	1 (2.5%)		
Agree	201	51 (68.0%)	74 (86.0%)	39 (97.5%)	<0.0001	4.46 (2.15, 9.26)

Similarly, all the indicators for the level of organizational factors influencing use of DHIS2 data were significantly associated with the department level of DHIS2 data use ($p < 0.05$). The results indicate that compared to respondents who disagreed, those who agreed that organizational factors influence the use of DHIS2 data were associated with higher odds of reporting that the departments were moderate than low or high than low level use of DHIS2 data ($OR > 1$ for all the indicators).

Discussion

The study's main objective was to determine the organizational factors influencing the use of DHIS2 in Uasin Gishu Sub County Hospitals. The findings showed that there were adequate finances to run DHIS2 and most of the funding (79.1%) came from the County Government. The research further underscored that support on matters of DHIS2 came mainly from Sub-County or County Health Records and Information Officers. Besides, the same cadre of professionals was found to be the main champions promoting the use of DHIS2 information for decision-making in the County. Some of the main determinants in the use of information in DHIS2 for decision-making included: availability of computers, networking and internet services, and the presence of trained staff. In addition, the majority of the participants affirmed that the utilization of DHIS2 improves staff performance and can be influenced by organizational hierarchy.

The study also showed that the use of DHIS2 data can be influenced by government legislation, and customer reaction to DHIS2 services. However, major challenges experienced while using information in DHIS2 for evidenced-based decision-making included lack of management support, poor skills among the users, lack of adequate computers, and unreliable internet connectivity. Others included lack of power backup and resistance to change. In agreement with the findings of the study, a previous research has established that the use of computers systems, training and harmonization of indicators facilitated the increased use of HMIS data but a lack of capacity to analyse, interpret and use data by both data producers and users was the main challenge in data utilization for decision making²³. Additionally, another study notes that organizational factors, especially support, for data review and sharing forums were seen to affect information use²⁴.

The challenges found in the present study have been recorded elsewhere, among them inadequate infrastructure, low computer proficiency, inadequate staffing capacities, lack of proactive leadership and information ownership at all levels, as well as the still unmet demand for better quality and complete health data²⁵. On the same issue, a Botswana study cites several challenges in the national health information management system, including inadequate IT infrastructure including computers and unreliable internet access; limited skills in using the system and inadequate human resource capacity²⁶. In addition, a similar trend was observed in Cameroon²⁷. Another study in Iran investigated the relationship of resources of the organizations, organizational knowledge, processes, managerial structure, values and goals with the use

of computer and demonstrated a significant relationship between managerial structures, resources of the organizations and attitude²⁸.

Health information systems are critical to reaching universal health coverage. Information is vital for public health decision-making, health sector reviews, planning and resource allocation and program monitoring and evaluation. However, it seemed that no assessment has been done to ascertain that the tiers use information derived from DHIS2 to make evidence-based decisions in the Uasin Gishu Sub County Hospitals. The findings of the study would help the Uasin Gishu County Health Managers and Health System in general to adopt and periodically assess relevant health information systems to enhance the use of DHIS2 information for evidence-based decision-making and to ensure return on investment in County Public Health Facilities and Kenyan Health Care Delivery System as a whole. In addition, the study results would strengthen HIS Pillar and fast-track the realization of Kenya Vision 2030, SDGs, HSS as well as add to existing knowledge in health information systems.

Whereas the findings of this study are important, the researchers experienced a number of limitations. Some participants, especially those in management, were not conversant with the use of DHIS2. The study being cross-sectional, the researchers were unable to control the truth of the information because the information was collected at a particular point in time. Therefore, what happened before or after was not captured during the study.

Conclusion

Based on the study findings, it is evident that the main funding for the DHIS2 system comes from the County Government. Health records and information officers are the main promoters of DHIS2 information use. Additionally, the main determinants of DHIS2 information use are: availability of computers, network and internet services, trained staff and legislation. Lastly, the main challenges inhibiting the use of information in DHIS2 for evidenced-based decision-making include: lack of management support, poor skills among the users, lack of adequate computers, unreliable internet connectivity, lack of power backup and resistance to change. In light of these findings, the study recommends for more support and funding from the national government for DHIS2 activities. The political elite and entire healthcare workforce should be involved in championing and promoting the use of DHIS2 information. Moreover, there is need for ample supply of computers, network, internet services, and other accessories as well as

training staff to boost ICT infrastructural prerequisites for proper functioning of DHIS2.

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