

Infection control in anaesthesia in regional, tertiary and central hospitals in KwaZulu-Natal. Part 1: Unsafe injection practices among anaesthetists

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Abstract

Objectives: Unsafe injection and vial usage practices, including the reuse of needles and syringes for different patients, is one of the leading causes of the iatrogenic spread of blood-borne diseases. A study was conducted to determine the prevalence of the reuse of single-patient syringes and spinal fentanyl ampoules among anaesthetists at regional, tertiary and central hospitals in KwaZulu-Natal.

Method: All hospitals that are classified as regional, tertiary and central hospitals on the KwaZulu-Natal Department of Health website were visited. All encountered anaesthetists, regardless of rank or experience, were invited to complete a simple questionnaire in confidence.

Results: Ninety-one anaesthesiologists and anaesthetic practitioners completed the questionnaire. Thirteen (14%) of the anaesthetists admitted to reusing syringes on different patients. Seventeen (19%) of the anaesthetists admitted to reusing syringes on different patients after they had changed the needle or set. Fifty-seven (63%) practitioners acknowledged reusing single-use fentanyl ampoules for multiple patients.

Conclusion: The reuse of single-use syringes and single-use vials for multiple patients is an unacceptable practice. This issue should be urgently addressed.

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Introduction

The first and largest iatrogenic outbreak of blood-borne disease in history relates to the practice of reusing syringes and needles. In the 1960s in Egypt, a campaign for the treatment of schistosomiasis resulted in the infection of 10% of Egypt's adult population with hepatitis C by the 1980s.^{1,2} A report by the World Health Organization (WHO) in 2002 estimated that approximately 260 000 human immunodeficiency virus/acquired immune deficiency syndrome cases, 2 million hepatitis C infections and 21 million hepatitis B infections per annum occur as a result of the reuse of syringes and needles.³ In 2000, this practice was responsible for 40% of hepatitis C infections, 32% of hepatitis B infections, 28% of hepatoma cases, 24% of hepatic cirrhosis cases and 5% of retroviral infections.^{4,5}

Chant et al reported the reuse of a local anaesthetic vial or syringe at a private Australian clinic that resulted in the infection of four patients with human immunodeficiency virus (HIV).⁶ In 2010, the Association for Professionals in Infection

Control and Epidemiology noted that in the previous decade, unsafe vial, injection and infusion practices had resulted in more than 35 outbreaks of viral hepatitis in the USA. More than 100 000 patients had been exposed to infectious hepatitis.⁷ Anaesthetists have been implicated in most of these outbreaks. An outbreak in Nevada, USA in 2008 received significant media scrutiny. More than 63 000 patients were identified as being at risk of acquiring hepatitis C infection, and it was confirmed that at least 115 people had contracted the disease.^{8,9} It was noted in an investigation report that when an anaesthetist was asked whether he utilised a used propofol vial on new patients, his response was that he had "changed the needle and reused the same syringe".¹⁰

In our setting, with its high prevalence of HIV and viral hepatitis, the risk of iatrogenic transmission of blood-borne pathogens from unsafe injection and vial practices has significant implications. Therefore, a survey was conducted to determine the prevalence of the reuse of single-patient syringes and spinal fentanyl ampoules among anaesthetists at regional, tertiary and central hospitals in KwaZulu-Natal.

Method

Research approval was obtained from the Biomedical Research Ethics Administration and the Postgraduate Education Committee of the University of KwaZulu-Natal. Thereafter, further permission was obtained from the KwaZulu-Natal Department of Health, and the respective hospital managers of all hospitals that were classified as regional, tertiary and central hospitals on the KwaZulu-Natal Department of Health website.¹¹ Fifteen hospitals were visited. This included one central, two tertiary and 12 regional level hospitals. Names of the hospitals and anaesthetists were kept confidential. All encountered anaesthetists, regardless of rank or experience, were invited to complete a simple questionnaire in confidence. The importance of responses that reflected actual working practice was emphasised. After completion, the respondents were asked to place the folded questionnaire into an allocated common folder or box to maintain anonymity. The questionnaire is shown in Figure 1.

Results

Ninety-one anaesthetists or anaesthetic practitioners completed the questionnaire. The results are tabulated in Table I.

Discussion

Generally, the inscription “single use only” is contained on the packaging of a syringe or on the syringe itself. Infection control literature clearly emphasises that after contact with a patient or attachment to infusions, a syringe and needle should be considered to be contaminated and must never be reused on another patient.¹²⁻¹⁴ However, 14% of the participating anaesthetists admitted to the reuse of syringes

Figure 1: Questionnaire relating to the study of infection control in anaesthesia

<p>Question 1 In the last 24 months, have you ever used a syringe, e.g. that contains emergency drugs or analgesics, on one patient and then given the remaining drug to another patient? Answer: Yes/No</p>
<p>Question 2 In the last 24 months, have you ever used a syringe, e.g. that contains emergency drugs or analgesics, on one patient and then changed the needle or administration set and given the remaining drug to another patient? Answer: Yes/No</p>
<p>Question 3 In the last 24 months, have you ever reused an ampoule of fentanyl while performing spinal anaesthesia? Answer: Yes/No/Not applicable</p>

Table I: Anaesthetist questionnaire results

		Yes	No	No response
Question 1	Reusing syringes (with or without the needle) on different patients	13 (14%)	77 (85%)	1 (1%)
Question 2	Reusing syringes on different patients after changing the needle or set	17 (19%)	74 (81%)	-
Question 3	Reusing single-use fentanyl ampoules for multiple patients	57 (63%)	34 (37%)	-

on different patients. Furthermore, 19% reused syringes after changing the needle or infusion set.

Several myths may account for these practices.

Myth 1: Changing the needle or infusion set allows for syringe reuse

Despite the fact that only the needle comes into contact with the blood, syringes may become contaminated with blood upon removal of the needle. The generation of negative pressure that results from removing the needle produces a siphoning effect that aspirates the needle contents into the syringe. A study which examined this elicited a syringe blood contamination rate of 34% when injections were administered into infusion tubing in which blood flowed.¹⁵

Myth 2: Injection at the most distal port from the intravenous cannula prevents contamination of the syringe

Trepanier et al investigated the rate of intravenous (IV) infusion tubing contamination with blood during anaesthesia.¹⁵ Only IV tubings that were used for the first time in the operating room were studied. After examining 300 infusion tubings of three varieties at three injection ports, a contamination rate between 0.3% at the most distal port, and 3.3% at the most proximal port, to the catheter, was found. These figures may underestimate syringe contamination rates as infusion tubings that were placed prior to use in theatre, and which were therefore in place for longer duration and more likely to have had back-flow, and thus more likely to be contaminated, were excluded from the study.

Myth 3: The presence of a check valve in the infusion set prevents blood contamination

Trepanier et al also concluded that the presence of a check valve did not affect the incidence of blood contamination of the syringes.¹⁵ They postulated that as the specific gravity of blood is 1.06, contamination of the tubing occurred from blood sedimentation, rather than from the pressure gradient. Crosby also established that the competence of a one-way valve cannot always be assured.¹⁶

Myth 4: Absence of visible contamination of blood means that there is no contamination of blood

After contact with IV tubing, blood contamination of the syringe may not be visible.¹⁷ At room temperature, the survival of dried hepatitis C in the presence of serum is up to five days. However, Ciesek et al showed that in suspension, the hepatitis C could survive for three weeks.¹⁸ Paintsil et al detected viable hepatitis C in syringes for up to 63 days.¹⁹ Furthermore, the hepatitis B virion is approximately 40 nm

in diameter and can only be visualised with an electron microscope.²⁰

Our survey showed that 63% of anaesthetists at the studied hospitals reused a single-use fentanyl ampoule on multiple patients undergoing spinal anaesthesia. Pathogens from airborne contaminants or from failure to use an aseptic technique may contaminate open, partially used ampoules.¹⁴ Furthermore, non-sterile glass fragment contamination of single-dose glass ampoules on opening is well described.^{21,22} Infectious complications of spinal anaesthesia include, but are not limited to, meningitis, encephalitis, spinal and epidural abscesses.²³ In the latest *Saving mothers: report on confidential enquiries into maternal deaths 2008-2010*, one maternal death was attributed to post-spinal meningitis.²⁴ Accordingly, this practice is of significant concern and needs urgent address.

Ignorance of the dangers of the reuse of needles, syringes and single-dose drug ampoules, and of reports of related disease transmission may, in part, be the driving force behind this practice. Another possible causal factor may be erroneous concerns about cost containment.²⁵ Furthermore, the convenience of avoiding the cumbersome task of preparing a new set of syringes for each case might also explain the reluctance by some anaesthetists to change established working habits.

The risk of transmission of blood-borne pathogens that arise from unsafe injection practices is well established in in-vitro studies. Documented related outbreaks of infectious diseases have been reported. Many instances of iatrogenic blood-borne viral transmission are probably undetected as HIV, hepatitis B and hepatitis C infections cannot easily be diagnosed in the postoperative period. In the case of HIV, the long interval before diagnosis makes it difficult to establish a causal association with the anaesthetic experience. The exact magnitude of the problem remains unknown.

Conclusion

The risk of transmission of blood-borne pathogens that are associated with the practice of reusing syringes and single-dose drug ampoules is not insignificant. *Primum non nocere*, the ancient adage meaning "first do no harm", is a reminder of the risk and potential harm that is associated with the practice of medicine, and of our duty to protect patients from unnecessary harm. The cruel irony of unsafe injection practice is that greater morbidity or mortality may result, compared to the disease being treated. It is an unacceptable practice that must not be tolerated, most particularly in the South African environment where HIV, hepatitis B and hepatitis C infections are prevalent. Basic tenets of infection control and aseptic technique need to be reinforced in training programmes and incorporated into institutional policies. Compliance with these policies must be regularly monitored for adherence.

Conflict of interest

There is no conflict of interest.

References

1. Drucker E, Alcabes PG, Marx PA. The injection century: massive unsterile injections and the emergence of human pathogens. *Lancet*. 2001;358(9297):1989-1992.
2. Shepard CW, Finelli L, Alter MJ. Global epidemiology of hepatitis C virus infection. *Lancet Infect Dis*. 2005;5(9):558-567.
3. Safety of injections: World health report. 2002. World Health Organization [homepage on the Internet]. c2012. Available from: http://www.who.int/injection_safety/about/resources/en/QuestionAndAnswersInjectionSafety.pdf
4. Hauri AM, Armstrong GL, Hutin YJ. The global burden of disease attributable to contaminated injections given in health care settings. *Int J STD AIDS*. 2004;15(1):7-16.
5. Managing injection safety. World Health Organization [homepage on the Internet]. 2003. c2012. Available from: http://www.who.int/injection_safety/toolbox/en/ManagingInjectionSafety.pdf
6. Chant K, Lowe D, Rubin G, et al. Patient-to-patient transmission of HIV in private surgical consulting rooms. *Lancet*. 1993;342(8886-8887):1548-1549.
7. Dolan SA, Felizardo G, Barnes S, et al. APIC position paper: safe injection, infusion, and medication vial practices in health care. *Am J Infect Control*. 2010;38(3):167-172.
8. Centers for Disease Control and Prevention. Acute hepatitis C virus infections attributed to unsafe injection practices at an endoscopy clinic: Nevada, 2007. *Morb Mortal Wkly Rep*. 2008;57(19):513-517.
9. Fischer GE, Schaefer MK, Labus BJ, et al. Hepatitis C virus infections from unsafe injection practices at an endoscopy clinic in Las Vegas, Nevada, 2007-2008. *Clin Infect Dis*. 2010;51(3):267-273.
10. Wilson W. Public at risk: addressing the syringe reuse problem in healthcare. American Association of Nurse Anesthetists [homepage on the Internet]. 2008. c2012. Available from: <http://www.aana.com/newsandjournal/News/Pages/031808-Addressing-the-Syringe-Reuse-Problem-in-Healthcare.aspx>
11. KwaZulu-Natal Department of Health [homepage on the Internet]. c2008. Available from: <http://www.kznhealth.gov.za/hospitals.htm>
12. Guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings. Centers for Disease Control and Prevention [homepage on the Internet]. 2007. c2011. Available from: <http://www.cdc.gov/ncidod/dhqp/pdf/isolation2007.pdf>
13. The Association of Anaesthetists of Great Britain and Ireland. Infection control in anaesthesia. *Anaesthesia*. 2008;63(9):1027-1036.
14. Recommendations for infection control for the practice of anaesthesiology. American Society of Anaesthesiologists [homepage on the Internet]. c2012. Available from: <http://www.asahq.org/For-Members/Standards-Guidelines-and-Statements.aspx>
15. Trepanier CA, Lessard MR, Brochu JG, Denault PH. Risk of cross-infection related to the multiple use of disposable syringes. *Can J Anaesth*. 1990;37:156-159.
16. Crosby ET. Intravenous infusions and one-way valves. *Can J Anaesth*. 1991;38(6):799-800.
17. Parlow JL. Blood contamination of drug syringes used in anaesthesia. *Can J Anaesth*. 1989;36:61-62.
18. Ciesek S, Friesland M, Steinmann J, et al. How stable is the hepatitis C virus (HCV)? Environmental stability of HCV and its susceptibility to chemical biocides. *J Infect Dis*. 2010;201(12):1859-1866.
19. Paintsil E, He H, Peters C, et al. Survival of hepatitis C virus in syringes: implication for transmission among injection drug users. *J Infect Dis*. 2010;202:984-990.
20. Hunt R. Virology: hepatitis viruses. University of South Carolina [homepage on the Internet]. 2011. c2012. Available from: <http://pathmicro.med.sc.edu/virol/hepatitis-virus.htm>
21. Zabir AF, Choy CY, Rushdan R. Glass particle contamination of parenteral preparations of intravenous drugs in anaesthetic practice. *South Afr J Anaesth Analg*. 2008;14(3):17-19.
22. Zacher AN, Zornow MH, Evans G. Drug contamination from opening glass ampoules. *Anesthesiology*. 1991;75(5):893-895.
23. American Society of Anesthesiologists. Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques. *Anesthesiology*. 2010;112:530-545.
24. *Saving mothers: report on confidential enquiries into maternal deaths 2008-2010*. Pretoria: Department of Health; 2012.
25. Lessard MR, Trepanier CA. Use and misuse of syringes in anaesthesia. *Can J Anaesth*. 1997;44(8):793-797.