

## Monitoring Of Clinical Indicators to Improve Nursing Services in Hospital A, Sharing Malaysia Experience

AR. Abdul Aziz

KPJ Penang Specialist Hospital, Malaysia

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**Abstract:** In Hospital A, four indicators were monitored for a period of two years from January 2014 to December 2015. The four indicators are the Percentage of intravenous (IV) line complications (needles out, redness of skin, infection of sites, extravasation), the percentage of nursing care plan completed on discharge, the percentage of staff trained in prevention and control of infection practices and surgical site infection rate (clean elective cases). A retrospective study was conducted for a period of two years from January to December 2014 and from January to December 2015 for the four nursing indicators. Data collected on monthly basis were plotted using bar chart for year 2014 and year 2015 and both charts are compared to see the trending for both years. Analysis was done on both years to see the impact of those indicators on nursing care for Hospital A. The percentage of intravenous line complication ranges from 1.6% to 3.4% with an average of 2.3% in 2014 and for 2015 the percentage of intravenous line complications ranges from 2.2% - 3.8% with an average of 3.2% which is much higher compared to 2014. The implementation of nursing care plan was monitored on monthly basis for 2014 and 2015. It was 100% achieved for the whole year of 2014. However in 2015, from July to November the nursing care plan ranges from 99% to 99.8% with an average achievement of 99.7%. Percentage of staff trained in prevention and control of infection practices for 2014 and 2015 was measured and it was found that for 2014 the percentage ranges from 3.2% to 42.1% with an average of 20.4%. Lower percentages were recorded in the month of March and December due to long school holidays where many staff was away. For 2015 the percentage ranges from 0.2% to 22.4% with an average of 8.2% which is very much lower compared to 2014. The lowest figure was recorded in December 2015 due to long school holidays and toward the end of the year. For surgical site infection rate (clean elective cases), there was only one case reported in April 2014 where patient undergone emergency LSCS and was discharged well after a few days of admission. One week later the patient was readmitted with a complaint of swelling and pus produced from the wound. For 2015 there was no surgical site infection reported.

**Keywords:** clinical nursing indicators, improve nursing services, intravenous (IV) line complications, surgical site infection rate.

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### I. Introduction

Florence Nightingale began efforts to define the quality of nursing practice as she worked to improve hospital conditions and measure patient outcomes. Research linking hospital nurse staffing issues and adverse patient outcomes has caught the attention of those both inside and outside of health care. Between the '90s and the early 2000s, numerous studies were done regarding the era of the nursing shortage, burnout and job dissatisfaction. The media and the public became interested in the conclusions of these studies when it was reported that under-staffing was associated with increased mortality. Due to this attention it has helped to pave the way for measuring other indicators that relate to the quality of care.

Every nurse knows that patients have different needs from one another and the safety and quality of the care they give can make all the difference to patients and their families. In order to meet those needs, nurses draw on their knowledge and skills, use experience, intuition and creativity. What matters most to those they care is the belief in their own practice in term of competency. The effects of care need to be captured through measuring the quality of care which is central to providing services that are more transparent, accountable and focused. In 1996 a team of researchers used the term "nursing-sensitive indicators" to reflect elements of patient care that are directly affected by nursing practise. These indicators are said to reflect three aspects of nursing care: process, structure, and outcomes.

- Process indicators which measure methods of patient assessment and nursing interventions including nursing job satisfaction
- Structural indicators include the supply, the skill level, the education and certification levels of nursing staff.
- Outcome indicators reflect patient outcomes that are determined to be nursing-sensitive because they depend on the quantity or quality of nursing care. These include things like pressure ulcers and falls. Other types of patient outcomes are related to other elements of medical care and are not considered to be nursing-sensitive such as hospital readmission rates and cardiac failure.

Nurses should consider the continuous improvement in care quality as a dynamic and comprehensive identification of the factors involved in the work process of the nursing team and requires these professionals to implement actions and to develop instruments that allow a systematic evaluation of the levels of quality of the care provided. In order to gauge the quality of care accurately, it is worth highlighting the importance of working with evaluation of the outcomes of patient care so that analysis in the intra-and extra-institutional areas can be done consistently and comprehensively to enable nurses to reflect the different contexts of their professional practice. Some process measures are adopted simply because of ease of measurement without real consideration of their validated relationship with outcomes (Griffiths et al. 2008).

In order to generate improvement, the nursing quality indicator must be measurable, clear, objective and useful. The development of these indicators requires the search for principle points that indicate the need to consider the policies of care, education and management in health; the mission and the organizational structure; the programs and proposals for the work of the institutions; the human, material, financial and physical resources available; and meeting the expectations of the clientele.

Advances in nursing quality measurement have been made at an organisational level to put in place accountability systems that enable Directors of Nursing to report to Boards and feedback to teams about performance and areas for improvement (Donaldson et al. 2005). Some approaches draw on a balanced scorecard approach or an analytic hierarchy process (e.g. using a driver diagram) to link standards or objectives to measurement at organisation or department level (Chu et al. 2009). Nurse Managers can use clinical quality indicators recorded during the care process to flag up areas for further investigation, such as high infection rates in specific wards, or to monitor the effectiveness of interventions (Casey et al. 2006)

One of the indicator monitored to measure quality of nursing care is the intravenous infusion which is the most commonly performed surgical procedure in hospital wards and is a frequently used therapeutic regimen for hospitalized patients encompassing the entire spectrum of patient population and disease (Eremin, 1977). More than 50% of hospitalised patients require an intravenous cannula, of which up to 20% will develop peripheral venous thrombophlebitis (Nystrum B, 1983; Bregenzer T, 1998). The clinical consequences of PVT range from mild erythema to frank suppuration and systemic sepsis.

The first person to describe Intravenous thrombophlebitis is (Warthen, 1930) and he quoted that the vein wall becomes oedematous and painful from the constant flow of dextrose, which is mildly irritating on the third or fourth day. The lumen of the vessel is decreased by this oedema and the flow gradually diminishes. This succinct description remains as true today as it was over 50 years ago. The most common complication of intravenous infusion is thrombophlebitis (Curry, 1973) and is characterized by a painful local reaction often accompanied by erythema and oedema (Chamberland, 1977). Symptoms and signs usually last days or weeks. However (Hastbacka, 1965) reported that symptoms may persist for months. Complications will include suppuration (Ross, 1972; Curry, 1973; Arnold, 1977), septicaemia (Arnold, 1977) and rarely pulmonary embolism (Swanson, 1969) or death (Frazer, 1977). (Skajaa et al., 1961; Thaysen, 1973; Hessov et al., 1977)., defined infusion thrombophlebitis as "Redness and tenderness and oedema of the vein". However (Hastbacka, Al., 1965) defined it as "tenderness and/or erythema along the vein, incurred up to 14 days after the infusion". The duration of infusion is very important factor which influences the effect of other factors (Ross, 1972). There is a tendency for smaller veins to have a higher incidence of ITP but the series do not appear to be consistent and there is no clear evidence that any particular commonly used upper limb vein is more likely to develop ITP. Few authors agreed that larger veins are to be preferred (Jones, 1957; Swanson, 1969; Sketch et al., 1972; Eremin, 1977), but many patients prefer to have an intravenous infusion in the wrist or hand; for this is less restrictive than the antecubital fossa is utilized. There is no clear evidence that any particular commonly used upper limb vein is more likely to develop intravenous thrombophlebitis.

Prevention can be done by avoiding setting up or continuing an infusion unnecessarily. When prolonged intravenous therapy is required, it is recommended that the site of infusion be changed every 24 or 48 h where practical, as duration of infusion is an important factor. Adding certain drugs such as Heparin to the infusion solution will delay the development of ITP. In one study conducted by Daniell (1973), the addition of heparin 1000 i.u./litre of 5% Dextrose will reduce the incidence of ITP in a double-blind controlled study.

In order to support the continuous and efficient shared understanding of a patient's care history tools are needed that simultaneously aids sound intra and interdisciplinary communication and decisionmaking about the patient's future care. Such tools are vital to ensure that the continuity, safety, and quality of care endure across the multiple handovers made by the many clinicians involved in a patient's care. A primary purpose of documentation and recordkeeping systems is to facilitate information flow that supports the continuity, quality, and safety of care. Since recordkeeping systems serve multiple purposes (e.g., legal requirements, accreditation, accountability, financial billing, and others), a tension has arisen and is undermining the primary purpose of the record and instead fuelling discontinuity of care, near-misses, and errors. The more specialized types of documentation is the plan of care, which is a requirement by the hospital accreditation body such as the Joint

Commission(1,2). Though planning and plans should facilitate information flow across clinician providers there is little generalizable evidence about their effectiveness.

Quality of care is also monitored through nursing care plan which is a care plan flows from each patient's unique list of diagnoses and should be organized by the individual's specific needs. The plan is a means of communicating and organizing the actions of a constantly changing nursing staff and is a continuity of care. The updated plan is passed on to the nursing staff at shift change and during nursing rounds where the patient's needs are attended to. The care plan should specifically outline which observations to make, what nursing actions to carry out, and what instructions the client or family members require. They serve as a guide for assigning staff to care for the client. There may be aspects of the patient's care that need to be assigned to team members with specific skills.

The success of an infection control program depends on the understanding of the modes of transmission of infectious organisms and knowing how and when to apply the basic principles of infection prevention and control is critical. This responsibility applies to everybody working and visiting a healthcare facility, including administrators, staff, patients and carers. Preventing and reducing harms arising from hospital acquired infection depend on the application of a risk-management framework to manage 'human' and 'system' factors associated with the transmission of infectious agents. This approach ensures that infectious agents, whether common (e.g. gastrointestinal viruses) or evolving (e.g. influenza or multi-resistant organisms), can be managed effectively.

Microorganisms are the most infectious agents which exist naturally everywhere in the environment, and not all cause infection (e.g. 'good' bacteria present in the body's normal flora). Depending on the susceptibility of the host, several classes of microorganisms including bacteria, viruses, fungi and parasites can be involved in either colonisation or infection. With colonisation, there is a sustained presence of replicating infectious agents on or in the body, without the production of an immune response or disease. With infection, invasion of infectious agents into the body results in an immune response, with or without symptomatic disease. Transmission of infectious agents within a healthcare setting requires the following elements: a source or reservoir of infectious agents, a mode of transmission, susceptible host.

Infection is the result of a complex interrelationship between a host and an infectious agent and people vary in their response to exposure to an infectious agent. Some people never develop symptomatic disease even though exposed to infectious agents while others become severely ill and may die. On the other hand, some individuals may become temporarily or permanently colonised but remain asymptomatic where as others progress from colonisation to symptomatic disease either soon after exposure, or following a period of asymptomatic colonisation (AGFPCIH 2010). Also measured as an indicator for quality of nursing care is a surgical site infection which is an infection that occurs after surgery in the part of the body where the surgery took place. Surgical site infections can sometimes be superficial infections involving the skin only. Other surgical site infections are more serious and can involve tissues under the skin, organs, or implanted material. Centres for Disease Control and prevention (CDC) provides guidelines and tools to the healthcare community to help end surgical site infections and resources to help the public understand these infections and take measures to safeguard their own health when possible. Surgical site infection (SSI) continues to represent a significant portion of healthcare-associated infections. The impact on morbidity, mortality, and cost of care has resulted in SSI reduction being identified as a top national priority in the US Department of Health and Human Services Action Plan to Prevent Healthcare-Associated Infections. The majority of SSIs are largely preventable and evidence-based strategies have been available for over ten years and implemented in many hospitals, as nationally recognized by SCIP and SHEA in the US. Worldwide attention to safer surgery including prevention of SSI led to the development of the WHO Surgical Safety Checklist demonstrating the importance of teamwork and communication in addition to evidence-based care for preventing SSI (IHI).

## **II. Objectives**

To analyse the following nursing indicators for Hospital A for a period of two years from January 2014 to December 2015 :

1. Percentage of intravenous (IV) line complications (needles out, redness of skin, infection of sites, extravasation)
2. Percentage of nursing care plan completed on discharge
3. Percentage of staff trained in prevention and control of infection practices
4. Surgical site infection rate (clean elective cases)

## **III. Methodology**

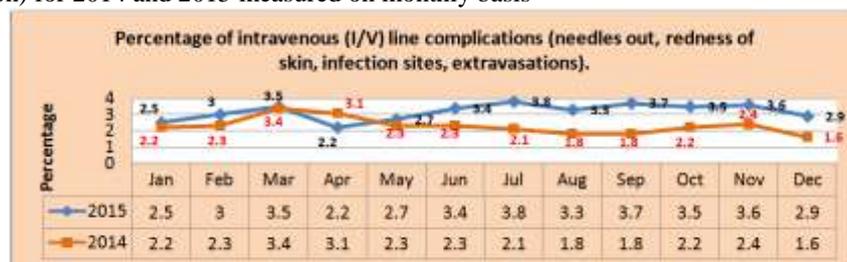
A retrospective study was conducted for a period of two years from January to December 2014 and from January to December 2015 for the following nursing indicators:

1. Percentage of intravenous (IV) line complications (needles out, redness of skin, infection of sites, extravasation)
2. Percentage of nursing care plan completed on discharge
3. Percentage of staff trained in prevention and control of infection practices
4. Surgical site infection rate (clean elective cases)

Data collected on monthly basis were plotted using bar chart for year 2014 and year 2015 and both charts are compared to see the trending for both years. Analysis was done on both years to see the impact of those indicators on nursing care for Hospital A.

#### IV. Results

- i. Percentage of intravenous (IV) line complications (needles out, redness of skin, infection of sites, extravasation) for 2014 and 2015 measured on monthly basis



For 2014 the percentage of intravenous line complication ranges from 1.6% to 3.4% with an average of 2.3%. Highest incidents were reported in March and April 2014 due to the increase in number of patients with intravenous line.

For 2015 the percentage of intravenous line complications ranges from 2.2% - 3.8% with an average of 3.2% which is much higher compared to 2014. Only month of January, April, May and December recorded the percentages of lower than 3%. The highest percentage was recorded in July which is 3.8% which was due to frequent changing of antibiotics and other drugs with high osmolality causing phlebitis. Peripheral access and immobilizing of the IVL site causing the IV needle to dislodge which require re-insertion of intravenous line.

- ii. Percentage of nursing care plan completed on discharge for 2014 and 2015 measured on monthly basis



For 2014 nursing care plan was 100% achieved. However in 2015, from July to November the nursing care plan ranges from 99% to 99.8% with an average achievement of 99.7%

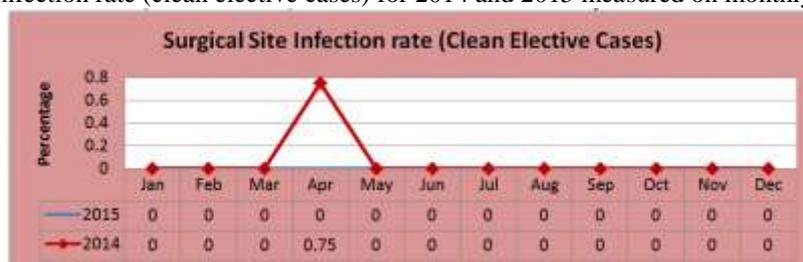
- iii. Percentage of staff trained in prevention and control of infection practices for 2014 and 2015 measured on monthly basis



For 2014 the percentage ranges from 3.2% to 42.1% with an average of 20.4%. Lower percentages were recorded in the month of March and December due to long school holidays where many staff was away.

For 2015 the percentage ranges from 0.2% to 22.4% with an average of 8.2% which is very much lower compared to 2014. The lowest figure was recorded in December 2015 due to long school holidays and toward the end of the year.

iv. Surgical site infection rate (clean elective cases) for 2014 and 2015 measured on monthly basis



For 2014, there was one case reported in April where patient undergone emergency LSCS and was discharged well after a few days of admission. One week later the patient was readmitted with a complaint of swelling and pus produced from the wound. For 2015 there was no surgical site infection reported.

#### IV. Discussion

This indicator was selected because it looks at patient safety and staff competency in the nursing services where the quality of nursing care provided for in-patients who are on intravenous therapy was measured. The intravenous line complications has an impact on the patient's health because it causes discomfort, pain and will increase cost due to longer patient's stay in the hospital. Intravenous line complications include infection of site, extravasation and needles being out. Infection of intravenous sites characterized by pain, tenderness, warmth, localized swelling and redness at or around the intravenous insertion site. The accidental administration of intravenous (IV) infused medications into the extravascular space/tissue around infusion sites characterized by swelling and redness around the site is called extravasation.

The percentage of intravenous line complication in hospital Aranges from 1.6% to 3.4% with an average of 2.3% in 2014. Highest incidents were reported in March which is 3.4% and April 2014 which is 3.1% due to the increase in number of patients with intravenous injection. For 2015, the percentage of intravenous line complications ranges from 2.2% - 3.8% with an average of 3.2% which is much higher compared to 2014. The highest percentage was recorded in July which was 3.8% due to frequent changing of antibiotics and other drugs with high osmolality causing phlebitis. Peripheral access and immobilizing of the IVL site causing the IV needle to dislodge which require re-insertion of intravenous line. In one study conducted by Schonauer V. et al (2003), it was found that the rate of intravenous thrombophlebitis was 7.3% which is much higher compared to the data collected from hospital A.

In another study conducted by AR Abdul Aziz et al (2013) in another private hospital in Malaysia, the rate recorded was much higher. The average rate of intravenous thrombophlebitis reported in this hospital was 6.8% before the implementation of the special protocol but reduced to 3.1% in year 2012 after the implementation of the special protocol. Based on the continuous monitoring it was found that from January to June 2013, the rate reduced to 2.52%. Percentage of nursing care plan completed on discharge was selected because it measures the quality of nursing care provided for inpatients. Nursing Care Plans are used to provide individualized patient focused care and act as tools needed for the Nursing Process. The nursing care plan outlines the nursing care to the patient which is a set of actions the nurse will implement to resolve/support nursing diagnosis identified by nursing assessment. The plan is an immediate stage of the nursing process which provides guidance in the ongoing provision for nursing care and provides assistance in the evaluation of the care. In order to ensure the desired outcomes of care, the implementation, evaluation and continuous assessment are required to achieve the desired outcomes of care.

Nursing documentation covers a wide variety of issues, topics, and systems. Researchers, practitioners, and hospital administrators view recordkeeping as an important element leading to continuity of care, safety, quality care, and compliance (Huffman, 2004). Studies, however, reveal surprisingly little evidence of the linkage between recordkeeping and these outcomes. The literature features multiple exhortations and case studies aimed at improving nurses' recordkeeping in general (Caldwell, 2000) or for specific diagnoses. (McMath E, 2004) All patients admitted shall have an initial assessment process for patients where nursing needs are identified and the nursing care plan completed within 24 hours of admission followed by re-assessment. Total number of patients who had Nursing Assessment and Nursing Care Plans developed within 24 hours will be compared to the total number of patients admitted during the study period.

A few studies examined the completeness of nursing documentation utilizing chart review and audit as a methodology. Croke, EM (2003) cites failure to document as one of the six top reasons that nurses face malpractice suits. In terms of overall completeness, Stokke TA and Kalfoss, MH (1999) found many gaps in

nursing documentation in Norway. Care plans, goals, diagnoses, planned interventions, and projected outcomes were absent between 18 percent and 45 percent of the time. Taylor C (2002) found that many of the care plans reviewed did not convey the specific information necessary to carry out the required procedure. One third of the nurses in this study mentioned accessing written documentation but did not express any preference for care plans (Strauss, 1997) One reason for the emphasis on nursing documentation may be the increasing need for secure and accurate transfer of patient-related information between different caregivers (Socialstyrelsen, 2000). The patient record is a principal source of information in which the nursing documentation of patient care is an essential component.

In one study conducted by Catrin Björvell (2002), it was found that training RNs to use a structured documentation system improves their record-keeping and care planning skills. However, such a system is not sufficient. There are likely other factors in the organisation of the clinical practice that influence the action of documenting nursing care in addition to lack of knowledge and practice.

Based on the data collected in Hospital A, it was found that for the whole year 2014, 100% nursing care plan was completed on discharge. However for year 2015, only 99% of the nursing care was completed for the month of July, August and September. The percentage was slightly higher in October which recorded 99.6% and 99.8% in November. In December the nursing care plan was 100% completed upon discharge.

Hospital acquired infections (HAIs) is a major safety concern for both health care providers and the patients. Considering morbidity, mortality, increased length of stay and the cost, efforts should be made to make the hospitals as safe as possible by preventing such infections (Plowman R, 1999)

The goals of infection control and prevention training are to educate health professionals regarding the transmission of pathogens in the work environment such as from patient to healthcare worker, healthcare worker to patient, patient to patient, and within the same patient. This type of infection is called endogenous infection. It also apply current scientifically accepted infection control principles as appropriate for the specific work environment to minimize opportunity for transmission of pathogens to patients and healthcare workers. The training conducted will familiarize professionals with the law requiring this training and the professional misconduct charges that may result from failure to comply with the law.

Infection prevention and control measures are important to nursing care and nurses. As regulated health professionals, nurses are accountable for their practice and in order to meet this requirement they should practise according to the standards set out by their nursing colleges, which guide the knowledge, skills, judgment and attitudes they need to practise safely. Even though clinical practices change as science and technologies evolve, the principles of prevention, transmission and control in everyday nursing practice remain the same. The rationale to monitor the percentage of staff trained in prevention and control of infection practices in Hospital A is because it reflects the delivery of safe patient care in this hospital. Healthcare Associated Infection is a significant problem in hospitals which impact the safety of patient, staff and visitors. The Hospital Infection Control and Antibiotic Committee is responsible to coordinate and monitor the training of all staff to ensure the effectiveness of the hospital's Prevention and Control of Infection program. Training on Infection Control can be defined as specific training on aspects of prevention and control of infection including in-house training. Trainings are conducted for all staff including specialists, medical officers, house officers, nursing staff and students. Based on the data collected it was found that for 2014 the percentage ranges from 3.2% to 42.1% with an average of 20.4%. Lower percentages were recorded in the month of March and December due to long school holidays where many staff was away. For 2015 the percentage ranges from 0.2% to 22.4% with an average of 8.2% which is very much lower compared to 2014. The lowest figure was recorded in December 2015 due to long school holidays and toward the end of the year.

Surgical Site Infection Rate (Clean Elective Cases) was chosen as indicator in Hospital A to reflect the delivery of safe patient care because surgical site infection is a significant nosocomial infection problem in hospital which will effect patient safety. Timely investigating the data of higher infection rate will identify the causes so that preventive measures can be taken. Clean Surgery is a surgery in patients with no prior laceration wound at the surgical site present of wound/sore/infection in the body, or present of acute severe soft tissue injury. Wound infection includes both the superficial and deep infection (CDC guideline). Through the monthly monitoring of surgical site infection in Hospital A for the whole year 2014 and 2015, it was found that only one incidence that had happened in April 2014 where patient had undergone emergency LSCS and was discharged home with no complication. However the patient was readmitted after 1 week complaining of swelling and pus surrounding the wound. Treatment was given after admission but due to the financial constraint, the patient had requested to be treated at the public hospital. For the whole year of 2015 there was no reported case.

Infection at or near surgical incisions within 30 days of an operative procedure, is called surgical site infection which contributes substantially to surgical morbidity and mortality each year. Surgical site infection (SSI) accounts for 15% of all nosocomial infections and, represents the most common nosocomial infection among surgical patients (Watanabe 2008).

Surgical Sites Infection (SSI) involved only the skin and subcutaneous tissue of the incision. In superficial infection according to Centers for Disease Control and Prevention (CDC), the patient will have one of the following signs such as purulent drainage from the superficial incision, organisms isolated from an aseptically cultured fluid or tissue from the superficial incision. Besides that, the patient also will have at least one of the following signs or symptoms of infection such as pain or tenderness, localized swelling, redness or heat or superficial incision is deliberately opened by surgeon, unless incision is culture negative. The diagnosis of superficial incisional SSI will be made either by the surgeon or attending physician.

Deep Infection involved deep soft tissues (e.g. fascia and muscle layers) of the incision and the patient will have at least one of the following signs and symptoms such as purulent drainage from the deep incision but not from the organ/space component of the surgical site, a deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has fever (> 38 degree C) or localized pain or tenderness, an abscess or other evidence of infection involving the deep incision is found on direct examination, during re-operation, or by histopathologic or radiologic examination or diagnosis of deep incisional surgical site infection by a surgeon or attending physician.

The cut-off point to be considered in SSI is 3 months post-surgery. Therefore, all the clean elective operative patients must be seen or reviewed within three months post-surgery.

Postsurgical infection leads to increased length of postoperative hospital stay, drastically escalated expense, higher rates of hospital readmission, and jeopardized health outcomes. Accordingly, the first step in the treatment of SSIs is in their prevention. This encompasses meticulous operative technique, timely administration of appropriate preoperative antibiotics, and a variety of preventive measures aimed at neutralizing the threat of bacterial, viral, and fungal contamination posed by operative staff, the operating room environment, and the patient's endogenous skin flora. It is this latter aspect of contamination, and specifically mechanical methods of prevention, on which this review focuses.

## **VI. Conclusion**

For Hospital A, the percentage of intravenous line complication ranges from 1.6% to 3.4% with an average of 2.3% in 2014 and for 2015 the percentage of intravenous line complications ranges from 2.2% - 3.8% with an average of 3.2% which is much higher compared to 2014. The highest percentage was recorded in July 2015 which is 3.8% which was due to frequent changing of antibiotics and other drugs with high osmolality causing phlebitis. Peripheral access and immobilizing of the IVL site causing the IV needle to dislodge which require re-insertion of intravenous line.

The implementation of nursing care plan was monitored on monthly for 2014 and 2015. It was 100% achieved for the whole year of 2014. However in 2015, from July to November the nursing care plan ranges from 99% to 99.8% with an average achievement of 99.7%.

Percentage of staff trained in prevention and control of infection practices for 2014 and 2015 was measured and it was found that for 2014 the percentage ranges from 3.2% to 42.1% with an average of 20.4%. Lower percentages were recorded in the month of March and December due to long school holidays where many staff was away. For 2015 the percentage ranges from 0.2% to 22.4% with an average of 8.2% which is very much lower compared to 2014. The lowest figure was recorded in December 2015 due to long school holidays and toward the end of the year.

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