Hospital Practice

A study of the use of intravenous cannulas for medical emergencies in Newham – implications for financial savings

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Summary: A study of intravenous (i.v.) cannula usage for medical emergencies admitted to hospitals in the Newham Health District was undertaken during two defined periods (24 and 35 days). Almost half the cannulas inserted (47%) were not flushed following an initial bolus injection of heparinized saline. The duration that cannulas remained in a vein ranged from 24 hours to 8 days (median 2 days) and inflammation around the cannula site was related to the length of time since insertion but unrelated to whether the cannula was flushed regularly or to the type of fluid used. Our findings indicate a substantial wastage of i.v. cannulas due to difficulties with insertion and suggest that isotonic saline, without heparin, is effective in maintaining cannula patency for 48 hours.

It is concluded that these findings are not unique to the Newham Health District and worthwhile financial savings should be achieved throughout the NHS if clinicians reconsider the indications and use of i.v. cannulas for their patients.

Introduction

The use of indwelling intravenous cannulas for intermittent or continuous infusion and drug therapy is commonplace and they are often inserted into the forearm veins of patients admitted for medical emergencies, even when there is no immediate need for them. Despite the widespread nature of this practice there is little information about its effectiveness. Previous studies have considered the incidence of cannula-related phlebitis and sepsis^{1,2,3} and one study has compared the advantages of maintaining cannula patency by intermittent flushing with heparinized saline or isotonic saline alone.⁴ There are no recent reports of the use of i.v. cannulas in National Health Service Health Districts. This study had two aims. The first was to discover the number of intravenous cannulas used during a defined time interval for the acute medical admissions to hospitals in Newham, and relate it to the age and admission diagnosis of the patients. The second was to determine whether cannulas were flushed by a saline solution at regular intervals after their insertion and whether the addition

of heparin to isotonic saline helped to maintain patency or to prevent phlebitis.

Patients and methods

The intravenous (i.v.) cannulas used were Venflon 18 g/1.2 mm Teflon cannula, 45 mm in length, manufactured by Viggo AB, Helsingborg, Sweden. The two acute hospitals in the Newham Health District serving a catchment population of 210,000, are Newham General Hospital (403 beds) and St. Andrew's Hospital (297 beds). Acute medical emergencies are admitted through the Casualty Department at Newham General Hospital whereas patients are referred by local general practitioners or the Emergency Bed Service to a receiving room at St. Andrew's. In order to answer our questions we divided the study into two phases. Throughout the study the junior medical staff were not informed of the precise nature of the investigation but they were told that a record was being held of all medical admissions.

Phase 1 All medical emergencies admitted to either hospital during a 24 day period were monitored and details of age, sex and admission diagnosis recorded. Those patients in whom an i.v. cannula was inserted

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were visited each day by the ward pharmacist who answered a simple questionnaire about the cannula. In this way a record was kept of how long the cannula remained in place, whether it was flushed on a regular basis, by what type of solution and whether the insertion site appeared inflamed. The presence of either erythema, or tenderness, or local warmth was taken as an indication of inflammation.

Phase 2 During this part of the investigation (35 days) a record of all medical emergencies admitted through the receiving room at St. Andrew's Hospital was made. For the first 14 days the receiving room nursing staff kept a record of the numbers of cannulas successfully inserted and those discarded. In addition, a record was made as to whether the cannulas were immediately flushed after insertion and the type of fluid used. During the next 21 days of the study, with the agreement of consultant colleagues, 5 ml 0.9% normal saline ampoules were substituted for heparinized saline ampoules (10 units of heparin per ml, Hepsal manufactured by Weddel Pharmaceuticals Ltd.). The record by the nurses about flushing of cannulas was maintained but on this occasion the patients were observed over 48 hours. The cannula patency was assessed by a bolus injection of 5 ml isotonic saline: grade 1 patency denoted easy flushing, grade 2 some difficulty and grade 3 occluded. In addition, a record was kept of any evidence for inflammation surrounding the cannula.

Results

The details of 198 patients (57% female, 43% male; mean age 63 years, age range 17 to 95 years) with an intravenous cannula inserted on admission were recorded during the 2 phases of the study. The patients' presenting diagnoses were chest pain of uncertain origin in 60%, and cerebrovascular accident, bronchitis, cardiac failure or gastrointestinal haemorrhage in 35%. The diagnosis in 5% of cases included collapse, confusional state, alcohol withdrawal and tonsillitis.

Phase 1 The total number of patients in whom i.v. cannulas were inserted was 117. The cannulas were left in place for a median of 2 days (see Figure 1). The assessment by the ward pharmacist showed that 31% were maintained by a constant intravenous infusion and 22% by regular flushing with 5 ml of heparinized saline but 47% were flushed only when inserted. A linear increase in the incidence of inflammation or phlebitis around the cannula site was recorded by the ward pharmacist during the days after insertion (Figure 2), which was unrelated to whether the cannula was flushed or not, the type of solution used

Figure 1 The length of time cannulas (Venflon) remained in a vein following insertion for phase 1 of the study (117 patients).

and the severity of the patient's illness. No record, unfortunately, was kept of the skin preparation before insertion of the cannula; the usual practice, however, was wiping with a sterile swab saturated with 70% isopropyl alcohol.

Phase 2 Thirty patients admitted through the receiving room to St. Andrew's Hospital during the first period of the study had i.v. cannulas inserted but 40 cannulas were used, a 36% wastage due to difficulties with insertion. Almost all the cannulas (29) were immediately flushed after insertion, 17 by continuous i.v. infusion, 8 by a bolus injection of Hepsal and 3 by a bolus of antibiotics. The 8 cannulas which were immediately flushed by a bolus of heparinized saline, were not subsequently flushed on the ward. During the

Figure 2 The incidence of inflammation around the cannula (Venflon) site observed during the days after insertion for phase 1 of the study (117 patients). The number of cannulas showing inflammation are expressed as a percentage of the total number still in place.

final 21 day period 51 patients had cannulas inserted. Of these, 20 were flushed immediately after insertion with a bolus of isotonic saline, the remainder by a constant infusion of antibiotics. Thirteen of the 20 cannulas were removed by 48 hours but the ward pharmacist confirmed that their removal was not because of inflammation. Of the remaining 7, 5 were easily patent (grade 1) when flushed with isotonic saline at 48 hours while 2 had grade 2 patency; one cannula site showed early evidence for inflammation.

Discussion

This study shows that a large number of patients with medical emergencies admitted to hospital in the Newham Health District have an indwelling intravenous cannula inserted irrespective of age and presenting diagnosis. These cannulas may remain in the same vein for periods up to 8 days and relatively few are flushed on a regular basis. We found evidence for considerable cannula wastage owing to insertion difficulty and a high incidence of inflammation around the cannula site in those successfully placed.

We do not consider this experience to be unique to Newham District. The period chosen for the study coincided with the middle of the pre-registration house staff second appointment by which time they had become proficient in the procedure of cannula insertion. The small number of cannulas flushed on a regular basis is probably explained by the strict enforcement of the General Nursing Council recommendations for i.v. drug administration in Newham. Nevertheless, we found no difference in the incidence of cannula-related phlebitis when we compared those regularly flushed by a bolus injection of heparinized saline, those maintained by a continuous infusion and those cannulas which were not flushed. Furthermore, our results are very comparable to previous reports.^{2,3} It does not appear likely that the incidence of phlebitis was related to the type of cannula used: a previous study found no difference in the incidence of infection

or inflammation when comparing the use of stainless steel, polypropylene and Teflon cannulas.³

Although the numbers are small, the results from the second phase of the study would appear to support the suggestion that a single bolus of isotonic saline immediately following the insertion of an i.v. cannula is effective in maintaining its patency for 48 hours. In addition, there was no evidence that this practice increased the incidence of inflammation around the cannula. These findings are in line with a study by Epperson who reported no significant difference in the loss of patency or the incidence of phlebitis during a double-blind controlled study of heparinized saline and isotonic saline alone flushed through the cannula on a regular basis.⁴

Our findings suggest that a reappraisal by consultant and junior medical staff of the use of intravenous cannulas for medical patients may lead to substantial financial savings. Newham Health District spends £12,500 per annum on the purchase of i.v. cannulas; even abolishing the wastage on insertion could achieve useful savings, and £1500 each year would be saved by the substitution of isotonic saline for heparinized saline to flush the cannulas. We suspect that significant savings could be made each year when considering the National Health Service as a whole.

On the basis of our findings, we advise clinicians of all grades to reconsider whether intravenous cannulas are being overused. We are recommending in our Health District that isotonic saline is substituted for heparinized saline to flush i.v. cannulas and that cannulas are removed or resited by 48 hours.

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