

Effectiveness and Efficiency of the Two Trolley System as an Infection Control Mechanism in the Operating Theatre

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Abstract

A good infection control manager understands the need to prevent a complete cycle of infection. The Infection Control Working Group Manual of Fiji, emphasised that the Cycle of Infection is the series of stage in which infection is spread. Operating theatres have infection control protocols. Most equipments and instruments used in operating theatre circulate within the theatre. The theatre trolleys are a main component in managing an operating theatre but the least recognised.

This paper reviews the effectiveness and efficiency of the current two-trolley system as an infection control mechanism in theatre. The paper will discuss infection control using the current trolley system in relation to the layout of Labasa Hospital operating theatre, human resource, equipment standard and random swab results.

The following are random swab results of theatre equipments taken by the Infection Control Nurse from 2006 to 2008. The Labasa Hospital Infection Committee have discouraged random swab sample from mid 2008 based on new guidelines on infection control. The two trolley system, in which an allocated outside trolley transports patients from the ward to a semi-sterile area in theatre. The inside trolley which transports the patient to the operating table. The two trolley system means more trolleys, extra staffs for lifting, additional handling of very sick patients, congestion and delay in taking patients to operating table. in theatres should be considered.

The one-trolley system in theatre greatly reduces the chances of manually lifting patients, thus reducing the risk of patient injury from fall and risk of back injuries to nurses. There are other evident based practices which can compliment the one trolley system for an effective infection control mechanism in theatres. The Fiji Infection Control Manual (2002) emphasises the importance of regularly cleaning the environment and equipments in theatre but there is never a mention about using a two trolley system as an infection control mechanism for theatre. PHD, 2009; (15) (2); pp. 39 - 44.

Introduction

Human beings share the world with vast variety of micro-organism whereby a few are able to cause disease (Larvin & Verma, 2009). Larvin and Verma (2009), also noted that media coverage of infections example Bird Flu, worried the public but interested healthcare professionals because they are most vulnerable to contracting the disease. Keeping up to date with information on latest outbreak and infection control practice safeguards the welfare of healthcare professionals, including patients. An infection is the invasion of the body by a pathogenic microorganism which multiples, causing disease by nearby cellular destruction either by secreting toxins or initiating an antibody-antigen response (Mosby, 2006). A good infection control management understands the need to prevent a complete cycle of infection. The Infection Control Working Group Manual of Fiji (2002), emphasised that the Cycle of Infection is the series of stage in which infection is spread. There are six stages in the Cycle of Infection whereby, the first stage is the Agent or harmful microorganism. The second stage is the Reservoir of micro-organism where the environment is suitable



for it to multiply, which is usually dark and moist. The third stage is the Place of Exit, whereby the micro-organism leaves the host or environment example an infected wound, urinary tract, respiratory tract or gastro-intestinal tract. Micro-organism leaves the host organism or environment by many ways example droplet. The fourth stage is the method of transmission of infection from one place to another, which can be by dirty hands, contaminated instruments, insects, water etc. The fifth stage is the place of entry of the infection, which can be a mucus membrane example the urethra or a break in the skin example a wound. The sixth stage is the susceptible host, the likely people to be infected are those handling infection materials, caring for infected patients or standing within a close proximity to an infected person.

Surgical procedure increases the chance for a complete cycle of infection. The Infection Control Working Group Manual of Fiji (2002), stressed that the easiest way to break the cycle of infection is to kill the harmful micro-organism by antiseptics or hand washing, cleaning of instruments and environments, sterilization of instruments, high-level disinfection of instruments, protective clothing and safe waste disposal.

West et al (2008), found that hospitals act as a reservoir for variety of infections because sick patients release large quantity of pathogenic micro-organism into the environment. Operating theatres have infection control protocols for example, sterile surgical scrubbing and gloving which distinguish it from other units. Most equipments and instruments used in operating theatre circulate within the theatre. There are a few which go out of the sterile area and return, one these is the theatre patient trolley. Rainer and Russ (2005), found that the spread of infection in theatre is more likely to be from contaminated surface than the controversial contaminated air. Theatre trolleys or outside trolleys make various trips to wards and back, which might increase chance of contamination. Fiji's Ministry of Health Annual Report 2007 (2008) warned the continuing rise and poor record keeping of post-operative infections in caesarean sections, which is further worsen by the non-availability of a Caesarean Section Classification under the current P.A.T.I.S. The theatre trolleys are a main component in managing an operating theatre but the least recognised. Dharan and Pittet (2002), stressed that normal skin bacteria of patients and healthcare workers cause more than half all infection following clean surgery. Surgical site infection is the leading complication of surgery. This paper reviews the effectiveness and efficiency of the current two-trolley system as an infection control mechanism in theatre. The paper will discuss infection control using the current trolley system in relation to the layout of Labasa Hospital operating theatre, human resource, equipment standard and random swab results.

Aim of The Study

The aim of the study is to explore the effectiveness and efficiency of the two-trolley system as an infection control mechanism at the Labasa Hospital operating theatre from 2006 to 2008.

Method

This is a quantitative research whereby data is gathered by literature review and past routine swab results of theatre by the Labasa Hospital Infection Control Nurse from 2006 to 2008.

The Setting

The study would be done on the operation theatre at the Labasa Hospital, involving the transportation of patients into and out of the operating theatre.

The Findings and Discussion

Swab Results: The following are random swab results of theatre equipments taken by the Infection Control Nurse from 2006 to 2008. The swab taken inside theatre on (08/12/06) showed heavy growth of *Escherichia coli* Agglonerous.



On (02/11/07), the theatre swab showed it's worst side with *Acinetobacter Heamolyticus* found in operating room 2 (O.R.2) air-conditioning outlet and the minor operation theatre (M.O.T.) suction tube. *Acinetobacter baumannii* was found in the suction bottle lid in operating room 2 (O.R.2) and *Pseudomonas maltophilia* was found in the M.O.T. hand washing sink.

The swabs taken on (23/01/08) showed no improvements as, *Proteus retgen* was found in O.R.1 operating table (mid-section). *Acinetobacter baumannii* was found in O.T.1 suction bottle, air-conditioning outlet, anaesthetic machine tube and O.R.2 operating table (mid-section).

The Labasa Hospital Infection Committee have discouraged random swab sample from mid 2008 based on new guidelines on infection control. WHO Guideline for Infection Control (2006), recommends that bacteriological testing of the environment should be reserved for outbreaks when the source of infection needs to be identified.

The Layout

Infection control practise and policy is determined by various factors, examples are the function of the unit, traffic, age of the building and layout (Infection Control Manual of Fiji, 2002). Labasa Hospital is an old building where the layout and age of the building greatly challenges the implementation of current infection control policies. One of the challenges is the narrow one way traffic for pre-operative and post-operative patients into and out of the theatre. When a pre-operative patient trolley enters theatre, the narrow passage way is shared by the anaesthetic room and post anaesthetic recovery unit (P.A.R.U.). This passage leads to the transfer zone which is a wide room with many doors. The tea room, minor theatre sluice room, female and male change rooms are connected to the transfer area. The transfer area leads to another narrow passage which contains the two operating rooms opposite each other. The layout increases the chance of a cycle of infection because there is no definite separation between the sterile area and non-sterile area. Rainer and Russ (2005) identified that most microbes in theatre are from staffs and a few from patients. They found that a well ventilated theatre is more likely to pose a risk of direct contact transmission of infections from contaminated surfaces rather than air.

The Trolley System

The most challenging is to develop a sustainable patient transportation system best suited for the one way traffic layout. The two trolley system is an old but simple method of infection control suitable for this type of scenario. Trolleys have advantages over beds in comparison of size and shape because they are small so it takes less parking-space, mobile and narrow, easy access for doctors and nurses in attending to patients on all sides. The two trolley system, in which an allocated outside trolley transports patients from the ward to a semi-sterile area in theatre. This area is commonly known as the transfer zone. In the transfer zone, the patient is transferred from the outside trolley to another similar inside trolley, while the trolley attendant or a nurse assist in the process. The inside trolley which transports the patient to the operating table. As research have guided evidence-based practise, the two trolley system should be scrutinized as an infection control mechanism. The Infection Control Manual of Fiji (2002), stresses that a good hospital infection control prevents hospital-acquired infections. The prevention of hospital-acquired infection saves life, limbs, money and resources. Micro-organisms are found in everything but in a given environment it multiples to become pathogenic. Rainer and Russ (2005) identified that most microbes in theatre are from staffs and a few from patients. They found that a well ventilated theatre is more likely to pose a risk of direct contact transmission of infections from contaminated surfaces rather than air.



Trolley Contamination Verses Staff and Instrument Contamination

The WHO Guideline for Infection Control (2006), classifies trolleys as a low risk of transmitting infection so emphasis of using two trolleys as an infection control is more cosmetic than science. Theatre personnel infection control attitudes, knowledge and skills should be scrutinised instead. Rainer and Russ (2005), emphasises that most micro-organisms found in theatre are from staffs and a few from patients. It was noted that if the ventilation inside the theatre is effective than air should not be a source of infection, regardless whether it is a clean or dirty case. Another way that was recommended would minimise infection in theatre was to limit movement and the number of people present in theatre.

West et al (2008), found that in most surgical situations, transmission occurs by direct contact between contaminated instruments or hands and the patients' tissues. Basic hygiene and hand washing is a very effective tool in infection control. Chan, et al (2007), emphasises the importance of being vigilance in infection control by strict hand washing after contact transmission by personnel was suspected in a drug resistant pathogen outbreak.

The Transfer Area

Transfer areas are supposed to provide a barrier and minimise the contamination of operating rooms from the outside environment. The pathogens usually found in operating theatre are either part of the environment or from patients or staffs.

Ayliffe, Babb, Collins and Lowbury (1969), found that there was a need to warn hospital administrators against the general thinking that the two trolley system into theatre is an effective protection against contamination. It was identified that it was harder to develop an effective and practical infection control measures, for trolley surfaces and wheels. A two trolley system would need a clean area for transferring patients before entering the sterile area. Allocating spaces for transfer area is practical if hospitals can prove it as an effective infection control mechanism. The two trolley system means more trolleys, extra staffs for lifting, additional handling of very sick patients, congestion and delay in taking patients to operating table. Instead, it was emphasises that the environment inside theatre should be scrutinized as a source of infection. In a survey of 53 hospitals where 63% had transfer zones, Lewis, et al (1990), found that the bacterial count in theatre did not increase when using the one trolley system as compared the two trolley system. Transfer areas do not improve infection control management so alternative scenarios on how to prevent transmission in theatres should be considered.

The Transfer Process

The transfer process of patients using the two trolley system is a time and resource consuming practise. Also it is a health hazard for patients and an occupational hazard for healthcare professionals or workers. Mathematically, a patient is manually lifted 5 times on the way to the operating table and back to the ward bed, under the theatre's two-trolley system.

Humphery (2007), discovered that the Guideline National Institute of Occupation Safety & Health of America recommends that an average woman should only lift 19kg but with 2 out of 3 adults are overweight and a quarter of the population obese, this puts nurses at greater risk of back injury. Nurses rate high amongst occupation with back pain and back-related injuries.

Brown (2003), found there needs to caution in the recommended lift teams and training of nurses about proper lifting techniques, does not protect from back injury from the long term reparative manual lifting. Manual lifting also puts the patient at the risk of injuries example skin abrasions from friction, fractures from



fall and dislocation from pulling arms or legs. There are lifting machines available but hospital administrators are reluctant to use it because it is expensive and needs a specialized operator.

In Fiji hospitals, if we are to continue with manual lifting because of financial constraints then we need to reduce the number of lifts for a patient to get to theatre and back to the ward. The one-trolley system in theatre greatly reduces the chances of manually lifting patients, thus reducing the risk of patient injury from fall and risk of back injuries to nurses.

Recommendations

There are other evident based practices which can compliment the one trolley system for an effective infection control mechanism in theatres. Patient centred care and decision making helps patients actively participate in controlling the transmission of infection. Naqraj, Clark, Talbot and Walker (2006), survey of 171 in-patients and day cases found that majority of patients would prefer to walk if given the choice. It was also noted that walking to theatre for surgery lessen patient's anxiety and enhanced autonomy in patient care. Walking to theatre for surgery helps to reduce delay in transferring patients and releases resources for other purposes.

The welfare of healthcare workers should not be compromised for the sake of strict infection control protocol. Demoralised and tired healthcare workers increase the risk of spreading infection. West et al (2008), found that the level of MRSA is often reflective of the total rate of nosocomial infections within a hospital. It also reflects overcrowding, heavy workloads and understaffing in wards.

Conclusion

The Fiji Infection Control Manual (2002) emphasizes the importance of regularly cleaning the environment and equipments in theatre but there is never a mention about using a two trolley system as an infection control mechanism for theatre. A change to the one trolley would be favourable for healthcare workers and patients. There would be less waiting time for patients and healthcare workers can attend to peri-operative tasks example patient's vitals. The important lesson is regardless of the mode of transporting the patient to the operating theatre, example the trolley should well maintained and cleaned according to infection control guideline. Lewis, et al (1990), recommends that the one trolley system can be used in theatre but it should be washed regularly, especially the wheels.

The Fiji Infection Control Manual (2002), recommends that all theatre equipments are scrubbed or wiped with soap and water before each day (or shift) begins, after each case and at the end of the each day (or shift). It also stressed the importance of scrubbing surfaces with soap and water is a more effective way to remove micro-organism.

Rainer and Russ (2005), emphasized proper cleaning of theatre surfaces between each case. It was also recommended that a trolley needs to be allocated for each theatre which must be kept clean regularly. An effective and efficient infection control management for operating theatres can be achieved, if less emphasis is placed on the type of trolley system used but instead on the regular cleaning of it. Also, those staffs handling the trolleys should practice basic hygiene, example hand washing, and promote patient participation. Infection control is everybody's responsibility.

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