

## Impact Of A Special Protocol (Integrated Intravenous Care) To Reduce Intravenous Thrombophlebitis: Sharing The Experience Of Kpj Seremban Hospital Malaysia

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**Abstract :** A retrospective study was conducted for a period of two years from January to December 2011 before the implementation of a special protocol and from January to December 2012 after the implementation of the special protocol to reduce the rate of Intravenous thrombophlebitis. The study only included all peripheral IV site inserted to patients above 12 years old. In October 2011, a special protocol (integrated intravenous care) was approved by the Infection control committee of the hospital to be implemented in order to reduce the rate of intravenous thrombophlebitis and the protocol was implemented starting January 2012. The average rate of intravenous thrombophlebitis for year 2011 was 6.8% before the implementation of the special protocol and the rate reduced to 3.1% in year 2012 after the implementation of the special protocol. Continuous monitoring was done and it was found that from January to June 2013 the rate reduced further to 2.52%. Therefore the special protocol that was implemented managed to reduce the rate of intravenous thrombophlebitis in KPJ Seremban.

**Keywords:** Intravenous thrombophlebitis, special protocol, integrated intravenous care, infection control committee

### I. Introduction

The most commonly performed surgical procedure in hospital wards is an i.v. infusion 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 i.v. infusion is thrombophlebitis (Curry, 1973) and is characterized by a painful local reaction often accompanied by erythema and oedema (Chamberland, 1977). Symptoms 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 (Hastback et al., 1965) defined it as tenderness and/or erythema along the vein, incurred up to 14 days after the infusion".

Dinley (1976) had classified the infusion thrombophlebitis according to the following criteria:

Grade 0 " Puncture wound clean, no reaction or discomfort."

Grade 1 " Slight tenderness may be present at the infusion site. Induration around the vein and no pain on speeding up the infusion rate and no evidence of phlebitis."

Grade 2 " Tenderness, over cannula and just proximal to it with mild discomfort at the infusion site. Slight discomfort on increasing the infusion rate. Erythema around the cannula site, but not extending beyond the tip of the cannula."

Grade 3 "Constant moderate to severe pain when the intravenous rate is increased. Moderate discomfort at the intravenous site. Erythema extending to less than five cms. proximal to the tip of the cannula."

Grade 4 "Moderate to severe discomfort at the intravenous site. Infusion usually markedly slowed or ceased spontaneously. Erythema greater than five cms. proximal to the tip of the cannula."

Grade 5 "As for grade 4, but pus seen at the infusion site on removal of the cannula."

There was limited histopathological study of human veins following intravenous thrombophlebitis (Thomas, 1970). In one study conducted by Ghildyal, (1975), a small piece of vein was removed under local anaesthesia from each of 50 patients with ITP. They also studied bacteriologically the tips of catheters, needles and other infusion devices and found that histological changes were categorized as mild, moderate or severe with mild changes in 23 specimens consisted of swelling of endothelial cells and PMN leucocyte infiltration in the tunica media. A further 18 specimens displayed cellular destruction and cellular breakdown of the endothelium. Oedema, PMN leucocyte infiltration and pyknotic nuclei of muscle cells were seen in the tunica media. The remaining nine were severely affected, with destruction of endothelium, cell nuclei pyknosis in the media with oedema and PMN leucocytic infiltration. Additionally, there was haemorrhage and necrosis of the wall. The damage was most severe when a thrombus was present. Five positive cultures of catheters or i.v. devices grew either *Staphylococcus aureus* (two), *Streptococcus haemolyticus* (two) or *Pseudomonas pyocyanea* (one). In conclusion they found that there was little or no correlation between the bacterial cultures and phlebitis in their study.

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 i.v. 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.

Dinley (1976) showed that the incidence of venous reactions was related to the cannula material. He used cannula of four types of material. Fluoroethylene propylene Teflon cannulae caused less reactions than tetrafluoroethylene Teflon. Polyvinylchloride and polyethylene cannulae were more irritant than either type of Teflon. Hecker (1980) measured thrombus formation associated with seven types of cannula made of polyethylene, polypropylene and types of Teflon and found a significant difference of greater than two-fold in the amount of thrombus formed. Greater experience in performing venepuncture decreases the incidence of ITP (James 1954). Watt (1977) was concerned that the trauma of insertion provides bacterial access to the circulation. Eremin and Marshall (1977) suggested that trauma is more likely to occur to smaller veins at the time of insertion of the cannula and they felt that plastic cannula inserted through an i.v. needle may be associated with less trauma to the vein than the plastic cannula inserted as a sheath around the venepuncture needle. They found that complications were highest with the latter type of cannula and, also, highest in small veins.

Some drugs will cause infusion thrombophlebitis. As reported by Thomas, Evers and Racz (1970), potassium chloride added to an infusion increased the risk of phlebitis. Hastbacka and co-workers (1965) reported that injection of undiluted pethidine increased the incidence of ITP by about one-third. A histamine-like reaction along the course of the vein followed pethidine administration in 25% of cases.

Prevention can be done by avoiding setting up or continuing an infusion unnecessarily. When prolonged i.v. 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.

## **II. Objectives:**

- i. To monitor the rate of Intravenous thrombophlebitis in KPJ Seremban
- ii. To see the impact of various interventions to bring down the rate of Intravenous thrombophlebitis.

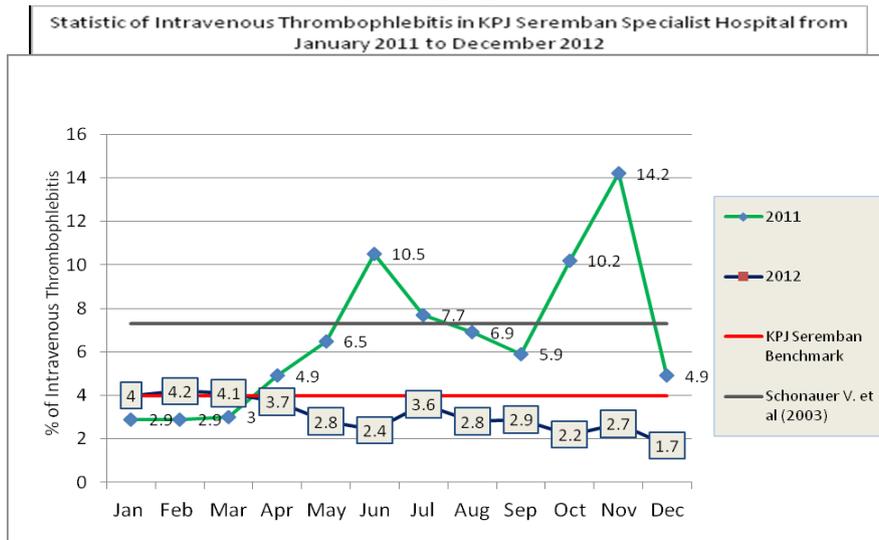
## **III. Methodology**

A retrospective study was conducted for a period of two years from January 2011 to December 2011 before the implementation of a special protocol and from January 2012 to December 2012 after the implementation of the protocol to reduce the rate of ITP. The study only included all peripheral IV site inserted to patients above 12 years old. In October 2011, data on intravenous thrombophlebitis were presented to the Infection control committee of KPJ Seremban Specialist Hospital and it was agreed by the committee to develop a special protocol to reduce the incidences. This protocol was called a special interventions procedures to be carried out by the health care providers and this protocol will be implemented effective January 2012. The various interventions carried out were as follows:

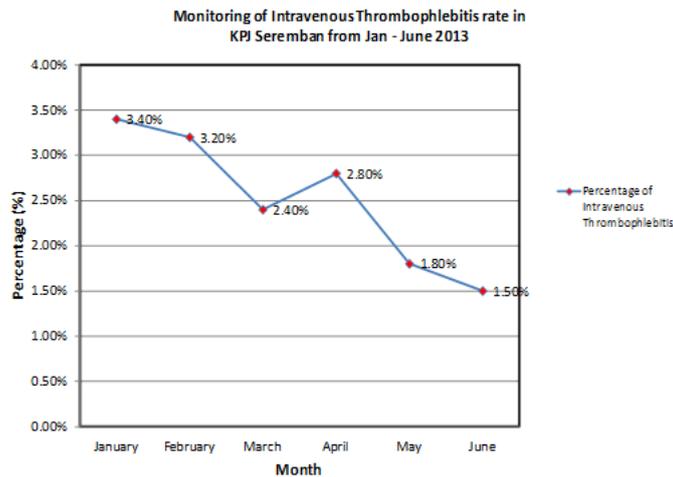
- i. Hand washing
  - Perform hand hygiene before and after contact with Intravenous catheter site (WHO,2004)
- ii. Aseptic technique
  - Maintain aseptic technique when performing the insertion procedure
  - Maximum barrier precaution including sterile gown, glove, mask, surgical scrub and large sterile drape should be used for midline, PICC, arterial and central line insertion (Weinstein,2007)
- iii. Replacement of Intravascular Catheter
  - Replacement of intravenous catheter within 72-96 hours only for adults case to prevent phlebitis. Exception for paediatric cases
  - Promptly remove any intravascular catheter that is no longer essential
  - Replace catheter as soon as possible if the adherence to aseptic technique cannot be ensured e.g emergency situation (MOH)
- iv. Replacement of Catheter site Dressing
  - Change catheter site dressing if the dressing becomes damp, loosened or visibly soiled.
  - Replacement of IV dressing : Short term CVC
    - Gauze dressing : change at least every 2 days
    - Transparent dressing : change at least every 7 days (CDC,2011)
- v. Inspection and Monitoring
  - Close monitoring of intravenous catheter site using checklist
  - Evaluate the catheter insertion site daily by palpation through the dressing to discern tenderness and by inspection if a transparent dressing is used (CDC,2011)
- vi. Others
  - Avoid shaving skin site; use hair clipping
  - Insert cannula into vein, preferably in an upper limb, using no touch technique (Josephson, 2004)

Continuous monitoring was done from January 2013 onwards to see the rate of intravenous thrombophlebitis in this hospital.

#### IV. Results



Average % of intravenous iv thrombophlebitis for year 2011 was 6.8%  
 Average % of intravenous iv thrombophlebitis for year 2012 was 3.1%



#### V. Discussion

Based on the data collected it was found that ,before the implementation of the special protocol (January – December 2011) , the intravenous thrombophlebitis rate varies from 2.9% to 15.2%. The average rate for year 2011 was 6.8% .In one study conducted by Schonauer V. et al (2003) , it was found that the rate of intravenous thrombophlebitis was 7.3% . Therefore when we used this data as the benchmark we found that the rate was higher for the month of June, July, October and November 2011.However after the implementation of the special protocol in January 2012 it was found that the intravenous thrombophlebitis rate was lower than 7.3% for the whole year of 2012 starting from January to December 2012. The average rate for year 2012 was 3.1% Therefore we can see that the implementation of the special protocol managed to reduce the intravenous thrombophlebitis rate in KPJ Seremban from 6.8% in year 2011 to 3.1% in year 2012 which is much lower compared to the rate reported by Schonauer V. et al in year 2003.

During the infection control committee meeting in April 2012, based on the data collected from January to March 2012, it was agreed by the committee to set the benchmark of 4% for the intravenous thrombophlebitis rate in KPJ Seremban. It was found that from April to December 2012, the rate was lower than 4%. Continuous monitoring was done by the Infection Control Officer to record the rate of intravenous thrombophlebitis in this hospital. Based on the data collected from January to June 2013, it was found that the rate was much lower than 4%.The average rate from January to June 2013 was 2.52% which is lower compared to the rate from January to December 2012. Therefore the special protocol that had been implemented managed to reduce the rate of intravenous thrombophlebitis and the organization managed to achieve the set target of 4% as per the approval by the Infection control committee .

In KPJ Seremban from year 2011 until June 2013 ,there was no reported complications of intravenous thrombophlebitis .However patients will not feel comfortable and will tarnished the good name of the organization.

## VI. Conclusion

The implementation of the special protocol(integrated intravenous care) was effective in reducing the rate of intravenous thrombophlebitis in KPJ Seremban Specialist Hospital. The rate was reduced from 6.8% in year 2011 to 3.1% in year 2012 and further reduced to 2.52 for the first half of year 2013.

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