ACKNOWLEDGMENTS

Product development is a lengthy, and at times, frustrating process—but it is much easier to persist when the proposed end-users eloquently express their needs in numbers and in stories. Nurses have long articulated their wish for simple but effective tools to reposition their patients in bed and costs associated with injuries related to moving and assisting patients in bed are well documented. This slider sheet system has seen much iteration over the last 4 years, but the Ergonomic Specialists believe it will now provide the tools needed to significantly reduce the risk of fatigue, frustration, and injury, while meeting the goals of safe, quality patient care during repositioning. In addition, we believe these benefits can be realized at a cost that is reasonable. The Interior Health Ergonomic Specialist Team, Workplace Health and Safety wishes to thank the following for their support:

- This project was supported with funds from WorkSafeBC (Workers Compensation Board of British Columbia) and co-funded by the Workers Compensation Board of Nova Scotia
- Drs. Binsted and Jakobi of the University of British Columbia Okanagan for their invaluable guidance and the learning opportunities provided by this partnership.
- Staff, managers and the other ergonomic specialists of the Interior Health Authority for generously giving their time and expertise to help create a product that would mitigate risks for all caregivers associated with repositioning in bed.
- Tom Frame and MIP Inc., the linen supplier for Interior Health for expertise, patience with our systematic process and commitment to a shared goal.
- We also wish to acknowledge the significant contributions made by our colleague, Nancy McGovern PT to this project. Nancy was the genesis of the slider sheet system concept and the originator of many of its best features. Her passionate commitment to reducing unnecessary risks in the working lives of nurses and all caregivers is reflected in every facet of this work.
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EXECUTIVE SUMMARY

Studies have shown that patient repositioning is one of the most physically demanding tasks that nurses perform and is the cause of approximately 25% of all patient handling musculoskeletal injury compensation claims (Fragala, 2005; Nelson, Lloyd, Menzel & Gross, 2003). Ceiling lifts and repositioning slings are effective engineering controls to reduce the risk of musculoskeletal injuries. (Nelson & Baptiste, 2004) However, few acute care units are fully equipped with this equipment and the use of ceiling lifts takes significantly longer to complete a repositioning task in comparison to manual techniques (Alamgir, 2009; Keir, 2004). Therefore, many nurses throughout Interior Health, particularly when faced with high workloads often carry out the task of repositioning manually, on a repetitive basis.

There are a number of studies in the literature recommending the use of slider sheets or friction-reducing assistive devices for repositioning in bed, as part of an injury prevention program (Hignett, 2003; Collins, 2004). Friction-reducing devices such as slider draw sheets, roller sheets, gel filled envelope sheets, slider boards, pairs of flat sheets and specialty mattresses are readily available and have been utilized throughout healthcare over many years. However, in our experience, those products that are effective in reducing forces also present significant barriers to their use such as high unit cost, the inability to leave the product under the patient at all times, or the inconvenience of additional layers on the bed.

Consequently, a two part ‘slider sheet system’ was designed by the Ergonomic Specialists and the Laundry managers at Interior Health, in partnership with the laundry supplier and introduced in a Phase One 6-month trial in 2007. The two parts consist of a slider draw sheet and a slider bottom sheet with a 20” panel of low friction, anti-static, breathable microfiber sewn lengthwise into the centre of a jersey sheet. The slider sheet system components, which can remain under patients at all times, provided simple and accessible tools which substantially reduced the physical demands placed on the nurses when manually repositioning dependent patients in bed.

Based on the positive Phase One results and due to a required change in the standard Interior Health linen product, a second trial was initiated. Phase Two expanded the trial sites, improved on research quality and design, and tested the durability of the newly designed bottom sheet. The objectives of the Phase Two trial were:

1. To determine if nurses would change their practice of manual bed repositioning if provided with the slider sheet systems
2. To study the co-efficient of friction (slipperiness) of the products and muscular effort required to use them.

3. To evaluate the durability of the new slider bottom sheet.

WorkSafeBC (Workers’ Compensation Board of British Columbia) funded the Phase Two trial under an ‘Innovation at Work’ grant. This funding offered the opportunity for the Ergonomic Specialists to partner with Dr. Jennifer Jakobi and Dr. Gordon Binsted, of the Human Kinetics Department at the University of British Columbia Okanagan. Their research focused on obtaining quantitative data regarding the physical properties of the products and the muscular effort involved in using them in comparison to traditional linens and repositioning practices.

FINDINGS

The four clinical areas studied included surgical, renal, hospice and rehabilitation units. Data was collected from one-on-one interviews with nurses (117), focus groups (25 participants), documentation of bed make-up (975 beds) and phase 1 surveys (29). The quantitative data and qualitative/clinical findings corroborated each other. Staff reported that using at least one component of the slider sheet system rather than traditional linens made it “easier” and “faster” to manually reposition patients, the slider bottom sheet being the common denominator in the preferred combination on each of the trial units. Quantitatively, of the combinations tested, the slider bottom sheet is the most important component in decreasing the friction, and any associated risk.

Staff feedback indicated that the “more dependent the patient, the more useful the whole slider sheet system” making it advantageous for large/heavy, palliative, and immobile patients, while the whole slider sheet system was less valuable for mobile, restless, or agitated patients as the patient moved around too much on the sheets. Other component combinations however, were effective with these patient populations.

The study also found that two years after implementation, the Phase One sites continue to use the slider sheet products. The preferred combinations mirror the results of the Phase Two study, with a preference for the whole slider sheet system or the slider bottom sheet and soaker pad combination. This confirmation of the study’s objectives is particularly powerful as it is without any continued involvement of Workplace Health & Safety reducing likelihood of researcher bias.

RECOMMENDATIONS

It is recommended that Interior Health purchase both components of the slider sheet system, i.e. the slider bottom sheet and slider draw sheet, and make them available as standard laundry items. Prior experience has shown that individual unit and/or facility purchases of these
items is not cost-effective due to the significantly increased sorting process required in laundry as well as the attrition of the items as they are returned to alternate units and/or facilities.

It is recommended that a higher proportion of slider bottom sheets be purchased, relative to the slider draw sheets. The overwhelming acceptability of the slider bottom sheet to staff and patients increases confidence that they will be a regularly chosen item in the care of patients. A ratio of approximately 2 slider bottom sheets: 1 slider draw sheet is suggested at this time.

It is recommended that if resources can only support the purchase of one of the slider sheet components, the slider bottom sheet is purchased due to the low friction benefits and its preferred clinical usage. The slider draw sheet is not recommended as a stand-alone purchase for a unit and/or facility due to its limited effectiveness in reducing friction when used with a jersey sheet and its low usage rates when given other choices.

It is recommended that WorkSafeBC review their bulletin entitled “Soaker pads are not for repositioning”. The bulletin focuses on valid concerns when using the soaker pad with a traditional jersey bottom sheet but its direction does not give credence to clinical judgment when using low friction bed linens. This study supports the choice of the soaker pad as a repositioning tool when used in combination with the slider bottom sheet trialed in this project.
RESEARCH PROBLEM

Background

Many studies have shown that patient repositioning is one of the most physically demanding tasks that nurses perform (Collins, 2004; Marras, 1999; Nelson, 2004; Owens, 2000; Skotte, 2008). Although the frequently used “two person draw sheet” technique has been found to create the lowest spinal loads in comparison to other manual transfer and repositioning techniques, the technique still puts the nurses at a relatively high risk for low back injury (Marras, 1999). The use of a traditional draw sheet or a “soaker pad” for repositioning a patient up the bed creates high internal compressive and anterior-posterior forces at the L5/S1 disk due to the forceful lifting action combined with bending, twisting and other awkward postures (Nelson, 2003; Skotte, 2008; Waters, 2007). Musculoskeletal injuries caused by repositioning patients account for approximately 25% of all patient handling injury compensation claims (Fragala, 2005).

Ceiling lifts and the use of repositioning slings are effective engineering controls to reduce the risk of musculoskeletal injuries from repositioning, however few acute care units are fully equipped with this equipment. In addition, the use of ceiling track lifts takes significantly longer to complete a repositioning task when compared to manual techniques (Alamgir, 2009; Keir, 2004). This ‘time factor’ poses a disincentive to the nurses in both residential and acute care to use the mechanical equipment available to them, particularly when they are facing high workloads.

There are a number of studies in the literature recommending the use of slider sheets or friction reducing sheets for repositioning. Hignett (2003) reviewed the literature to conclude that the use of slider sheets is recommended for various levels of assistance for moving a patient in a lying position. Collins (2004) also recommended that friction reducing sheets be included in the equipment provided to care facilities as part of an injury prevention program based on a significant reduction in post-intervention injuries. McGill (2005) studied the co-efficient of friction on roller boards, concluding that the assistive devices substantially reduce the friction by well over one half compared to the regular cotton sheet. The slider device and the repositioning technique used, appear to be more important factors in decreasing the physical load than either the patient’s weight or ability to help (Skotte, 2008).

The Ergonomic Specialist group at Interior Health Authority felt that there was a gap in the research with respect to linking clinical preference and usage of accessible, individual slider
Changing the Slider Sheets-II

sheet components to the quantitative information such as the co-efficient of friction and muscular effort required for use. The purpose of linking these findings is to give guidance to health care authorities and/or facilities on responsible and evidence-based purchasing decisions for effective repositioning tools.

**Phase One Review**

Friction reducing assistive devices for moving patients in bed are readily available; products such as slider draw sheets, roller sheets, gel filled envelope sheets, slider boards, pairs of flat sheets and specialty mattresses had been utilized throughout Interior Health over the past 10 years. However, those products that were effective in reducing forces also presented significant barriers to their use such as high unit cost. Staff also complained about the inability to leave the product under the patient at all times, or the inconvenience of having two movable components, as with two slider draw sheets used together.

A two part slider sheet system was designed by the Ergonomic Specialists and a Laundry manager at Interior Health, in partnership the with the laundry supplier and introduced in a 6 month trial in 2007. The two parts consist of a slider draw sheet and a slider bottom sheet; the fitted slider bottom sheet has a 20” panel of low friction, anti-static, breathable microfiber sewn lengthwise into the centre of a jersey sheet. The jersey panels on each side of the center panel prevent patients from sliding out of the bed when they are close to the edge.

The slider sheet system components, which can remain under patients at all times, provide simple and accessible tools which decrease the physical demands placed on the nurses when manually repositioning patients. Although the majority of the nurses surveyed preferred using the slider sheet system rather than traditional bed linens, further research was required as there were changes made to the slider bottom sheet including a redesign at weak seam junctions, a change in grain direction in the microfiber component, and a change in the jersey material to an ‘ultra knit’ fabric.

**Phase Two Trial**

Phase Two of the slider sheet trial began in September 2008 following receipt of an Innovation at Work grant from WorkSafeBC, co-funded by the Workers Compensation Board of Nova Scotia. Recognizing that equipment and devices must be readily available to staff in order to encourage their use (Trinkoff, 2003), and that “availability” incorporates quantity, location, and access of equipment commensurate with staff and patient needs (ANA, 2003), most of the grant funds were allocated to provide an adequate supply of the slider sheet system components.
The Ergonomic Specialist team within the Workplace Health and Safety Department of Interior Health partnered with Dr. Jennifer Jakobi and Dr. Gordon Binsted, assistant professors in the Human Kinetics department, Faculty of Health and Social Development at the University of British Columbia Okanagan (UBCO). The researchers advised the team on the research question, trial and questionnaire design and conducted studies to establish the physical properties of the slider sheet products and traditional linens as well as the muscular effort required in use.

Objectives of Phase Two trial

1. To determine if the provision of the slider sheet system could impact nurses to adopt a change in practice relative to manual bed repositioning.
2. To evaluate the durability of the new slider bottom sheet.
3. To gather data on the co-efficient of friction of the various products and the muscular effort required when using the various combinations.

METHODOLOGY

The trial was conducted over a 4-month period from January-May 2009. The methodologies of the clinical trials and UBCO based quantitative studies included:

1. Selection of clinical trial sites
2. Staff training
3. Clinical data collection
   i) Weekly interviews with staff
   ii) Weekly observations of bed make-up
   iii) Focus groups
   iv) Phase One site surveys
4. Quantitative research
   i) Measurements of Coefficient of friction
   ii) Electromyography (EMG) studies
   iii) Borg Rating of Perceived Exertion

Selection of clinical trial sites

Four acute care sites were selected according to the following criteria:

- Nursing staff provide care to patients, which involve bed repositioning.
- Patients have various medical/surgical conditions requiring hospitalization.
- Unit does not have overhead ceiling track lift equipment over 100% of the beds
Managerial, nursing, and para-professional staff provide consent for the research project and are enthusiastic to participate.

The selected units included a hospice, rehabilitation, in-patient renal, and surgical unit with a total of 79 beds; the units were equipped with 5 sets of the slider sheet system per bed. Refer to Appendix I for bed numbers and supply per unit.

**Staff Training**

An Ergonomic Specialist met with unit managers, housekeeping and laundry staff to confirm trial details such as labelling, laundry cart supply, and standard bed make-up at terminal clean etc. Ergonomic Specialists provided the nurses with in-servicing (see Appendix II), question and answer sheets (see Appendix III), laminated ‘head-of-bed’ cards (see Appendix IV), and a communication book to document thoughts, observations, patient feedback, etc.

Standard bed make-up on patient admission included both parts of the slider sheet system in order to ensure ready availability of the product. Nurses were free to make a clinical decision as to the appropriate bed makeup over the course of each patient’s stay. Nurses were not given a formal assessment tool or specific instructions for the prescription of bed make-up, but were asked to rely on their clinical judgement in choosing the appropriate bed make-up for each patient. Options included:

- Slider sheet system
- Slider draw sheet on a fitted jersey sheet
- Slider bottom sheet alone
- Other combinations to be determined by the staff.

Soaker pads were to be added only if required for incontinence, wound drainage, etc.

**Clinical (qualitative) data collection**

Qualitative research validity was augmented through triangulation, the use of multiple means of data collection as well as having multiple researchers (Glesne, 2006). The subjective data was corroborated by documentation of bed make-up to further verify that nurses’ statements reflected their observed practice. An additional validity check was employed through “peer review and debriefing” in asking an external colleague to review the study and conclusions. The following data was collected:

i) **Weekly interviews with staff (n= 117 clinical staff)**

An Ergonomic Specialist attended each trial unit once/week for 14 weeks in order to collect data regarding the usage of the slider sheet system components. One to four staff members (including nurses, occupational therapists, and physical therapists) were interviewed
Changing the Slider Sheets-II

at each visit (see Appendix V).

ii) Weekly observations of bed make-up (n= 975 beds)

A “snapshot” of the bed make-up on the units (i.e. the total number of beds with each option of bed make-up) was documented by an Ergonomic Specialist each week for 14 weeks in order to track usage patterns and trends.

iii) Focus groups (n= 25 participants)

All staff at the 4 trial sites were invited to site-specific focus groups at the end of the trial in order to collect more in-depth feedback from staff and to allow discussion between staff members. The focus groups provided a setting in which to tell “stories” or give examples of when the slider sheets did or didn’t work (see Appendix VI). A scribe attended each of the focus groups in order to record all participants’ statements; the content was reviewed at the end of each group to validate and verify the statements.

iv) Phase One site surveys (n= 29 respondents)

The Phase One trial sites had been using the slider sheet system for more than two years; they provided feedback with respect to usage patterns and preferences for the various components of the slider sheet system over time and without ongoing support. Questionnaires were distributed and collected by the unit manager and/or patient care coordinator (see Appendix VII).

v) Satellite site surveys

In order to increase the potential for clinical feedback, the slider sheet systems were distributed to 4 additional acute care sites as an adjunct to the trial. These sites were not formally included in the research results but do help to provide additional feedback regarding staff perception and preference regarding the slider sheet system components. Feedback regarding staff preference for the different combinations of slider sheet products was collected by questionnaires which were distributed and collected by the unit manager and/or patient care coordinator.

Quantitative research

i) Coefficient of friction.

The coefficient of friction is a dimensionless scalar value, which describes the ratio of the force of friction between two bodies and the force pressing them together. The coefficient of friction depends on the materials used; for example, ice on steel has a low coefficient of friction, while rubber on pavement has a high coefficient of friction; generally coefficients of friction
range from near zero to one (although > 1 values can occur). For all combinations of top sheets (soaker pad and slider draw sheet) and base sheets (standard jersey sheet and slider bottom sheet), 10 estimates of the frictional coefficient were performed. For each estimate, the base sheet was snugly affixed to a 3-foot square sheet of \( \frac{3}{4} \) inch lexan glass and a segment of top sheet was wrapped tightly around a 5 kg block (contact area = 225 cm\(^2\)). The wrapped mass was placed in the centre of the covered lexan sheet; the sheet was horizontally oriented. One edge of the sheet was slowly raised (~10 deg/sec) until the mass began to slide. This ‘friction angle’ was used to determine the accompanying coefficient of friction. Subsequently, a one-way analysis of variance and appropriate post-hoc procedures were performed to ascertain differences.

ii) Electromyography studies

Although many patient handling studies focus on measures of the low back and spine, repositioning patients is performed on a horizontal plane using the weaker muscles of the arm and shoulder as primary muscles, rather than the stronger muscles of the legs (Nelson, 2003). As it is likely that the shoulder strength capability is exceeded before the lateral shear force limit of the spine is reached for most repositioning activities (Waters, 2007), it was determined that arm and shoulder muscle activity would be studied in this project. Electromyography (EMG) provides a measure of muscle activity and in situations where force cannot be measured, EMG offers an indication of force production as the two are strongly correlated. Thus, any increase in EMG represents an increase in external force produced to transfer the patient.

Temporal characterization of the electromyography (EMG) signal through quantification of periods of muscle quiescence (gaps) and phases of muscle activity (bursts) has been used to measure workplace tasks and the associated demand of the job with respect to muscle fatigue and injury (Harwood, 2008; Jakobi, 2008). Five female volunteers who were unfamiliar with the slider draw sheet and slider bottom sheet, but trained in boost and turn patient transfers with the soaker pad and jersey sheet, participated in this investigation. Each participant wore surface electrodes (Biometrics SX230, Swent, UK) affixed to the skin above the forearm and shoulder muscles. The forearm flexors and extensors, biceps brachii, triceps brachii, and upper trapezius were studied and averaged to provide an indication of overall upper body effort. Because the nature of the boost and turn are fundamentally different, and the primary mover to execute each movement differs between transfers, one or two muscles do not provide complete representation of upper body involvement.

Maximum voluntary exertions (MVE) were executed for each muscle against experimenter resistance. The greatest MVE recorded from the three attempts was used to
normalize the EMG measures gained from the boost and turn reposition. Subsequent to MVE, the boost or turn reposition was executed three times in a randomized order. The EMG signals for all muscles were sampled at 1,000 Hz, amplified (1,000 x), band-pass filtered (20-450Hz), and stored on a 512MB MMC flashcard for offline analysis. Gaps were defined as a period of muscle activity less than 1% amplitude of the MVE lasting longer than 0.1 seconds and a burst was muscle activity greater than 2% amplitude for duration longer than 0.1 seconds. The number, duration and overall activity of each event (burst and gap) were determined. The numbers of bursts were quantified by measuring the occurrences of each. Time was measured in second(s). The mean activity of all bursts was used to calculate burst duration (s/burst), area (%MVE × s), rate (bursts/s), and amplitude (average peak amplitude of all bursts (%MVE)). Values referring to amplitude and activity were measured as a direct normalization to each MVE and rate activities were measured per second. These calculations are similarly applied to gain measurement of gap parameters.

iii) Borg Rating of Perceived Exertion Scale

The Borg Rating of Perceived Exertion (RPE) was used following each execution to determine the subject's perception of the effort in executing the boost or turn. The 10 point scale was used in which exercise is rated: 0- no exertion at all, 1-extremely light, 2-fairly light, 3-moderate, 4-somewhat difficult, 5-difficult, 7-very difficult, and 10-very, very difficult (American College of Sports Medicine). The Borg Rating of Perceived Exertion is a method commonly used to measure levels of physical activity intensity. It is based on the physical sensations felt when the body is working, for example; increased heart rate, increased respiration, increased sweating, and muscle fatigue.

PROJECT FINDINGS

Qualitative Thematic Analysis

The weekly interviews and focus groups generated a significant amount of information; thematic analysis was used to synthesize the data. This is a process that involves coding and then segregating the data codes into data clumps for further analysis and description (Glesne, 2006). In keeping with the primary objective of the study, the focus in all of the data and feedback collected was “nursing practice”. Within that focus, 4 distinct themes emerged as follows:

1. Perceived effort
2. Patient experience
Perceived Effort

The key words heard throughout the interviews and focus groups were “easier” and “faster” to describe manual boosts and turns with patients when using the slider sheets. One staff member whose patient required three bed linens and pyjama changes in one night said “It was so much easier to repetitively turn him” to get dressed/undressed, etc. when on the slider bottom sheet. Some nurses indicated that because the effort required to reposition patients was less, they were able to reposition some patients independently or manage heavy, difficult patients with less nurses.

Almost one third of the respondents indicated that patients slid down more on the whole slider sheet system, requiring more frequent boosting up the bed; for the majority of these respondents it was stated as an observation, rather than a deterrent to the use of the system. Approximately one quarter of the nurses indicated that the ‘excessive’ slipperiness of the whole system was partly, the reason for their preference for other combinations such as the slider bottom sheet/soaker pad and slider bottom sheet alone, or, less frequently, the slider draw sheet/jersey sheet – all of which they found to be effective at decreasing the effort required to move the patient.

Patient Experience

Patient feedback was obtained primarily through the staff interviews as few patients were interviewed directly; however, the direct feedback from patients did corroborate the nurses’ comments. The most frequent response highlighted the increased level of independence for patients with respect to boosting or turning when lying on at least one component of the slider sheet system. Benefits of this increased independence were described as:

1. Less nursing assistance was required as described in the previous section.
2. Earlier activation for patients as bed mobility required less strength.
3. Enhanced self-esteem for patients who did not have to rely on nursing assistance to move.

A Hospice nurse described a situation where a family requested that the slider bottom sheet be put back on the bed, to assist their family member to maintain independence in rolling/turning in bed. A small number of the respondents also described the repositioning as being ‘smoother’ and ‘nicer’ for the patients with at least one of the slider sheet components.

While most patients were reportedly neutral to the slider bottom sheet, there were a small number of nurses who described patients who were either ‘sweaty’ or ‘cold’ when lying
directly on the slider bottom sheet. Feverish patients were amongst those identified as being sweaty, if lying directly on the slider bottom sheet.

**Clinical Judgment**

Many nurses felt that the slider sheet system was advantageous for large, heavy, palliative, or immobile patients. However some indicated that they did not like using the whole system for mobile, restless, agitated, or confused patients, as the patients moved around too much on the sheets and “ended up all over the bed”. This excess sliding led to bunching of the slider draw sheet, causing wrinkling and in a few cases, discomfort for the patient. Although most of the statements indicated that clinical assessment factors such as diagnosis, physical limitations, skin condition, etc. would determine the slider sheet components used, it was also indicated that nurses would change the components based on patient preference and the nurses’ own personal preferences.

**Product / System**

All sites, which had on-site laundry facilities indicated that 5 sets/bed, was an adequate supply. Regarding standard bed make-up on patient admission comments such as “I like that we don’t have to go get the sheets when we need them” and “It’s easier to take them off if we don’t need them” summarized the feedback regarding availability. There were no issues with respect to product durability.

**Weekly observations of bed make-up**

As an adjunct to the anecdotal evidence, information from the weekly observations of bed make-up provided insight to practice patterns. The following graphs summarize the usage patterns for each of the combinations of slider sheet components, at each trial site, over the 14 weeks of observation:

Figure 1 shows the usage of the whole slider sheet system; both the renal and surgical units chose to use the whole system approximately 50% of the time. Usage by the hospice and rehabilitation units tended to decline over the course of the trial.

![Slider Sheet System - Weekly Bed Coverage](image)
Figure 2 shows the usage pattern of the slider bottom sheet and soaker pad. Although this combination was not included in the options presented in the staff in-servicing, nurses in both Phase One and Phase Two trials adopted its use. This combination was the clear preference of the nurses on the hospice unit.

![Slider Bottom Sheet and Soaker Pad – Weekly Bed Coverage](image1)

Figure 3 shows the usage pattern of the slider bottom sheet alone. Although this was one of the least preferred options by many sites, rehabilitation staff did clearly prefer the slider bottom sheet as a stand-alone item. This component does give the typical rehabilitation patient the assistance often needed to be more independent with respect to bed mobility.

![Slider Bottom Sheet - Weekly Bed Coverage](image2)

Figure 4 shows the usage pattern of the jersey sheet and slider draw sheet combination. Clearly, this was the least frequently observed choice at all 4 trial sites.

![Jersey Sheet and Slider Drainsheet](image3)
Figure 5 shows the usage pattern of the traditional linens, jersey sheet and soaker pad. Based on staff feedback, nurses changed the linens back to traditional bed linens primarily for the fully mobile patient or at patient request. The renal and surgical units used this combination approximately 30% of the time, averaged over the 14 weeks.

Each of the trial units demonstrated a different preference for components of the slider sheet system and standard bed linens based on their clinical assessments and differing patient needs. However, the common denominator of the 3 most preferred combinations was the slider bottom sheet.

**Phase One Trial Site Surveys**

The nurses were asked to rank their preferences for each combination on a 1-5 scale, 1 being ‘most preferred’ and 5 being ‘least preferred’. Table 1 shows a summary of the rankings for each combination, averaged over the number of surveys returned from each unit. The post-anaesthetic recovery and medical units prefer the whole slider sheet system; staff on the intensive care unit indicate a preference for the slider bottom sheet and soaker pad together. For all 3 units, however, they continued to use one or both components of the system rather than returning to traditional bed linens for those patients who require manual repositioning.

### Table 1

**Phase One Trial Site Survey Results**

<table>
<thead>
<tr>
<th>Slider Sheet Components</th>
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<td>1.8*</td>
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<td>2.4</td>
<td>1.5*</td>
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<td>2.6</td>
<td>2.8</td>
</tr>
<tr>
<td>Jersey sheet &amp; soaker pad</td>
<td>3.0</td>
<td>3.8</td>
<td>2.9</td>
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* indicates the preferred linen combination for that unit
Quantitative Research

Coefficient of friction

As Dr Binsted noted “...it appears that the slider bottom sheet is the most important component in driving the coefficient of friction downwards”. The slider sheet system, i.e. slider draw sheet and slider bottom sheet, yielded the lowest coefficient of friction (0.17). The other combinations yielded coefficient of friction values as follows:

- Soaker pad/slider bottom sheet combination - 0.256
- Slider draw sheet/jersey bottom sheet – 0.40
- Traditional linens, i.e. the soaker pad and jersey bottom sheet - 0.48

See Figure 6 for all comparisons:

![Coefficient of Friction Diagram](image)

Legend

- SDraw = Slider Draw sheet
- SBottom = Slider Bottom Sheet
- JB = Jersey Bottom
- SP = Soaker pad

Figure 7: Experimentally determined coefficients of friction for all top/base sheet combinations.
All pairwise comparisons were significant p < 0.001

Electromyography

To evaluate activity in the transfers across all muscles, the average values were used and a one way repeated ANOVA applied for the independent variable (transfer) on the EMG dependent variables. There were 15% fewer muscular bursts, and the duration of bursts was significantly abbreviated (12% shorter) with the slider draw sheet and slider bottom sheet together when compared to the soaker pad and jersey sheet for the boost reposition. Similarly, the gaps were also greater in number and longer in duration for the boost reposition with the soaker pad and jersey sheet relative to the slider draw sheet and slider bottom sheet. Evaluation of the ‘turn’ indicated similar results to the ‘boost’. The number (16%Δ), and total duration of bursts (9%Δ) were greater with the soaker pad/jersey sheet relative to the slider sheet system and the number of gaps and gap area were greater with the soaker pad/jersey sheet compared to the slider sheet system (p=0.03).
The Borg Rating of Perceived Exertion

The Borg Rating of Perceived Exertion (RPE) results for the soaker pad / jersey sheet (traditional) combination was significantly greater compared with the slider sheets.
DISCUSSION

From both a qualitative and quantitative perspective, the data indicate that the slider sheet system makes manual repositioning patients “easier” for the caregiver. Although nurses on each of the trial units demonstrated different preferences for slider component combinations, staff on all the units did change nursing practice when manually repositioning patients if the appropriate equipment was immediately available. The slider bottom sheet was the leading component, both clinically and quantitatively, when only one component of the system was chosen.

The quantification of bursts and gaps of the EMG signal indicates that there is a greater ‘on’ and ‘off’ pattern of muscle activity for both the boost and turn repositioning with the soaker pad/jersey sheet relative to the slider sheet system. This data, coupled with higher friction and higher Borg Rate of Perceived Exertion scores with the soaker pad/jersey sheets demonstrate that muscle activity required to reposition is greater with the soaker pad/jersey sheet combination than the slider sheet system. This also implies that muscle fatigue and injury might be delayed with use of the slider sheet system.

The absence of a study-imposed formal assessment tool allowed for pragmatic and autonomous clinical choices to be made by the nurses with respect to bed make up. Although nursing feedback did reflect some personal preference when choosing the slider sheet components, a study design allowing self-selection of products inherently increases the content validity by allowing the experienced patient handlers to select as they would in their everyday practice (McGill, 2005).

These findings were consistent between the current trial and the Phase One follow-up sites. As part of the trial design, the clinical staff were not given information on the quantitative findings; nor were the ‘benefits’ of the low-friction surfaces promoted at in-servicing or during the interview or focus group process. Yet analysis of the findings demonstrates that the rankings of the quantitative findings (physical properties and physiological effort) align directly with clinical preferences over 7 different units (see Table 2), making it highly unlikely that there are alternative explanations for the results such as dominant biases on the part of the nurses or an attempt to “please” the researchers with a particular pattern of use for the trial period.
Table 2:

Clinical and Quantitative Rankings of Bed Linen Choices

<table>
<thead>
<tr>
<th>Ranked Bed Linen Preferences</th>
<th>Coefficient of Friction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Slider sheet system (preferred by renal, surgical, PAR, medical)</td>
<td>0.17</td>
</tr>
<tr>
<td>2. Slider bottom sheet/soaker pad (preferred by hospice, ICU)</td>
<td>0.256</td>
</tr>
<tr>
<td>3. Slider bottom sheet alone (preferred by rehabilitation unit)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>4. Jersey bottom/slider draw sheet (least preferred by all units)</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Over the 4 months of the study, there were no reports of rips, tears, or runs in the slider bottom sheet. It appears that the durability issues of the Phase 1 slider bottom sheet have been rectified in the new slider bottom sheet; the researchers feel confident in recommending this product for purchase.

This study did not specifically address the issue of manual repositioning versus the use of mechanical devices for repositioning. While ceiling track lifts used together with repositioning slings minimize the risks associated with repositioning, the experience of the Ergonomic Specialists in Interior Health has been that staff continue to manually reposition patients on a frequent basis, despite ready access to the equipment and a clear preference for the ceiling lifts when transferring patients. While the ceiling track system provides the highest level of risk reduction, if it is not used our analysis indicates that any combination of the slider sheets is a safer option when compared to the traditional lift and heave manoeuvre with the soaker pad on jersey sheets.

Two suggested redesigns of the soaker pad were brought up by the staff in the focus groups i.e. longer, wider soaker pads, and slider soaker pads incorporating low-friction microfiber on the bottom surface. These options were both considered in the development phase but were dismissed as non-viable, due to increased weight and laundry capacity as well as being unnecessary when targeted absorbent capacity was required.

The research analysis suggests that the slider sheet components must be standard laundry items in order to be successful. Facilities which have independently purchased the slider draw sheets in the past have relied on labelling and sorting of the sheets for the components to be returned to them; this system has largely been unsuccessful. Yearly replacement as part of the linen replacement program is the most effective solution for these issues.
IMPLICATIONS FOR FUTURE RESEARCH

WorkSafeBC Bulletin

The results show that although the trial sites initially used the whole slider sheet system for the majority of their patients, each of the trial units began to prefer various combinations of the products based on clinical assessment and patient preference. The negative feedback focused on excess material, the tendency to wrinkle under the patient, as well being too slippery for certain patients. Many staff preferred using the soaker pad on the slider bottom sheet rather than the slider draw sheet. With respect to physical properties, the slider bottom sheet/soaker pad combination had the second lowest coefficient of friction.

These findings have implications for practice as they contradict some of the concerns in a recent WorkSafeBC Bulletin entitled ‘Soaker pads are not for repositioning’. While the bulletin identifies several issues with the use of the soaker pad (refer to Appendix VIII), the concerns are based on the use of the soaker pad with a traditional jersey bottom sheet. However, the question now is “Could the soaker pad be an acceptable repositioning tool in combination with a slider bottom sheet?” The slider bottom sheet/soaker pad combination has a significantly better coefficient of friction than the slider draw sheet/jersey bottom sheet combination that has recently become an acceptable combination within healthcare.

Clinical Judgement

As there was no formal patient assessment tool provided to the nurses to prescribe the slider sheet components to use, the decisions were based on clinical judgement and the preferences of patients and nurses. It was observed during the trial that sometimes, at the patient’s request, the bed make-up was switched to component combinations which were less beneficial to the staff members in reducing the repositioning effort. It appeared that patient preference did ‘trump’ staff safety at times, often without any further discussion with the patient. Although the researchers gathered data on the clinical reasons for changing slider sheet components, the reasons for differences between units are beyond the scope of this study and do raise questions for further research. Another study may be able to identify if a formal patient assessment tool would provide more clinical guidance for staff or perhaps give them ‘permission’ to continue to promote the slider sheet components unless there was clear evidence of discomfort or safety concerns. This information may give additional guidance for purchasing or practice decisions.
**Stretcher Application**

One of the current limitations is the need for research on appropriately sized stretcher slider sheets. Many departments such as Emergency, Ambulatory Care etc primarily use stretchers and may benefit from these tools.

**IMMEDIATE AND LONG-TERM BENEFITS**

The most compelling outcome of the study was that all trial sites wanted to continue using the slider sheet system components following the end of the trial period and were unwilling to return them to the Ergonomists. In addition, continued use by the Phase One sites over the past two years, without any further support or involvement from the researchers speaks to their value to and acceptance by staff and patients.

Another benefit of the slider sheets was the increased level of independence of patients. Many patients were able to turn and/or boost themselves or assist with bed mobility which had threefold benefit:

1. Increased patient self-esteem
2. Maintained or increased patient strength
3. Decreased assistance required from staff and/or less numbers of staff required

Note: Staff members from the Rehabilitation unit have contacted the researchers, at the request of two families seeking information regarding the retail availability of the slider sheet system products in order to use the sheets at home.

In terms of long-term benefits, the primary goal will be to decrease the number and severity of musculoskeletal injuries as a result of manual repositioning activities among nurses in acute care, residential care, and home and community care. This can only be measured over the long-term as many of the current injuries from repositioning activities occur as a result of repetitive wear and tear after many years of manual repositioning using a high degree of force and awkward postures (Waters, 2007).

**Relevant User Groups for the Project Results**

The immediate user group for the project results will be acute and residential care Nursing staff within Interior Health. Other user groups include any other care-giving setting where staff is repositioning patients.

An additional user group would be Interior Health home support workers servicing clients through Home and Community Care. Interior Health does not provide the equipment used in clients’ homes; however, it is the responsibility of the home support supervisors and clinicians to make recommendations for equipment which minimizes the risks involved in providing care.
The slider bottom sheets would fit on most hospital and single bed mattresses used by home care clients and possibly could be made available for purchase to the public.

The final user group which would benefit from the research results are the faculty educators for long term care aides, LPNs, RNs, OTs, PTs, Rehab Assistants, etc. It is imperative that the students are educated in the proper patient handling techniques with the appropriate equipment, and that their instruction reflects current best practice. The partnership created between Interior Health and UBCO provided an opportunity to liaise with nursing faculty. This resulted in the donation of a number of slider sheet systems from Interior Health to the nursing practice lab to allow healthcare students to become familiar with the benefits of the slider sheet system while in their educational preparation phase. It will also encourage instruction to the students to use the system components when in their practicum site. If low friction slider systems are not in evidence, we hope the students would inform their future colleagues of their benefits.

**Knowledge Transfer**

The first opportunity for dissemination of the knowledge gained through the project was a one hour presentation at the B.C. Health Authorities Workplace Health, Safety, and Wellness Conference held in Kelowna, B.C. in September, 2009. The target audience of the conference includes healthcare providers, researchers, workplace health, safety and wellness practitioners, employers, and union representatives.

Within Interior Health project results will be communicated through direct meetings with stakeholders including managers/directors in acute care, residential care as well as Laundry Services in order to develop feasible recommendations regarding product quantities and funding sources. A Decision Brief will be presented to the Senior Executive Team (SET). On a more informal level, the project results will be submitted for inclusion in the monthly Interior Health newsletter.

The musculoskeletal injury prevention advisors (MSIP Advisors) within B.C.’s health authorities would be key stakeholders as they are the primary consultant group involved in the development of education programs and equipment recommendations with respect to safe patient handling. This group meets on an irregular basis as the British Columbia Health Care Musculoskeletal Injury Prevention Advisors.

The authors plan to submit an article regarding the research project to a nursing leadership journal; if accepted, this would be an effective method to broadly disseminate the information to influential stakeholders within the field of nursing.
Lastly, project results will be posted on the WorkSafeBC website for access to both healthcare practitioners and the public.

**RECOMMENDATIONS**

Based on analysis of the qualitative and quantitative results the researchers will be recommending the following:

1. Both components of the slider sheet system are purchased as standard laundry cart items, and are part of the yearly linen replacement program.
2. Two slider bottom sheets should be purchased for every one slider draw sheet.
3. Slider draw sheets are not approved as a stand-alone purchase due to their limitations both quantitatively and clinically.
4. All future Interior Health healthcare students become familiar with the benefits of the slider sheet system while in their education preparation phase and are instructed by their faculty to utilize these systems as part of their standard safe work practices throughout their practicum and careers.
5. WorkSafeBC review its repositioning bulletin and give consideration to advising that soaker pads may be an appropriate choice if used with low friction slider bottom sheets.
REFERENCES


# Appendix I Site Summary

## Slider sheet system supplies

### Phase Two Trial Units:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Unit</th>
<th>Beds</th>
<th>No. of slider sheet systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penticton Regional Hospital</td>
<td>Hospice</td>
<td>12</td>
<td>75</td>
</tr>
<tr>
<td>Penticton Regional Hospital</td>
<td>Rehabilitation</td>
<td>14</td>
<td>75</td>
</tr>
<tr>
<td>Kelowna General Hospital</td>
<td>Renal (in-patient)</td>
<td>18</td>
<td>90</td>
</tr>
<tr>
<td>Vernon Jubilee Hospital</td>
<td>Surgical</td>
<td>35</td>
<td>175</td>
</tr>
</tbody>
</table>

### Phase One Trial Units:

<table>
<thead>
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<th>Facility</th>
<th>Unit</th>
<th>Beds</th>
<th>No. of slider sheet systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kootenay Boundary Hospital</td>
<td>PAR</td>
<td>9</td>
<td>51</td>
</tr>
<tr>
<td>Penticton Regional Hospital</td>
<td>ICU</td>
<td>7</td>
<td>36</td>
</tr>
<tr>
<td>Royal Inland Hospital</td>
<td>Medical</td>
<td>35</td>
<td>161</td>
</tr>
</tbody>
</table>

### Satellite Sites:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Unit</th>
<th>Beds</th>
<th>No. of slider sheet systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Kootenay Regional Hospital</td>
<td>Medical</td>
<td>29</td>
<td>210</td>
</tr>
<tr>
<td>Invermere Hospital</td>
<td></td>
<td>8</td>
<td>65</td>
</tr>
<tr>
<td>Kelowna General Hospital</td>
<td>Medical</td>
<td>35</td>
<td>175</td>
</tr>
<tr>
<td>Kootenay Boundary Regional Hosp.</td>
<td>Surgical</td>
<td>20</td>
<td>140</td>
</tr>
</tbody>
</table>
Appendix II Introduction and Inservice Outline

I. Introduction of trial:
- Discuss rationale of trial – comparison of traditional bed linens and new products – i.e. the properties (low-friction microfiber, size of slider draw sheet, etc.)
- objectives of current trial, 1) would new products impact nursing practice with respect to repositioning, and 2) durability of the slider bottom sheet
- outline of trial process, i.e. locations, timelines, focus group research design, expectations of staff within the focus group design

II. Introduction of slider sheets and bed make-up linen selection:
- 2 products – slider draw sheet and slider bottom sheet
- Discuss standard bed make-up for trial – each bed will be made up with slider bottom sheet and slider draw sheet at terminal clean. Nurses will then determine the appropriate combination based on the assessment of the patient.
- Demonstrate possible options in bed make-up:
  - slider bottom sheet and draw sheet (slider sheet system – SSS)
  - slider draw sheet on jersey sheet
  - slider bottom sheet alone
- refer to assessment for Bed Make-Up Selection in the patient’s chart and HOB
- patient safety - be aware of potential contraindications and potential risks such as sliding out of bed; understand measures to prevent such occurrences.
- slider bottom sheets will not be used on specialty mattresses
- soaker pads should only be used in situations where significant moisture is expected i.e. patient incontinence (overflow from pads) or significant wound drainage

III. Demonstration of bed adjustments – Use the Bed, Protect the Body!
  a) Before the reposition:
      - to reduce the physical demands of repositioning for both the worker and/or the patient
        - use Trendelenburg for gravity assist
        - use the knee gatch adjustment if bed does not have Trendelenburg option
        - if Trendelenburg is contraindicated, then lower head of bed (HOB) as appropriate
        - adjust bed height to workers’ comfort level
  b) After the reposition:
     - to reduce/prevent the tendency of the patient to slide towards the foot of the bed and to reduce shearing forces acting on the patient’s skin and underlying tissues
       - use the knee gatch before elevating HOB
       - alternatively use the Trendelenburg adjustment followed by elevating HOB

IV. Body posturing principles
- teach the caregivers to “slide” the draw sheet – avoid “lifting”. Use the principle of a weight shift using a walk stance, i.e. weight shifts from forward leg to back leg
- bend slightly at the hips and knees to lower the center of gravity and to prepare for the weight shift
- keep the body in neutral alignment, elbows close in to the sides, wrists straight, and forearms positioned with palms facing (use whole hand to grasp the slider sheet)

V. Patient positioning – boosts up the bed
  a) Patient who can assist:
Changing the Slider Sheets-II

- raise the upper side rails on the bed
- encourage patient to use both hands on the side rails to help move up the bed
- if patient has the ability to do a chin tuck and/or to push with legs bent at hips and knees, encourage this effort
- having patients push with their legs sometimes makes the work more difficult as the leg push can result in the patient’s shoulders/upper body compressing the mattress thereby increasing the resistance of moving the patient

b) Patient who is unable to assist – 2 person reposition
- ask the patient if he/she is able to maintain a bent leg position
- if unable, then allow legs to remain flat on bed
- each worker grasps the slider draw sheet at shoulder level of patient (facing foot end of bed) – weight shift backwards from front leg to back leg, keeping arm positions constant.
- if there is not adequate room at HOB for using the above technique – workers stand at the side of the bed with feet shoulder width apart; when ready to boost, workers take a step towards the HOB, with full weight shift, with toe pointed towards the HOB. The arm positions stay constant.

VI. Patient positioning – turns in bed

a) Patient who can assist
- have patient turn head in direction of turn
- have patient reach with both hands as able toward side rail in direction of turn (assist as required)
- have patient bend their leg at the knee or cross that leg over towards the direction of the turn.
- patient may be able to use the bedrail to turn and/or push self back to center on bed – this is mostly effective when the two part slider sheet system is used

b) Patient who is unable to assist or requires some assistance
- position the patient to facilitate the turn i.e. head turned, arm across body, legs crossed at ankle, all in the direction of the turning action
- grasp the draw sheet at patient’s hip and shoulder level, perform a weight shift straight back to draw the patient to the side of the bed (a partial turn may result and worker is now behind the patient)
- pass the draw sheet to the caregiver on the other side of the bed who grasps it with both hands, and performs a weight shift to complete the turn

VII. After the reposition and before leaving the patient:
- to smooth the draw sheet under the patient, have two caregivers pull on opposite corners of the draw sheet to smooth out wrinkles under the patient (ensure that all 4 corners are used)
- tuck in the “wings” of the slider sheet under the sides of the mattress to stabilize it
- the “wings” can be left untucked if the patient is not at risk of sliding out of bed and wants to move self using the bed controls and side rails, i.e. understands risk, is reliable, etc.
- adjust the bed.
Appendix III Slider Sheet Trial – Frequently Asked Questions

Q: What is the slider bottom sheet system?
A: This refers to a two part system. The two parts consist of:
   a) a draw sheet with a built-in low friction center panel made of a breathable microfiber - this piece is referred to as a “slider draw sheet”, and
   b) a fitted bottom jersey sheet with a built-in center panel of a low friction anti-static, breathable microfiber – this is commonly referred to as the “slider bottom sheet”.

Q: How do I know when to use the slider bottom sheet system?
A: It is recommended that bed make-up following a terminal clean will include the 1) slider bottom sheet, and 2) slider draw sheet. The care staff will then determine the appropriate combination based on the assessment of the patient who occupies the bed. In most cases, the two part system will be left on the bed i.e. when patients need your help to turn or to get higher up the bed.
At this time, the slider bottom sheets are NOT to be used on specialty mattresses. Use only the approved sheets as per the specialty mattress manufacturer’s instructions.

Q: Can the slider draw sheet be used by itself – without the slider bottom sheet?
A: Yes, it can still be used over the standard jersey sheet but it is only effective for smaller, lighter patients. Remember, if the reposition feels difficult then it is too heavy for you. This should prompt you to use the two part system or a repositioning sling with ceiling track lift where available.

Q: Can the slider bottom sheet be used by itself – without the slider draw sheet?
A: Yes, the slider bottom sheet may be used by itself for patients who can be independent with bed mobility using these sheets alone. It will be helpful to the researchers to get feedback from patients who are using the slider bottom sheet (without the slider draw sheet) as to their comfort, ease of movement, etc.

Q: Should I be concerned about patients sliding off the bed in an attempt to get up?
A: Caregivers need to be aware of this possibility even though care has been taken to design the products to deter this from happening. Specifically, the slider bottom sheet was NOT made the full width of the bed to minimize possible slippage along the sides of the bed. As well, the “wings” of the slider draw sheet are intended to be tucked under the mattress sides to help stabilize it and keep it in place. As patients get more independent, a return to standard bed linens may be appropriate.

Q: Can the sheets remain under the patient at all times?
A: Yes, the products have been designed to remain under the patient. The moisture vapour transfer rating (i.e. breathability) of the microfiber is good and should not contribute to heat build-up.

Q: What about soaker pads?
A: Soaker pads should only be added to the bed make-up if the patient who occupies the bed requires the soaker pad for incontinence concerns and/or wound drainage. Soaker pads are not to be used for repositioning patients.

Q: I was taught that layers of bed linens should be kept to a minimum to help prevent skin breakdown/promote healing. Won’t these extra layers contribute to pressure problems?
A: This is Phase Two of the slider sheet trial; skin breakdown was monitored in Phase One of the trial in ICU, PAR, and surgical units and was not shown to be a concern. However, each patient must be assessed as to his/her tolerance and skin condition.

Q: Won’t the patient slide back down the bed, requiring workers to do even more boosting up in bed?
A: Use of the bed’s adjustments, such as the knee gatch or Trendelenburg, can prevent movement down the bed. The patient’s knees must be raised first, before raising the head of the bed. It will be essential for care staff to know how to work with these adjustments to optimize patient comfort and safety.
Appendix IV Head of Bed Cards:

Check the most appropriate selection

Slider Draw sheet & Slider Bottom Sheet

Slider Draw sheet & Standard Jersey Sheet

Slider Bottom Sheet
Appendix V Weekly Interview Questionnaire

SLIDER SHEET SYSTEM TRIAL
Weekly Checklist

Date: _____________________                                Unit: ______________________
Ergonomic Specialist: ______________________________

1. With respect to product durability, have you had any problems with any of the slider
draw sheets (SD) or slider bottom sheets, i.e. rips, tears, etc.?
____________________________________________________________________
____________________________________________________________________

2. Have you had any problems with the supply of sheets, e.g. accessing them,
inadequate supply from laundry, etc?
____________________________________________________________________
____________________________________________________________________

3. How many beds are you using the sheets on out of your patient assignment? Specify
numbers:
Please state any clinical reasons for determining the bed make-up:
  1) slider sheet system (SD and slider bottom sheet) ___________  (State x out of y)
     ______________________________________________________________________
  2) SD and jersey sheet ______________
     ______________________________________________________________________
  3) Slider bottom sheet only _____________
     ______________________________________________________________________
  4) Slider bottom sheet and soaker pad ______________
     ______________________________________________________________________
  5) Soaker pad on jersey sheet only ______________
     ______________________________________________________________________
  6) other, please specify __________________________________

4. Do you have concerns for any particular types of patients using the sheets? If so,
please describe the patients and potential risks:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
5. Demographics:
   a) Role: RN___ LPN__ PT/OT __ Rehab Assistant __ Student Nurse/
       Year_____
   b) Years worked
   c) Full time Part time Casual
   d) Age___ Height___ Weight____ (all optional)

6. Do you have current or past musculoskeletal injuries? If so, please explain.
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

7. (If a concern about musculoskeletal health was identified, ask): When you use the
   new sheets, do you feel that there is any difference with respect to your
   ____________________? Please explain.
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

8. In general, what differences do you find between the new sheets (the slider draw
   sheet and slider bottom sheet) and the “traditional” sheets used (i.e. the soaker pad and
   jersey sheet)?
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

   How does that impact your care of patients?
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

9. Patient Feedback:
   i)
   ii)
   iii)
Appendix VI Focus Group Questions

SLIDER SHEET TRIAL – FOCUS GROUP QUESTIONS

1. HOW DID THE SLIDER SHEET SYSTEM IMPACT YOUR ABILITY TO REPOSITION YOUR PATIENTS?

2. CAN YOU GIVE ME AN EXAMPLE OF WHEN THE SLIDER SHEET SYSTEM WORKED WELL?

3. CAN YOU GIVE ME AN EXAMPLE OF WHEN THE SLIDER SHEET SYSTEM DIDN’T WORK WELL?

4. DURING THE TRIAL, WE OBSERVED MANY DIFFERENT COMBINATIONS OF THE SLIDER SHEET SYSTEM. CAN YOU TELL ME SOME OF THE REASONS FOR CHOOSING DIFFERENT BED MAKE-UPS?

5. WHEN WOULD YOU CHOOSE TO USE THE SLIDER SHEETS OVER OTHER AVAILABLE OPTIONS FOR REPOSITIONING PATIENTS?

6. WHAT RECOMMENDATIONS WOULD YOU MAKE TO IHA, AS AN ORGANIZATION, FOR STANDARD BED MAKE-UP?


Appendix VII Phase One Staff Questionnaire

1) Facility: _____________________

2) Type of unit (e.g. ICU, surgical, etc.): _____________________

3) Please rank your preferences for bed make up
   (Most preferred = 1 2 3 4 5 = Least preferred)
   a) Jersey Sheet & Soaker Pad  _____
   b) Slider Bottom Sheet Only  _____
   c) Slider Bottom Sheet & Soaker Pad  _____
   d) Jersey Sheet & Slider Draw Sheet  _____
   e) Slider Bottom Sheet & Slider Draw Sheet  _____

Note:  Slider Bottom Sheet = fitted bottom sheet with centre, blue low friction panel
       Slider Draw Sheet = draw sheet with low friction material on under-surface

4) Out of the total number of beds on your unit, on any given shift what number would
   you like to see made up as follows: (e.g. Slider Bottom Sheet only - 5/28)
   a) Jersey Sheet & Soaker Pad  _____
   b) Slider Bottom Sheet Only  _____
   c) Slider Bottom Sheet & Soaker Pad  _____
   d) Jersey Sheet & Slider Draw Sheet  _____
   e) Slider Bottom Sheet & Slider Draw Sheet  _____

5) Anything else you would like to tell us about the slider sheet system (i.e. slider bottom
   sheet and slider draw sheet)?  e.g. How does it compare to using the repositioning sling
   and ceiling track lift?

Please return to your PCC, CRC, or manager.  PCC/CRC/Manager - Please fax to 250-492-2111.
Thank you!
Appendix VIII WorkSafeBC Bulletin

Soaker pads are not for repositioning

Healthcare workers are using soaker pads to reposition (boost or turn) patients in bed, despite the risk of sprains or strains (musculoskeletal injury) to themselves. Soaker pads, also known as incontinence pads or bed pads, are designed to absorb urine in order to keep beds and linens dry, and protect patients' skin. Soaker pads should only be used for their intended purpose — they are not meant for repositioning patients.

Risks of repositioning using soaker pads

There are several concerns with using soaker pads to reposition patients in bed:

- Soaker pads are not designed for repositioning patients.
- Soaker pads do not have low friction properties — sliding them requires great effort.
- Soaker pads are small and positioned under the lower part of a patient's trunk and upper legs. The pads do not fully support the patient's trunk and shoulders, so using them for repositioning results in an unbalanced load and greater effort.
- According to section 4.3(1)(b)(i) of the Occupational Health and Safety Regulation, all equipment must be used according to the manufacturer's instructions. Soaker pad manufacturers should provide instructions for the safe use of the product.

According to sections 4.47-4.50 of the Regulation, employers must identify, assess, and control the risk of musculoskeletal injury to workers. Using soaker pads to reposition patients poses a risk of injury to workers — this risk must be controlled using appropriate control measures. When repositioning patients, workers have options to control the risk of injury:

- The first option is to consider the use of a mechanical device such as a ceiling lift with a repositioning sling.
- If no mechanical device is available, use a low-friction slide or draw sheet.

For more information on patient handling, visit the Safety at Work Centre for Health Care at WorkSafeBC.com.

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