LA MORT D'UNE INFIRMIERE DE SALLE D'OPERATION EN COLOMBIE-BRITANNIQUE AURAIT-ELLE PU ETRE PREVENUE AU MOYEN DE LA TECHNIQUE MAINS LIBRES?

Auteures :
Ted Haines, MD et MSc en épidémiologie, est professeur agréé au sein du programme de médecine du travail et environnementale au département d'épidémiologie et biostatistique cliniques dans la Faculty of Health Sciences à la McMaster University, à Hamilton en Ontario.

Bernadette Stringer, infirmière autorisée et docteure en épidémiologie et biostatistique, est professeure agréée au département d'épidémiologie et biostatistique cliniques dans la Faculty of Health Sciences à la McMaster University, à Hamilton en Ontario.

« Dédicace à Bev Holmwood, une infirmière de salle d'opération ayant contractée l'hépatite C suite à un accident de travail et qui est décédée deux mois plus tard en décembre 1991 » [1]

RESUME
En 1991, Bernadette Stringer, représentante en matière de sécurité et de santé chevronnée de la British Columbia Nurses' Union, a appris qu'une infirmière périopératoire de Victoria (C.-B.) âgée de 48 ans est morte suite à une piqûre accidentelle avec une aiguille contaminée par l'hépatite C. Cet incident a déclenché une étude évaluant la possibilité que l'application de la technique mains libres réduise le risque de blessures percutanées, de déchirure de gants et de contamination cutanéo-muqueuse pendant la chirurgie effectuée par Mme Stringer dans le cadre des exigences de son doctorat (décerné en 1998 par les départements d'épidémiologie, de biostatistique et de santé au travail de la Faculté de médecine). Les résultats principaux de l'étude ont été publiés en 2002 dans une des revues du *British Medical Journal*, *Occupational and Environmental Medicine*.[2]

Le présent article discutera de certains aspects du cas de Bev Holmwood, passera en revue les renseignements disponibles sur la technique mains libres et décrira une nouvelle étude ayant de nouveau évalué l'efficacité de la technique mains libres.

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2 Stringer B, Infante-Rivard C, Hanley J. "Effectiveness of the hands-free technique in reducing operating theatre injuries" *Occupational and Environmental Medicine*. 59.10 (2002): 703-707.

COULD THE DEATH OF A BC OR NURSE HAVE BEEN PREVENTED BY USING THE HANDS-FREE TECHNIQUE?

Authors:
Ted Haines, MD and MSc in Epidemiology and Biostatistics, is an Associate Professor in the Occupational and Environmental Medicine Program in the Department of Clinical Epidemiology and Biostatistics in the Faculty of Health Sciences at McMaster University, in Hamilton, ON.

Bernadette Stringer, RN and PhD in Epidemiology and Biostatistics, is an Assistant Professor in the Department of Clinical Epidemiology and Biostatistics in the Faculty of Health Sciences at McMaster University in Hamilton, ON.

"Dedicated to Bev Holmwood, an operating room nurse who contracted hepatitis C due to a work injury and died two months later, December, 1991" [1]

ABSTRACT
In 1991, Bernadette Stringer, a long time BC Nurses' Union health and safety representative, learned about the death of a 48 year old Victoria, B.C., OR nurse who had sustained a hepatitis C contaminated needlestick. This incident led to a study evaluating the hands-free technique's ability to decrease the risk of percutaneous injury, glove tear and muco-cutaneous contamination during surgery that

Ms. Stringer carried out in partial fulfillment of her Ph.D. (granted in 1998, by McGill University's Joint Departments of Epidemiology, Biostatistics and Occupational Health, in the Faculty of Medicine). That study's main findings were published in 2002 in one of the British Medical Journal's publications, Occupational and Environmental Medicine [2].

The following article will discuss aspects of Bev Holmwood's case, review the literature on the hands-free technique, and describe a new study that has again evaluated the hands-free technique's effectiveness.

Occupational Risk of Contracting a Bloodborne Disease in the OR

Of the seven U.S. OR studies, in which a dedicated observer or circulating nurse recorded surgical personnel's exposures, a percutaneous injury occurred in 1.7 - 15% of all surgeries and a contamination occurred in 6.2 - 50% of all surgeries[3,4,5,6,7,8,9]. Surgeons and residents were found to usually, although not always, sustain the greatest number of percutaneous and other exposures during surgery. In one OR study scrubbed personnel (nurses or technicians) sustained as many percutaneous injuries as surgeons[10] and in another, circulating nurses sustained the greatest total number of exposures[11]. As well, it should be highlighted that in one or more of these seven OR studies, emergency status, length, type of surgery, blood loss, number of personnel present and time of day were all factors that were found to be associated with risk of injury and/or contamination[12,13,14,15,16,17,18].

While data from similar Canadian studies do not yet exist, some information about risk to surgical personnel in our hospitals is known. For example, in a 2002 report based on Health Canada's Canadian Needle Stick Surveillance Network (a group of 14 volunteer hospitals who contribute standardized information about all work related blood and body fluid exposures), 24% of percutaneous injuries reported were due to suture needles, scalpel blades and other types of surgical instruments[19]. In another report based on nursing surveys conducted in 1998 and 1999 in British Columbia, Alberta and Ontario, it was found that 70% of operating room (OR) nurses had sustained a percutaneous injury at some time during their career[20].

Occupational Injury and Death of a B.C. OR Nurse

A concrete example of risk from OR work in Canadian hospitals is provided by the tragic experience of Bev Holmwood, who, while circulating during an operation in Victoria, BC, on a patient suspected of being hepatitis C positive, sustained a needlestick when a surgeon was handing her a syringe full of blood. Within days of the injury, Bev developed fulminant acute hepatitis C and was transferred to a Vancouver hospital where her disease quickly progressed to the end stages and she died.

As a result, her partner claimed survivor benefits through the BC Workers Compensation Board (BC-WCB) but because Ms. Holmwood had not reported the injury to her employer (which is standard policy in Canadian hospitals and other workplaces), the BC-WCB first conducted an investigation. As a result of evidence provided by co-workers, the BC-WCB quickly determined that Bev Holmwood had contracted Hepatitis C as a result of an occupational injury. Nevertheless the hospital, her employer, contested and it was at this point that Bev Holmwood's partner contacted the BC Nurses' Union for help appealing the claim. Although the claim was eventually won, it should be noted that if the denial and appeal had not taken place, the union might never have known about this incident and this OR nurse's work related death.

Reducing the Risk

Risk reduction methods have been proposed for many aspects of operating room work. Although strategies to reduce risk make intuitive sense, some have not been evaluated with well-designed studies[21]. Some methods, such as the use of certain redesigned safety syringes,[22] double gloves[23,24] and the use of blunt suture needles instead of sharp suture needles whenever possible[25,26] have been well evaluated and are considered effective. Others require further evaluation. One of these is the hands-free technique. Although the Operating Room Nurses Association of Canada (ORNAC)[27], its U.S. equivalent the AORN,[28] and other professional[29,30,31] and regulatory[32] organizations recommend use of the technique whenever possible, the hands-free technique's effectiveness is being further evaluated in a recently concluded Canadian study involving six hospitals in two provinces. The study was carried out in three phases and funded by Ontario's Workplace Safety and Insurance Board[33]. Study results should be available by April 2007.

Evidence of the Hands-free Technique's (HFT) Effectiveness

Three previous OR studies have assessed the HFT's ability to reduce percutaneous injuries alone,[34] glove tears alone[35], and percutaneous injuries, glove tears and muco-cutaneous contaminations[36]. The study that evaluated the HFT's ability to reduce the risk of sustaining all three outcomes found that when the HFT was used 75% or more of the time during surgery, it was protective; the other two studies did not find that it reduced the risk of percutaneous injury, in one study and glove tears, in the other.

The hands-free technique study that found a positive effect was conducted most recently by one of this article's co-authors (BS), over six months during 1995 to1996, in a 300-bed inner city teaching hospital in a large U. S. city, where use of the HFT was OR policy[37]. In that study, which included the largest number of surgeries, all same-day surgeries and surgeries taking place in the main operating rooms from a variety of sub-specialties, including cardio-thoracic, vascular, orthopedic, general, neuro, etc. were eligible as long as a full-time circulating nurse was present during the procedure. The nurse completed a questionnaire at the end of the surgery as well as recorded the details of percutaneous injuries, glove tears and muco-cutaneous contaminations sustained by physicians, nurses, technicians, physicians' assistants, residents and medical students if they occurred. Only incidents sustained by anaesthesia personnel were not eligible for inclusion.

Circulating nurses completing the questionnaire consulted with scrub personnel, to estimate the overall proportion of use of the hands-free technique during the surgery according to five categories: approximately 100%, 75%, 50%, 25% and 0%. As well, they recorded the type and length of surgery, the amount of bloodloss, the time of day it took place, whether or not the surgery was noisy, the number of people present for at least 75% of the surgery and its status (emergency/non-emergency). When an event occurred, the details of the event were also recorded as soon as possible.

By/Par: J. Porteous

A kidney basin may be easily utilized as a "hands-free zone"

The study found that the hands free technique was used 75% or 100% of the time in only 42% of the 70% (3,765/5,388) eligible surgeries included in the study, even though it was hospital policy. As well, during the study there were 40 percutaneous injuries, 52 glove tears and 51 contaminations reported by eligible personnel.

Using logistic regression to test for interaction and to adjust for potential confounders, study analyses found that although using the HFT

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Hands-Free (cont.)

75% or more of the time during surgery was protective, that was only the case in surgeries in which there at least 100 cc of blood loss occurred. In those surgeries, using the HFT most of the time during an operation, reduced the risk by 59% [95% CI 28% -77%]. More specifically, in surgeries in which there was blood loss of 100 cc or more and the HFT was also used 75% or more of the time, the incidence rate was 3.7% compared to 10% in surgeries in which there was blood loss of 100 cc or more but the HFT was used 50% or less. Since there were 1,366 surgeries in which blood loss was at least 100cc, that is 486 surgeries in which the hands-free technique was used 75% or more of the time and 880 surgeries in which the HFT was used 50% or less of the time, it was estimated if the technique had been used in those 880 surgeries when the HFT was used 50% or less of the time, 54 incidents could have been prevented.

Of the two other studies in which the HFT was also evaluated, only one had the primary purpose of evaluating the HFT's effectiveness[38]. The evaluation, however, was done only by looking at the rate of glove tears in caesarean sections. In that study, personnel in randomly selected surgeries were asked to use the HFT to pass instruments while surgeries not selected, or 'control' surgeries, were asked to continue to use whatever technique they normally used. And at the end of each intervention and control surgery surgeons, assistants and technicians placed gloves worn during surgery in a bag for later testing and they also provided information about their role on the surgical team, level of experience, dominant hand and whether or not they had observed a glove tear during the surgery.

In this study, researchers reported randomizing only 165/192 eligible surgeries, although they did not say why and excluded nine surgeries because personnel did not save gloves or record data. In the remaining 156 surgeries, there were glove perforations in 19% of intervention surgeries, compared to perforations in 16.1% of control surgeries – a difference not found to be statistically significantly different (P=0.5).

While the randomized control trial is usually considered the most rigorous study design, it can be argued that randomization should have been at the level of the hospital, not surgery by surgery as was done in this study since doing so required surgical team members to change their practice case-by-case, making results vulnerable to contamination. This is especially of concern since independent assessments, to assess whether or not the hands-free was used in intervention surgeries and not used in control surgeries, were not made.

In addition to this, the other main methodological issue of concern was that only 444 pairs of gloves were tested, including 38 sets of double gloves although 596 personnel were reported to have been involved in the included surgeries that could have resulted in a substantial proportion of eligible gloves being untested for perforations

The objective of the third study was to assess which of ten potential risk factors were associated with percutaneous injury and passing sharp items directly was one of the factors assessed[39]. This study included only 17% of eligible surgeries (1,382 out of 8,153) in two U.S. hospitals.

In this study, observers with no other tasks were trained to record information on the ten techniques, categorizing frequency of HFT use as <1/3, 1/3-2/3, >2/3, or uncertain, and to also collect data on other potential risk factors.

The study found that percutaneous injuries occurred in 6.9% of surgeries and, interestingly, that 32% of the sharp items causing injury later re-contacted the patient wound.

And, although the study did not find that HFT use decreased risk of injury, it did report that most surgeons used the HFT most of the time while most nurses used it very little. More specifically, in 957 surgeries HFT use by surgeons was greater than 2/3 of the time, and there were 66 injuries, and in 407 surgeries, HFT use by surgeons was less than 2/3 of the time and there were 27 injuries (OR=1.0 [95% CI 0.6-1.5]). It also reported that hands-free use by nurses was greater than 2/3 of the time in only 21 surgeries, in which there were 3 injuries,

while in 1,346 surgeries, hands-free use was less than 2/3 of the time and there were 90 injuries (OR=0.5 [95% CI 0.2-1.4]). But because use by surgeons and nurses has to be highly correlated (since when surgeons use the HFT >2/3 of the time during surgery it means that most of the time they are retrieving sharp items that have been laid down by nurses) the amount of use by each occupational category does not make sense. This indicates unresolved methodological issues and makes these findings questionable.

THE HANDS-FREE TECHNIQUE (HFT)

As mentioned in the abstract, the hands-free technique (HFT), whereby no two people touch the same sharp item at the same time, is one of a number of methods suggested to reduce the risk of percutaneous injury, glove tear and bloody contamination during surgery.

The hands-free technique minimizes the frequency of hand-to-hand passes between surgeons, residents, scrub and circulating nurses, and technicians during surgery. The intent of the technique is to 'standardize' the passing of sharp items and thus increase the predictability and expectations of all involved by decreasing variability and relying less on individual alertness, which is consistent with human factors research and research on safe organizations[40,41].

The need to increase predictability has been highlighted because of the context in which surgery is carried out. Surgical teams are made up of a variety of members with diverse skills who may or may not work together on a regular basis. Communication between team members can be difficult as a result of surgical masks, face shields, and goggles. Team members handle slippery, perforating instruments on a swift and fairly regular basis.

In regular passing of sharp items, the item is passed directly from one person's hand to another's hand. Implementing the hands-free technique turns this in to a two-step process. Step one is laying a sharp item down in a neutral or safe zone. The second step is the retrieval of that sharp item. Often, but not always, the retrieval is carried out by a different person. Sometimes, however, the same person who lays it down is also the person who retrieves it.

The 'neutral' zone can be selected from items regularly used during surgery, such as a mayo stand or a rectangular basin (a kidney basin is not ideal because its shape may not permit a scalpel or other sharp item of a similar size to lie securely in it) or by allocating a specific section of the surgical field. The neutral zone needs to be selected on a case-by-case basis dependant on the location of the incision, the amount, shape and weight of sharp items that will be used, the passing frequency, the number of persons near the surgical site, and the team members' personal preference. More than one location or item can be used for the 'neutral zone'. For example, a sharp item can be laid down for the surgeon to retrieve on the surgical field, but when the item that was originally retrieved by the surgeon is returned it can be placed onto a mayo stand. Regardless of the site or sites selected, it is key to agree upon areas or items that will be used as neutral zones at the start of a procedure. In the rare case when there is a need to change the location or the item used as the neutral zone, this should also be clearly communicated to everyone.

RISK REDUCTION AND THE HFT

The positive results from the Ph.D. study on the HFT provided the impetus to further assess its ability to reduce risk in a three phase Canadian study that has just ended[42]. Data collection for the third phase was completed in November 2006. This study's principal investigator is also B. Stringer but this time she is working with eight co-investigators, including Ted Haines, from a variety of Canadian universities as well as one co-investigator from the University of California-Davis.

Briefly, the most recent study has been carried out in the following way: the first phase used interviews with 20 key informants to explore attitudes about use of the hands-free technique, barriers to its use, and suggestions on how to encourage use among Canadian and U.S. surgeons and OR nurses and technicians working in a variety of sub-specialties. Results from this study have been published in a recent issue of the AORN journal[43]. The second phase

of the study consisted of developing an educational video demonstrating and promoting use of the hands-free technique during surgery. The video was then used as the main component of an intervention used in the third phase study. The third phase study consisted of a pre and post intervention study that took place in three Hamilton hospitals, two Sudbury hospitals, and an Edmonton hospital. Its objectives were to again assess the hands-free technique's ability to reduce risk of injury glove tear and muco-cutaneous contamination as well as assess the video's ability to increase use of the technique.

The video is also in DVD format and is being distributed by the researchers free of charge until the copies they possess run out. More specifically, ORNAC, the AORN, and other nursing and surgical professional bodies throughout the world have been provided with copies.

CONCLUSION

The recent report of an OR nurse sustaining an injury when a cardiac surgeon tried to hand a scalpel "back to her while the nurse was passing another instrument to another surgeon"[44], at the Dallas Veteran Affairs Medical Center, indicates that injuries such as the one suffered by Bev Holmwood more than a decade ago continue to occur. Accidents can happen and there is always opportunity during surgery for perioperative team members to be unaware of an instrument being passed from outside their sightline, or to be distracted, misunderstand requests, or lose control of instruments. The use of methods, such as the hands-free technique, designed to make the passing of instruments more predictable are warranted even as we continue to evaluate them.

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