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## **A Test Re-test Reliability Study of the Hands-free Technique and Safety Climate Questionnaire in B.C. OR Nurses**

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# A Test Re-test Reliability Study of the Hands-free Technique and Safety Climate Questionnaire in BC OR Nurses

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## **Highlights**

- 45 BC and 39 Ontario nurses and technicians were able to reliably respond to all questions on the Hands-free Technique (HFT) and the Safety Climate Questionnaire.
- For the question ‘In surgery do you use the HFT 100%, 75%, 50%, or 25% of the time, or rarely or never?’ the Kappa statistic was 0.83 when HFT use was dichotomized (75% or > and 50% or <) and 0.82 when technique use was analyzed using 5 categories; Kappa levels considered ‘very good’.
- For safety climate, the intra-class correlation coefficients ranged from 0.56 to 0.75, falling within the ‘good’ range.
- The reliability of the HFT and safety climate questions was not related to whether the repeated administration of the questionnaire was done in less than or greater than 30 days.
- All BC participants knew about the HFT, whereas only 62% of those in Ontario knew about the HFT.
- 32% of BC nurses/techs and 5% of those in Ontario use the HFT 75% or more of the time.
- After controlling for age, logistic regression found that a better safety climate was linked to increased use of the HFT 75% or more of the time, in surgery ( $p = 0.04$ ).
- Over 50% of nurses/techs worked in cluttered areas, 37% didn’t have safety conscious managers, 26% didn’t feel ‘supported’, 19% experienced conflict, and 11% couldn’t easily communicate with supervisors.
- ‘Incivility’ from doctors (67%), co-workers (64%) and supervisors (49%), was very prevalent.
- Supervisor ‘incivility’ was moderately correlated with the safety climate dimension ‘conflict and poor communication’ ( $r = 0.32$ ,  $p = 0.003$ ).

## **Implications**

- The Hands-free Technique and Safety Climate Questionnaire should elicit reliable answers.
- It is plausible that hospital safety climates would predict hands-free technique use.
- Lack of support and ‘incivility’, considered a milder form of mistreatment than overt harassment, have been linked to job withdrawal. Since nurse retention is of great concern, a questionnaire able to measure both dimensions will provide pertinent information to develop of future interventions.

## **Executive Summary**

### **Background:**

The occupational risk of contracting HBV, HCV and HIV, as a result of exposure during surgery, or transmission to patients, is well recognized.<sup>1 2 3 4 5 6 7</sup> To decrease risk of injury and contamination, OSHA along with surgical and nursing professional organizations,<sup>8 9 10</sup> have recommended surgical

practice changes, including use of the Hands-free Technique (HFT), a work practice whereby no two OR personnel handle the same sharp item at the same time.<sup>11</sup> In a previous HFT study,<sup>12</sup> when HFT use was 75% or more of the time during surgery, it was found that risk of percutaneous injury, contamination and glove tear decreased by 60%, in surgeries with 100cc or more blood loss.

As is the case for Standard Precautions,<sup>13</sup> also recommended as a means of reducing blood and body fluid exposure during surgery, use of the HFT by surgical teams may be associated with the hospital safety climate. That is, in hospitals where health and safety training programs exist, where personal protective equipment is readily available, and union management committees oversee health and safety, there may be significantly more use of the HFT, 75% or more of the time during surgery. To assess this, we propose to survey a nationally representative sample of OR nurses, using the newly developed questionnaire, of which the reliability when used in OR nurses and technicians, is discussed in this report.

### **Objectives:**

To assess the test-retest reliability of the main exposure and outcome items of a newly developed questionnaire on aspects of HFT use and the workplace safety climate, in Ontario and BC nurses and technicians, who scrub and circulate in hospital operating rooms.

### **Methods:**

Using the internal mail system, the full and shortened versions of the HFT and Safety Climate questionnaire were distributed to randomly selected OR nurses and technicians, who scrub and circulate, a minimum of two weeks apart.

### **Results:**

OR nurses and technicians, working in three hospitals in London, Ontario, and one hospital, in Vancouver, BC, agreed to participate; 39 and 45, respectively.

Participants in each province were similar in age, gender, hours worked per week and there was no difference in HFT and safety climate reliability estimates, between provinces. Kappas for use of the

HFT were,  $K=0.83$  when use was dichotomized, and  $K=0.82$ , for use in five categories, reflecting 'very good' agreement. Kappa statistics for other aspects of HFT use, ranged from 0.61-0.66, reflecting 'substantial agreement'. Intraclass correlation coefficients for the six safety climate dimensions, ranged from 0.56-0.75, reflecting 'good agreement'.

Knowledge about the HFT and amount of use of the HFT, varied significantly by province though. In BC, all nurses and technicians knew about the HFT, and all but one defined it correctly, while in Ontario, only 62% knew about it; and, 32% used it 75% or more of the time during surgery, in BC, while only 5% used it 75% or more of the time, in Ontario.

Using logistic regression, the relationship between safety climate and use of the hands-free technique was assessed, and after controlling for nurse/technician's age, better safety climate scores were found to be associated with increased use of the HFT 75% or more of the time, during surgery ( $p = 0.04$ ).

#### **Discussion:**

If the Hands-free Technique and the Safety Climate Questionnaire is used in a national OR nurses survey as proposed, these study results suggest that responses will be reliable, whether or not OR nurses are knowledgeable about, or use, the hands-free technique.

Although additional research is required, that higher safety climate scores were associated with more use of the HFT 75% or more of the time during surgery, supports the hypothesis that use of the HFT (by individuals and surgical teams), may be linked to the broader hospital safety culture.

## Main Research Report

This report is based on test re-test reliability studies of the new Hands-free Technique and Safety Climate Questionnaire conducted in 2003-2004 in BC and Ontario, funded by the BC Workers' Compensation Board and the Lawson Health Research Institute. The Ontario sample consisted of nurses and OR technicians from three hospitals, while in BC, nurses and technicians came from one hospital.

### **Background:**

The occupational risk of contracting HBV, HCV and HIV, during surgery is well recognized. Not only has exposure to blood and body fluids led to occupational transmission,<sup>14 15 16</sup> but infected caregivers, although less frequently, have transmitted to patients.<sup>17 18</sup> U.S. operating room (OR) studies in which observers recorded blood and body fluid exposures of surgical personnel found that percutaneous injuries occurred during 1.7-15% of surgeries and contaminations, during 6.2-50% of surgeries.<sup>19 20 21 22 23 24 25</sup> To decrease the risk of injury and contamination, the Occupational safety and Health Administration (OSHA) along with surgeon and nursing professional organizations<sup>26 27</sup><sup>28 29</sup> have recommended a change in surgical practices, including use of the Hands-free Technique (HFT), a work practice whereby no two surgical personnel handle the same sharp item at the same time,<sup>30</sup> which is considered to be a means of regularizing the handling and passing of sharp items, which requires no or little additional equipment and training. The HFT is similar to Standard Precautions (previously called Universal Precautions), which are guidelines that recommend work practices and the use of barriers such as gloves, masks, and goggles, to reduce the occupational risk of exposure to blood and body fluids.

In a comprehensive study in which the HFT's effectiveness was evaluated,<sup>31</sup> it was found that when HFT use occurred 75% or more of the time during surgery, risk of percutaneous injury,

contamination and glove tear decreased by 60% in surgeries with 100cc or more blood loss. The study took place in an inner core hospital of a large, west coast city in the U.S., where HFT use was hospital policy. Circulating nurses and scrub personnel, quantified HFT use at the end of 3,765 surgeries into five proportions (approximately 0%, 25%, 50%, 75%, 100%), and recorded information on other potential risk factors, using a standardized questionnaire. If a surgical team member was injured, contaminated and/or tore a glove during surgery, detailed information on the incident was also recorded (case surgeries), which occurred in 4% of surgeries. The intent of the HFT<sup>32</sup>, is that there be no direct transfer of sharp instruments, in the real world of the operating room, as found in the previous comprehensive HFT study,<sup>33</sup> there were many passes with many variations of practice. When the HFT was '*used most of the time*', though, most persons passed or retrieved sharp items to and from a neutral zone, most of the time. Based on this, the HFT use categories of 75% and 100% were merged to define the HFT '*used*' category of surgeries and 0%, 25% and 50% were merged to determine the HFT '*not-used*' category of surgeries. In this study, the HFT was '*used*' in 42% of surgeries.

From previous related research, there is also moderate to strong evidence that Standard Precautions are implemented more frequently in hospitals with a strong safety culture.<sup>34 35</sup> That is, in hospitals where health and safety training programs exist, where personal protective equipment is readily available, and union management committees oversee all aspects of health and safety, there is significantly more compliance with Standard Precautions.

Therefore we propose to assess whether HFT use 75% or more of the time during surgery is associated with hospital management's commitment to health and safety, in a national survey of randomly selected OR nurses using the new Hands-free Technique and Safety Climate Questionnaire. Safety climate questions used in the questionnaire are from a questionnaire validated by Gershon et

al.,<sup>36 37</sup> the two main HFT questions were from a questionnaire used in a previous study on the HFT in which the inter-rater reliability was confirmed,<sup>38</sup> and additional questions on aspects of the HFT were developed.

As a basis for the proposed national study, our aim in this project was to investigate the test re-test reliability of these questions among representative Canadian nurses.

### **Objectives:**

The study assessed the test retest reliability of the primary and secondary questions on the HFT and the safety climate, in a newly developed questionnaire that asks questions about aspects of HFT use and the safety climate, such as: management commitment to safety, health and safety training, availability of protective devices, whether jobs hinder the use of safety precautions, orderliness and interpersonal conflict.

### **Methods:**

In the initial development of the questionnaire, a version was created in consultation with a colleague with expertise in questionnaire development that included numerous items of potential relevance. In revision, those only peripherally related to the purposes of the eventual national survey were eliminated and others were reworded. Seven previously validated questions on ‘incivility’<sup>39</sup> were added to enhance the safety climate dimension ‘conflict and poor communication’. The questions measuring ‘incivility’, which is ‘behaviour with ambiguous intent to harm... in violation of workplace norms for mutual respect’,<sup>40</sup> were to measure ‘incivility’ related to doctors, managers and co-workers, during the first administration of the questionnaire. Both the full and short versions were pilot tested in five nurses and the final revisions were made in a professionally designed format.

### **Random Selection:**

Lists of 130 and 123, full-time, part-time and casual operating room (OR) nurses and OR technicians, who scrubbed and circulated, were compiled for Vancouver General Hospital, and the three London Health Sciences Hospitals, respectively. And, three separate samples of eligible participants were randomly selected per province.

## **Consents:**

To highlight the launch of the study, refreshments were brought into the nurses and technician's lounges and then a Letter of Information (LOI) and attached consent form was sent to selected nurses and technicians outlining the study and incentive, requesting their participation. Those agreeing returned the signed consent form in an accompanying envelope and, as had been requested, some who declined, also returned the consent form, unsigned. Home telephone numbers, although optional, were also requested, so that calls encouraging the return of questionnaires could be made.

## **The First Questionnaire (appended):**

As explained in the interim progress report, rather than waiting until a total of 45 personnel agreed to participate, as had been proposed initially, the full questionnaire accompanied by an envelope and letter was sent as soon as possible after consents were received. Participants were asked to complete the questionnaire within two weeks, to place it in the accompanying envelope and to place the envelope in a labeled container located near the internal mailbox. This change was implemented to hasten pick up of the first questionnaire.

Then, two weeks later, those who had consented and **had picked up** the questionnaire, but had not completed and returned it, and had provided telephone numbers were called and/or encouraged to return the completed questionnaire - asked if they required a replacement questionnaire. Those who had not provided telephone numbers were sent a reminder letter with a replacement questionnaire.

If the replacement questionnaire **had been picked up** and there was still no response, two weeks later they were telephoned again or sent another reminder letter and another replacement questionnaire, as was appropriate.

Approximately two weeks after, non-responders who had received two telephone calls or two replacement questionnaires, were then excluded.

This schedule of providing reminder letters and replacement questionnaires and telephone calls was only begun after those who consented **had picked up** the full questionnaire. Because a few personnel who agreed to participate had not picked up the first full questionnaire almost two months after its distribution, the head nurse was asked to send an email to all eligible OR personnel, reminding them to check for internal mail. A similar email was also sent after distribution of the second, shorter questionnaire.

### **The Second Questionnaire (appended)**

Once completed long questionnaires were received, the shorter questionnaires with only the same HFT and Safety Climate questions, accompanied by an envelope and letter, were sent approximately ten days later. Participants were asked to immediately complete the questionnaire and to place it in the accompanying envelope and to place the envelope in the container.

Two weeks later, those who **had picked up** the short questionnaire but not returned it were telephoned or sent reminder letters and replacement short questionnaires encouraging them to participate, as was appropriate, two more times, and then excluded if they did not respond.

At that time, those who **had not picked up** the short questionnaire and had provided telephone numbers were called and encouraged to pick up and complete the second questionnaire and the head nurse also sent an email addressed to all eligible OR personnel, encouraging those who had completed the first questionnaire to pick up the second questionnaire. This was done to reach participants who had not provided phone numbers.

After the shorter questionnaire was received, the nurse/technician was sent a \$25.00 book certificate.

## **Resolved Problems:**

1) Recruitment: It was harder to recruit participants than anticipated, which extended the length of the study and although the sample size in BC was adequate it was lower than desired in Ontario. Nevertheless, because results are based on the combined data, the sample size of 84 was more than adequate.

2) Time between completion of the questionnaires: This was especially problematic in Ontario, where more than 60% of nurses completed the second questionnaire more than 30 days after completing the first one, versus 20% in BC.

In Ontario, there was difficulty with distribution and pick up due to construction in one hospital and because nurses were being shuttled back and forth between two other hospitals but not necessarily checking for mail at the site where we had been told to place forms, letters and questionnaires. Once this was known, letters and questionnaires were placed at both sites, resulting in some duplication but facilitating response (to assess the effect of increased time between questionnaires, data were analyzed taking this into consideration).

## **Analysis:**

The hands-free technique (HFT) variable was defined as both a categorical variable with five categories and dichotomized. For the dichotomized variable, surgeries in which the hands-free technique was categorized at “75% of the time” or “100% of the time” were considered to ‘**use**’ the hands-free technique. In those surgeries in which the proportion of passes using the HFT were categorized as “0%”, “25%” or “50% of the time” it was considered that the HFT was ‘**not used**’.

Safety climate items were aggregated by category as was done previously by Gershon et al. (Table 1).<sup>41</sup> Scores ranged from 0-4 from ‘strongly agree’ to ‘agree’ to ‘neither agree nor disagree’, to ‘disagree’ and ‘strongly disagree’ and a mean score was derived for each subscale.

**Table 1: Subscales****Safety Climate Items**

<b>Orderliness</b>	6a) Our work area is kept clean
	6b) Our work area is not cluttered Our work area is not cluttered
	6c) Our work area is not crowded
<b>Availability</b>	6d) Disposable gloves are readily available in our work area
	6e) Sharps containers are readily accessible
<b>No hindrances</b>	6f) Job duties do not interfere with our being able to follow Universal/Standard Precautions
	6g) Our work allows enough time to always follow Universal/Standard Precautions
	6h) Usually there isn't so much to do so that Universal/Standard Precautions can't be followed
<b>Management Support</b>	6i) Protection from occupational exposure to pathogens (HCV, HBV & HIV) is a high priority with management
	6j) On my unit, all reasonable steps are taken to minimize hazardous tasks and procedures
	6k) Employees are encouraged to become involved in health and safety matters
	6l) Managers do their part to ensures our protection from exposure to HCV, HBV & HIV
<b>Feedback/ Training</b>	6m) On my unit, unsafe work practices are corrected by supervisors
	6n) My supervisor often discusses safe work practices with me
	6o) We have been properly trained to use equipment to protect ourselves from pathogens such us HCV, HBV & HIV
	6p) Personnel are taught to be aware of and recognize potential hazards at work
	6q) On my unit a copy of the hospital health and safety manual is available
<b>Communication</b>	6r) There is minimal conflict on our unit
	6s) On our unit there is open communication between supervisors and staff
	6t) Members of our unit support one another

Kappas were calculated to assess test retest reliability of the HFT items, and intraclass correlation coefficients, for reliability of the safety climate dimensions. One missing item was allowed when computing the scores for the safety climate scales. Cronbach's alpha was determined to assess internal consistency of the safety climate dimensions. Logistic regression was used to evaluate the influence of safety climate on HFT use, and correlation to investigate the relationship between

supervisor incivility scores and the scores for the adverse conflict/communication dimension of safety climate.

**Results:**

There were 117/130 eligible BC OR nurses and technicians who were selected and approached to participate in the study and of the 50 who consented, 45 completed both questionnaires (Table 2). As well, four BC nurses and technicians completed only the long version of the questionnaire and one completed neither. In Ontario, 100/123 eligible OR nurses and technicians were randomly selected; 57 agreed to participate and 39 completed both the long and short versions of the questionnaire; Also, five Ontario nurses and technicians completed only the long version of the questionnaire and 13 completed neither.

Table 2 shows the mean age, mean hours per week as scrub and circulating nurse or technician, and the proportion female, of the study participants.

<b>Table 2: Age, Gender, Scrubbing/Circulating hours, Questionnaire Interval</b>			
	BC	Ontario	
Number of subjects	45	39	
Mean age (years)	47.1	45.2	p = 0.37
Proportion female	93%	90%	p = 0.70
Mean hours/week scrubbing	16.0	16.0	p = 1.00
Mean hours/week circulating	18.1	18.0	p = 0.98
Interval > 30 days	20%	62%	p < 0.01

As can be seen, study nurses in the two provinces were comparable in age, gender and weekly hours worked as scrub and circulating nurse. In addition, the Table shows the proportion of nurses in each province for whom the interval between questionnaire administrations exceeded 30 days; 80% of BC nurses completed the two questionnaires within one month, but less than 40% did in Ontario. As noted in the Methods, this was due to improper information and difficulties with administration.

Interestingly, all 45 BC nurses reported knowing of the HFT, whereas only 24 (62%) of the Ontario nurses knew of it ( $p < 0.01$ ); of these, all, with one exception in BC and one in Ontario, were able to give a correct definition of the HFT. Of those indicating knowledge of the HFT, 38 (84%) in BC and 7 (29%) in Ontario reported having been taught to use it ( $p < 0.01$ ). In BC, 14 nurses (32%) said that they used the HFT 75% or more of the time, whereas only 2 (5%), Ontario nurses reported doing so ( $p < 0.01$ ).

A comparison between responders' (consented and completed both questionnaires) and non-responders' (who did not consent) age, seniority, etc. would have provided important information but could not be made because of lack of access to the information, therefore comparisons were made with the four BC and five Ontario nurses, who consented and completed the long questionnaire but not the short questionnaire. Other nurses who consented did not complete either questionnaire.

**Table 3: Comparison of Age, Scrubbing/Circulating hours between OR nurses/technician study participants and nurses lost to follow-up**

	BC		Ontario		Overall	
	Participants	LTFU	Participants	LTFU	Participants	LTFU
Subjects	45	4	39	5	84	9
Mean age (yrs)	47.1	40.8	45.2	47	46.2	43
Mean hrs/wk scrubbing	16.0	17	16.0	15.9	16	16.5
Mean hrs/wk circulating	18.1	19	18.0	15.5	18.1	17.3

Kappa for the question 'Do you use the HFT?' was 0.84. When respondents were asked to estimate HFT use in 5 categories ('In surgery do you use the HFT... 100%, 75%, 50%, or 25% of the time, or rarely or never?'), quadratic weighted kappa was 0.82. When these data were regrouped into HFT use of 75% and 100% of the time, compared to HFT use less than 75% of the time, the kappa was 0.83. Questions on whether nurses had been taught to use the HFT, on where sharps were placed if HFT was used, and whether respondents had observed other members of the surgical team using the HFT were associated with kappas ranging from 0.61 to 0.66. There were no statistically

significant differences in reliability between BC and Ontario nurses, with regard to questions on HFT use. The reliability of HFT questions was not related to whether the interval between questionnaire administrations was one month or less, or greater than one month.

Table 4 shows intraclass correlation coefficients and Cronbach’s alphas for the safety climate dimensions.

<b>Table 4: Safety Climate Dimensions</b>	ICC	Cronbach’s alpha
Cleanliness/orderliness	0.73	0.79
Availability of personal protective and engineering controls	0.78	0.82
Absence of hindrances to safe work practices	0.80	0.78
Management support for safety programs	0.84	0.85
Feedback/training	0.71	0.71
Minimal conflict and good communication among staff	0.74	0.88

No statistically significant differences in reliability between BC and Ontario nurses were found, with regard to safety climate dimensions. The interval between questionnaire administrations did not affect the reliability of the safety climate questions.

The safety climate questions revealed that aspects of safety climate are problematic in this sample. For cleanliness/orderliness, 54% disagreed with the statement ‘Our work area is not cluttered’. For feedback/training, 37% disagreed that ‘My supervisor often discusses safe work practices with me’. For conflict/communication, and 26% disagreed that, ‘Members of our unit support one another’, 19% disagreed that ‘There is minimal conflict in our unit’, and 11% disagreed that ‘On our unit, there is open communication between supervisors and staff’.

As well, the Workplace Incivility Scale (used in the first questionnaire administration) showed that incivility is prevalent in this sample. In the past 5 years, 67% had experienced incivility from doctors, 64% from coworkers and 49% from supervisors.

An examination of the relationship between safety climate and the use of the hands-free technique in this sample and after controlling for subjects' age in logistic regression, found that better safety climate scores were associated with increased use of the hands-free technique 75% of the time or more, in surgeries ( $p = 0.04$ ).

In addition, the investigation of the relationship between the scores for incivility associated with supervisors and the scores for the adverse conflict/communication dimension of safety climate found a moderate correlation of  $r = 0.32$  ( $p = 0.003$ ).

### **Discussion:**

OR nurses and technicians in hospitals in the 3<sup>rd</sup> and 10<sup>th</sup> largest Canadian cities work in culturally distinct settings. For example, the first AIDS cases were diagnosed at Vancouver General Hospital where precautions to reduce occupational blood and body fluid exposure, were implemented early, and Vancouver's HIV incidence rates have remained among the highest in Canada.

The statistically significantly lower HFT use reported in London compared to Vancouver reflects such cultural variation. In BC, for example, all nurses knew about the HFT and 32% of nurses used the HFT 75% of the time in surgery. In Ontario, on the other hand, only 62% knew about the HFT, and only 5% used the HFT 75% or more of the time during surgery.

Although certain questions on the hands-free technique were problematic and wording should be improved for those questions prior to further use, formatting/wording problems were not severe enough to be picked up at the pilot stage of questionnaire development.

As well, it should be noted that our main interest was in whether OR nurses could repeatably characterize their use of the hands-free technique as 75% or more, or less, both as a dichotomous and as a 5-category question (approximately 0%, 25%, 50%, 75%, 100%). We were secondarily interested in whether they could repeatably characterize other specific aspects of use. And we would

also like to emphasize that even with some difficulties with formatting, the main HFT questions nonetheless were repeatable, both in BC and Ontario. We do not think that relatively minor difficulties with formatting could have artefactually resulted in the repeatable answers that we observed.

Although recruitment took longer than anticipated, and fewer than 45 OR nurses and technicians participated in London (the original target sample size for Ontario), by combining subjects from both studies, the sample size of 84 was more than adequate to achieve our aim of estimating reliability coefficients with 95 percent confidence intervals of between +/- 0.2.<sup>42</sup>

And although, the interval between completion of the long and short versions of the questionnaire was longer than expected, primarily in Ontario where more than 60% of participants completed the second questionnaire 30 or more days after completing the first, compared to 20% in BC, reliability did not vary with this interval.

The interval between completion of questionnaires was increased in one hospital as a result of difficulty distributing and picking up forms, letters and questionnaires due to OR renovations, but in two others, it was increased because nurses alternated between facilities, and research personnel were not always leaving the letters and questionnaires at the site where individuals usually accessed their internal mail. Once a copy of appropriate letters and questionnaires were left at both sites, time between completing the first and second questionnaires decreased.

The results indicate that OR nurses and technicians in London and Vancouver, can reliably characterize the proportion of HFT use (five categories,  $K= 0.82$ , dichotomized,  $K=0.83$ ), and other aspects of the HFT ( $K= 0.61-0.66$ ), as well as the safety climate ( $ICC= 0.56-0.75$ ). Levels of kappa over 0.81 are considered to reflect ‘almost perfect agreement’, and those from 0.61 to 0.80, ‘substantial agreement’.<sup>43</sup> Intraclass correlation coefficients are thought to reflect good reliability for

ICC's between 0.40 and 0.75.<sup>44</sup> Cronbach's alpha exceeded 0.7, for all of the safety climate dimensions; as in Gershon et al.,<sup>45</sup> these levels of Cronbach's alpha in our study are considered to reflect good internal consistency.<sup>46</sup>

<b>Table 5 Comparison of Cronbach's alpha</b>	Gershon et al.	Test Re-Test Study
Cleanliness/orderliness	0.73	0.79
Availability of personal protective and engineering controls	0.78	0.82
Absence of hindrances to safe work practices	0.80	0.78
Management support for safety programs	0.84	0.85
Feedback/training	0.71	0.71
Minimal conflict and good communication among staff	0.74	0.88

While it is possible that the results based on participating OR nurses and technicians exaggerate the reliability that could be expected among all nurses, it is unlikely that the effect would be large as indicated by the comparisons of nurses lost to follow-up and study participants (Table 2). Although comparisons are based on only nine subjects, there is no evidence of substantial differences in individual and work related characteristics between these two groups.

That nurses can reliably estimate HFT use is consistent with results from the previous HFT study, which also found 'substantial agreement' in 68 surgeries in which HFT use estimates were made by an independent observer and compared to circulating nurse estimates (K= 0.72 (95% CI 0.54-0.90)).<sup>47</sup>

As well, safety climate score was found to be predictive of HFT use 75% or more of the time during surgery, after controlling for age. Although based on a small sample, this can be seen to provide additional evidence for the OR nurses national study hypothesis that nurses working in facilities with 'good' safety climates may be more likely to use the HFT 75% or more of the time, than nurses working in facilities with 'poorer' climates.

Safety climates were found to be problematic on several dimensions. For example, more than half the nurses and technicians worked in cluttered environments, 37% did not have safety conscious supervisors, 27% did not feel supported at work and 19% experienced conflict, and 11% could not openly communicate with their supervisor. As well, in the preceding five years, 64% and 67%, respectively, experienced incivility from co-workers and doctors, and 49% from supervisors, and adverse conflict/communication as measured for the safety climate was moderately correlated with supervisor incivility ( $r = 0.32$ ;  $p = 0.003$ ). OR personnel reported substantial safety climate inadequacies including poor working relationships.

To our knowledge this study is the first to have measured nurses' experience of 'incivility'. And although only 84 subjects were studied, the high prevalence reported is alarming. This is especially worrisome considering that increased incivility was found to be associated with job withdrawal in a large study of public service workers, and OR nurse retention is an ongoing problem in Canada.

### **Implications for Future Research:**

Since "The Hands-free Technique and Safety Climate Questionnaire" has been found to be reliable, it is now ready for use in the type of national survey described in the background section.

As well, the secondary finding that better safety climate score was associated with increased use of the HFT 75% or more of the time in surgery, adds new evidence in support of the hypothesis that nurses working in facilities with 'good' safety climates may be more likely to use the HFT 75% or more of the time, than nurses working in facilities with 'poorer' safety climates. The questionnaire will be made available to other researchers, if requested.

### **Policy and Prevention:**

Test retest reliability studies are unlikely to directly affect policy.

Potential user groups for this research are Management and front line OR nurses/technicians and other OR personnel, surgeons, hospital occupational health personnel, health and safety committee members, healthcare unions, and occupational health program planners.

### **Dissemination:**

**May 15 - 17, 2005:** The poster titled, “Test re-test reliability studies of the new hands-free technique and safety climate questionnaire in BC and Ontario OR nurses”, reporting main reliability results (Kappa and ICCs) of the Hands-free Technique and Safety Climate Questionnaire, was presented at the Canadian Association for Research on Work and Health (CARWH) Conference, in Vancouver (poster appended).

**June 2 - 3, 2005:** A presentation titled, “Workplace safety climate and incivility among BC and Ontario OR Nurses”, focusing on the following safety climate results: 3/6 safety climate dimensions were problematic; and, there is a correlation between supervisor ‘incivility’ and the dimension adverse ‘conflict/communication’, was given at CIHR’s ‘First Canadian Conference on Mental Health in the Workplace’, “Workplace Mental Health Research”, in Montréal (PPT slides appended).

**September 18-20, 2005:** A poster titled, “The influence of safety climate on nurses' use of the hands-free technique, an OR safety practice”, has been presented on the finding that safety climate score appears to be predictive of HFT use 75% or more of the time during surgery, after controlling for age. Poster presentation took place at the ‘International Conference on the Scientific Basis of Health Services’, Montréal (abstract appended)

### **Scientific Publications:**

Three articles reporting the results of this research are being developed.

- 1) Main article: A main article reporting methods and results is being developed.

- 2) Incivility article: To our knowledge, nurses' experience of 'incivility' has not been reported previously. Considering that two thirds of our study sample of OR nurses and technicians, experienced 'incivility' over the last five years, it is important, that these results are reported.

The article will outline the concept of 'incivility' in order to more clearly distinguish 'incivility' from workplace violence, provide an up to date literature review on 'incivility', and discuss the correlation between the supervisor 'incivility' and the safety climate dimension, 'adverse communication/conflict'.

- 3) Safety climate article: Safety climate responses to the first (Longer) Hands-free Technique and Safety Climate Questionnaire, from the 84 nurses and technicians in the test retest reliability studies, will be combined with approximately 250 questionnaires administered to OR nurses and technicians in Hamilton, Sudbury and London, within an ongoing WSIB funded, multi-hospital, before and after intervention study, on the hands-free technique's effectiveness and the ability of a training video to increase use of the HFT.<sup>48</sup>

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Identifier

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OPERATING ROOM SAFETY QUESTIONNAIRE



Section 1

1a) Gender M  F

1b) Year of birth \_\_\_\_\_

1c) English is my first language: Yes  No

1d) Your nursing education (check all that apply):
Diploma  BSN  MScN  PhD

1f) Are you a scrub and/or circulating nurse: Yes  No

If your answer to 1f) was Yes, please continue to complete the questionnaire.

If your answer to 1f) was No, please place the questionnaire in the envelope and then in the designated receptacle.

Section 2

2a) How many hours per week, on average, do you:

Scrub \_\_\_\_\_ hours

Circulate \_\_\_\_\_ hours

2d) Are you primarily (choose one)
Right handed  Left handed 
Ambidextrous

2b) How many hours per week, on average, do you scrub in:

General Surgery \_\_\_\_\_ ENT \_\_\_\_\_
Orthopedics \_\_\_\_\_ Vascular \_\_\_\_\_
Plastics \_\_\_\_\_ Cardio-thoracic \_\_\_\_\_
Urology \_\_\_\_\_ Neuro \_\_\_\_\_
Obstetrics/Gynecology \_\_\_\_\_ hours

2c) How many hours per week, on average, do you circulate in:

General Surgery \_\_\_\_\_ ENT \_\_\_\_\_
Orthopedics \_\_\_\_\_ Vascular \_\_\_\_\_
Neuro \_\_\_\_\_ Cardio-thoracic \_\_\_\_\_
Plastics \_\_\_\_\_ Urology \_\_\_\_\_
Obstetrics/Gynecology \_\_\_\_\_ hours

Section 3

3a) When you circulate, besides a mask, what apparel do you wear more than half the time to avoid blood and body fluid exposures (check all that apply):
A regular surgical gown 
One pair gloves  Two pairs gloves 
Goggles (if you don't wear glasses)

3b) When you circulate, besides a mask, what additional apparel do you sometimes wear to avoid blood and body fluid exposures (check all that apply):
A regular surgical gown 
One pair gloves  Two pair gloves 
Goggles (if you don't wear glasses)

3c) When you scrub, besides a mask, sterile gown and gloves, what additional apparel do you wear more than half the time to avoid blood and body fluid exposures (check all that apply):
A regular surgical gown  A reinforced surgical gown 
One pair gloves  Two pair gloves 
Goggles (if you don't wear glasses)

3d) When you scrub, besides a mask, sterile gown and gloves, what additional apparel do you sometimes wear to avoid blood and body fluid exposures (check all that apply):
A regular surgical gown  A reinforced surgical gown 
One pair gloves  Two pair gloves 
Goggles (if you don't wear glasses)

3e) When you scrub or circulate, to avoid blood and body fluid exposures, do you usually (check all that apply):
Alert the person to whom you are passing a sharp item 
Use forceps to remove scalpel blades

3f) When you scrub or circulate do you see surgeons and residents (check all that apply):

Wear two pairs of gloves most of the time 
Use blunt suture needles when possible 
Avoid using fingers to tie sutures

3g) Do you know of a technique to pass sharp items during surgery called the hands-free technique (sometimes called no-touch technique or the neutral zone)?
Yes  No

3h) If Yes, please describe the technique:

\_\_\_\_\_
\_\_\_\_\_
\_\_\_\_\_
\_\_\_\_\_
\_\_\_\_\_
\_\_\_\_\_

3i) If Yes, were you taught to use the hands-free technique?
Yes  No

3j) If Yes, were you taught: during your
Nursing education 
On the job 
Other

3k) Do you use the hands-free technique?
Yes  No

### Section 4

**DEFINITION:** The hands-free technique (**HFT**) is a method of transferring sharp instruments between surgeons, residents, nurses and technicians who scrub and nurses who circulate, so that personnel **do not handle the same sharp item at the same time**. It is a means of standardizing the passing and retrieving of sharp items during each surgery to help prevent percutaneous injuries, contaminations and glove tears. These are known routes of exposure to blood-borne pathogens such as HCV, HBV and HIV. The **HFT** can be implemented in a variety of ways depending on the type of surgery, sharp items that will be handled and personnel preferences. **Suggested ways include placing sharps on designated sections of the sterile field, a mayo stand, passing a sharp in a kidney basin, with or without using a magnetic pad.**

**4a)** In surgery do you **use the HFT**, on average (check one only):

- 100% of the time .....
- 75% of the time .....
- 50% of the time.....
- 25% of the time.....
- Rarely or never.....

**4b)** If you **use the HFT** during a surgery do you usually place and retrieve sharp item items from (check one only):

A section of the surgical field between you and the surgeon nearest to the:

- Surgeon .....
- Or nearest to you .....

**Or**

- A kidney basin .....
- A mayo stand .....
- Other.....

**4c)** If you **use the HFT** do you place the sharp point:

- Facing away from you .....
- Facing towards you .....

**4e)** If you **do not use the HFT** is it because (check all that apply):

- You did not know about it .....
- You do not know enough about it .....
- It takes too much time .....
- Surgeons or/and residents want to be handed sharp items directly.....
- Other.....

Explain \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Section 5

**5a)** Have you observed other members of the surgical team use the HFT: Yes  No

**(If No skip to questions 5l and 5m)**

**5b)** Do some surgeons use the HFT: 100% of the time   
75%  50%  25%  Rarely or never

**5c)** Do some residents use the HFT: 100% of the time   
75%  50%  25%  Rarely or never

**5d)** Do other scrub personnel use the HFT: 100% of the time   
75%  50%  25%  Rarely or never

**5e)** Is the HFT used about equally in surgical sub-specialties:  
Yes  No

**5f) If not used equally** in which is it used most **(check up to 3)**  
General  Neuro  ENT  Plastics  Obstetrics   
Vascular  Urology  Cardio-thoracic  Orthopedics

**5g) If not used equally** in which is it used least **(check up to 3)**  
General  Neuro  ENT  Plastics  Obstetrics   
Vascular  Urology  Cardio-thoracic  Orthopedics

**5k) If not used equally** is this because of:

Surgeons' preferences .....

Types of sharp instruments handled

Use of technologies (e.g. microscopes)

Other (explain) \_\_\_\_\_

**5l) What barriers most discourage use of the HFT?** \_\_\_\_\_

**5m) Can you suggest ways to overcome these barriers, that is, ways so that overall, the HFT could be used 75% or more of the time during every surgery?** \_\_\_\_\_

### Section 6

**How strongly do you agree or disagree with the following statements?**

**(Circle only one number per item.)**

	strongly agree	agree	neither agree or disagree	disagree	strongly disagree	don't know
<b>6a)</b> Our work area is kept clean.....	1	2	3	4	5	8
<b>6b)</b> Our work area is not cluttered.....	1	2	3	4	5	8
<b>6c)</b> Our work area is not crowded.....	1	2	3	4	5	8
<b>6d)</b> Disposable gloves are readily available in our work area.....	1	2	3	4	5	8
<b>6e)</b> Sharps containers are readily accessible.....	1	2	3	4	5	8
<b>6f)</b> Job duties do not interfere with our being able to follow Universal/Standard Precaution.....	1	2	3	4	5	8
<b>6g)</b> Our work allows enough time to always follow Universal/Standard Precautions.....	1	2	3	4	5	8
<b>6h)</b> Usually there isn't so much to do so that Universal/Standard Precautions can't be followed.....	1	2	3	4	5	8
<b>6i)</b> Protection from occupational exposure to pathogens (HCV, HBV & HIV) is a high priority with management.....	1	2	3	4	5	8
<b>6j)</b> On my unit all reasonable steps are taken to minimize hazardous tasks and procedures.....	1	2	3	4	5	8
<b>6k)</b> Employees are encouraged to become involved in health and safety matters.....	1	2	3	4	5	8
<b>6l)</b> Managers do their part to ensure our protection from exposure to HCV, HBV & HIV.....	1	2	3	4	5	8
<b>6m)</b> On my unit, unsafe work practices are corrected by supervisors.....	1	2	3	4	5	8
<b>6n)</b> My supervisor often discusses safe work practices with me.....	1	2	3	4	5	8
<b>6o)</b> We have been properly trained to use equipment to protect ourselves from pathogens such as HCV, HBV & HIV.....	1	2	3	4	5	8
<b>6p)</b> Personnel are taught to be aware of and to recognize potential health hazards at work.....	1	2	3	4	5	8
<b>6q)</b> On my unit a copy of the hospital health and safety manual is available.....	1	2	3	4	5	8
<b>6r)</b> There is minimal conflict in our unit.....	1	2	3	4	5	8
<b>6s)</b> On our unit, there is open communication between supervisors and staff.....	1	2	3	4	5	8
<b>6t)</b> Members of our unit support one another.....	1	2	3	4	5	8

## Section 7

**How strongly do you agree or disagree with the following statements?  
(Circle only one number per item.)**

**During the past 5 years in your unit there were situations when doctors:**

	strongly agree	agree	neither agree or disagree	disagree	strongly disagree	don't know
7a) Made unwanted attempts to draw you into a discussion of personal matters. ....	1	2	3	4	5	8
7b) Put you down or acted condescending to you. ....	1	2	3	4	5	8
7c) Paid little attention to your statements or showed little attention to your opinion. ....	1	2	3	4	5	8
7d) Made demeaning or derogatory remarks about you. ....	1	2	3	4	5	8
7e) Addressed you in unprofessional terms, either publicly or privately. ....	1	2	3	4	5	8
7f) Ignored or excluded you from professional camaraderie. ....	1	2	3	4	5	8
7g) Doubted your judgment on a matter over which you have responsibility. ....	1	2	3	4	5	8

**During the past 5 years in your unit there were situations when supervisors:**

**(Circle only one number per item.)**

7h) Made unwanted attempts to draw you into a discussion of personal matters. ....	1	2	3	4	5	8
7i) Put you down or acted condescending to you. ....	1	2	3	4	5	8
7j) Paid little attention to your statements or showed little attention to your opinion. ....	1	2	3	4	5	8
7k) Made demeaning or derogatory remarks about you. ....	1	2	3	4	5	8
7l) Addressed you in unprofessional terms, either publicly or privately. ....	1	2	3	4	5	8
7m) Ignored or excluded you from professional camaraderie. ....	1	2	3	4	5	8
7n) Doubted your judgment on a matter over which you have responsibility. ....	1	2	3	4	5	8

**During the past 5 years in your unit there were situations when co-workers:**

**(Circle only one number per item.)**

7o) Made unwanted attempts to draw you into a discussion of personal matters. ....	1	2	3	4	5	8
7p) Put you down or acted condescending to you. ....	1	2	3	4	5	8
7q) Paid little attention to your statements or showed little attention to your opinion. ....	1	2	3	4	5	8
7r) Made demeaning or derogatory remarks about you. ....	1	2	3	4	5	8
7s) Addressed you in unprofessional terms, either publicly or privately. ....	1	2	3	4	5	8
7t) Ignored or excluded you from professional camaraderie. ....	1	2	3	4	5	8
7u) Doubted your judgment on a matter over which you have responsibility. ....	1	2	3	4	5	8

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**OPERATING ROOM SAFETY QUESTIONNAIRE**



Identifier  
\_\_\_\_\_

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# OPERATING ROOM SAFETY QUESTIONNAIRE



## Section 1

**1a)** Do you know of a technique to pass sharp items during surgery called the hands-free technique (sometimes called no-touch technique or the neutral zone)?  
Yes  No

**1b) If Yes,** please describe the technique:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**1c) If Yes,** were you taught to use the hands-free technique?  
Yes  No

**1d) If Yes,** were you taught: during your  
Nursing education   
On the job   
Other

**1e) Do you use the hands-free technique?**  
Yes  No

## Section 2

The **HFT** can be implemented in a variety of ways depending on the type of surgery, sharp items that will be handled and personnel preferences. **Suggested ways include placing sharps on designated sections of the sterile field, a mayo stand, passing a sharp in a kidney basin, with or without using a magnetic pad.**

**2a)** In surgery do you **use the HFT**, on average (check one only):

100% of the time .....   
75% of the time .....   
50% of the time.....   
25% of the time.....   
Rarely or never.....

**2b)** If you **use the HFT** during a surgery do you usually place and retrieve sharp item items from (check one only):  
A section of the surgical field between you and the surgeon nearest to the:

Surgeon .....   
Or nearest to you .....

**Or**

A kidney basin .....   
A mayo stand .....   
Other.....

**2c)** If you **use the HFT** do you place the sharp point:

Facing away from you .....   
Facing towards you .....

**2d)** If you **do not use the HFT** is it because (check all that apply):

You did not know about it .....   
You do not know enough about it .....   
It takes too much time .....   
Surgeons or/and residents want to be handed sharp items directly.....   
Other.....

Explain \_\_\_\_\_  
\_\_\_\_\_

### Section 3

**3a)** Have you observed other members of the surgical team use the HFT: Yes  No

**(If No skip to questions 5l and 5m)**

**3b)** Do some surgeons use the HFT: 100% of the time   
75%  50%  25%  Rarely or never

**3c)** Do some residents use the HFT: 100% of the time   
75%  50%  25%  Rarely or never

**3d)** Do other scrub personnel use the HFT: 100% of the time   
75%  50%  25%  Rarely or never

**3e)** Is the HFT used about equally in surgical sub-specialties:  
Yes  No

**3f) If not used equally** in which is it used most **(check up to 3)**  
General  Neuro  ENT  Plastics  Obstetrics   
Vascular  Urology  Cardio-thoracic  Orthopedics

**3g) If not used equally** in which is it used least **(check up to 3)**  
General  Neuro  ENT  Plastics  Obstetrics   
Vascular  Urology  Cardio-thoracic  Orthopedics

**3h) If not used equally** is this because of:

Surgeons' preferences .....

Types of sharp instruments handled

Use of technologies (e.g. microscopes)

Other (explain) \_\_\_\_\_

**3i)** What barriers most discourage use of the HFT? \_\_\_\_\_

**3j)** Can you suggest ways to overcome these barriers, that is, ways so that overall, the HFT could be used 75% or more of the time during every surgery? \_\_\_\_\_

### Section 4

**How strongly do you agree or disagree with the following statements?**

**(Circle only one number per item.)**

	strongly agree	agree	neither agree or disagree	disagree	strongly disagree	don't know
<b>4a)</b> Our work area is kept clean.....	1	2	3	4	5	8
<b>4b)</b> Our work area is not cluttered.....	1	2	3	4	5	8
<b>4c)</b> Our work area is not crowded.....	1	2	3	4	5	8
<b>4d)</b> Disposable gloves are readily available in our work area.....	1	2	3	4	5	8
<b>4e)</b> Sharps containers are readily accessible.....	1	2	3	4	5	8
<b>4f)</b> Job duties do not interfere with our being able to follow Universal/Standard Precaution.....	1	2	3	4	5	8
<b>4g)</b> Our work allows enough time to always follow Universal/Standard Precautions.....	1	2	3	4	5	8
<b>4h)</b> Usually there isn't so much to do so that Universal/Standard Precautions can't be followed.....	1	2	3	4	5	8
<b>4i)</b> Protection from occupational exposure to pathogens (HCV, HBV & HIV) is a high priority with management.....	1	2	3	4	5	8
<b>4j)</b> On my unit all reasonable steps are taken to minimize hazardous tasks and procedures.....	1	2	3	4	5	8
<b>4k)</b> Employees are encouraged to become involved in health and safety matters.....	1	2	3	4	5	8
<b>4l)</b> Managers do their part to ensure our protection from exposure to HCV, HBV & HIV.....	1	2	3	4	5	8
<b>4m)</b> On my unit, unsafe work practices are corrected by supervisors.....	1	2	3	4	5	8
<b>4n)</b> My supervisor often discusses safe work practices with me.....	1	2	3	4	5	8
<b>4o)</b> We have been properly trained to use equipment to protect ourselves from pathogens such as HCV, HBV & HIV.....	1	2	3	4	5	8
<b>4p)</b> Personnel are taught to be aware of and to recognize potential health hazards at work.....	1	2	3	4	5	8
<b>4q)</b> On my unit a copy of the hospital health and safety manual is available.....	1	2	3	4	5	8
<b>4r)</b> There is minimal conflict in our unit.....	1	2	3	4	5	8
<b>4s)</b> On our unit, there is open communication between supervisors and staff.....	1	2	3	4	5	8
<b>4t)</b> Members of our unit support one another.....	1	2	3	4	5	8

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