

# Bagless Laundry System Final Report

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## Table of Contents

## Page

Executive Summary.....	3
Background.....	4
Methods.....	4
St. Paul's Hospital.....	4
Campbell River Hospital.....	4
Cost-effectiveness Evaluation.....	5
Results.....	5
St. Paul's Hospital.....	5
Campbell River Hospital.....	5
Cost Effectiveness Evaluation.....	7
Discussion and Conclusion.....	7
References.....	8
Appendix I - Operating Guidelines and Equipment.....	9
Appendix II - Implementation Tips.....	11
Appendix III – Questionnaire.....	12
Appendix IV - Staff Interview Questions.....	17
Appendix V - Management Interview Questions.....	18

## **EXECUTIVE SUMMARY**

The effectiveness of a new laundry collection system was examined at two large tertiary hospitals, St. Paul's Hospital and Campbell River Hospital. The bagless laundry system consisted of tote bins on wheels and a hydraulic lifter that were designed to eliminate manual lifting and carrying of laundry bags. This system replaced the traditional laundry bag and chute/cart systems previously used at both facilities to collect laundry in preparation for cleaning at an external facility.

During the 5 years preceding implementation of the bagless laundry system, St. Paul's Hospital reported an average of 4.0 time loss claims per year at an average total annual cost of \$11,400 and Campbell River Hospital reported an average of 2.6 claims per year at an average total annual cost of \$10,400 associated with handled laundry. Most of the injuries to workers who handle laundry involved the low back or shoulders as a result of lifting and carrying heavy laundry bags.

As part of their effort to curb the incidence of injury, the Occupational Health & Safety (OH&S) committee at Campbell River Hospital decided to conduct an 8-week trial of the bagless laundry system on one floor of their acute care unit. This trial identified several barriers to implementation that were subsequently resolved by the OH&S committee in consultation with staff. Policies and procedures for use of the bagless laundry system were developed to guide hospital-wide implementation. St. Paul's Hospital implemented a similar one-year trial on two wards of the hospital, and moved forward with hospital-wide implementation prior to completion of the trial.

The bagless laundry system was evaluated at both sites after a period of one year to determine the influence on risk factors for injury, injury rates, physical discomfort and job satisfaction. Questionnaires and interviews were used to gather staff and management perceptions, and injury statistics were collected to document injury rates and related costs. The bagless laundry systems were found to be effective at reducing injuries and work-related discomfort, while contributing to enhanced job satisfaction and productivity at both sites. After a period of two years at St. Paul's Hospital and one year at Campbell River Hospital, there have been no time loss injuries associated with handling laundry. The cost effectiveness of the bagless laundry system was conservatively estimated based on the cost savings from elimination of laundering cloth linen bags and the reduction in laundry handling injuries, with no additional manpower required to use the system. The cost of implementing the bagless laundry system was recoverable within a period of 1.3 years at both sites.

## **BACKGROUND**

A bagless laundry system is a process for collecting soiled laundry in hospitals and long-term care facilities (Appendix I). The system consists of tote bins on wheels and a hydraulic lifter, which replace traditional laundry bag and chute/cart systems. Larger facilities may require a motorized puller, depending on the number of tote bins being transported, and the distance that the bins are transported. The purpose of the bagless laundry system is to eliminate the need to manually handle heavy laundry bags, thereby reducing the risk of musculoskeletal injury (MSI) to laundry workers.

A workshop sponsored by OHSAH in September of 2000 examined risk factors for injury to hospital staff who handle laundry and discussed potential solutions to reduce risk. It was perceived that the main risk factor for injury was forceful exertion due to lifting and carrying heavy laundry bags. The bagless laundry system was believed to be a good potential solution because of the reported success at Nanaimo Regional Hospital and the elimination of all lifting and carrying of laundry bags.

St. Paul's Hospital and Campbell River Hospital were chosen to evaluate the effectiveness of the bagless laundry system because of their high injury rates associated with manual laundry handling.

From 1996 to 2000, \$57,000 was paid out for laundry-related healthcare claims at St. Paul's Hospital, and \$52,000 was paid out at Campbell River Hospital. Many of these claims were related to MSI of the low back and shoulders, and were believed to be caused by handling heavy laundry bags. These hospitals, like many healthcare facilities, collected soiled laundry in cloth laundry bags that were dropped down chutes located on each ward, collected in chute rooms on the lower level of the facility, and then transported in carts to a central laundry room where the laundry was then sent out for cleaning to an external facility. This process requires frequent manual handling of laundry bags that weigh up to 30 lbs each. Implementation of a bagless laundry system was anticipated to eliminate manual handling of laundry bags, and therefore reduce the incidence of associated injuries.

## **METHODS**

### **St. Paul's Hospital**

A one-year trial began in two nursing units (Geriatrics and Thoracics) in June 2001 to examine the effectiveness of the system at reducing the risk for injury to workers who handle soiled laundry. Pre-intervention questionnaires (Appendix III), designed to measure perceived discomfort, perceived risk of injury, and job satisfaction, were administered to 50 employees including nursing staff, ward aides, housekeepers, and laundry workers. Post-intervention questionnaires (Appendix III) were administered at the end of the one-year trial.

Hospital-wide implementation of the bagless laundry system began in January 2002, prior to the end of the trial. Pre- and post-intervention questionnaires were not administered during hospital-wide implementation.

St. Paul's Hospital has 165 90-gallon tote bins and 406 in-patient beds, or approximately one bin for every 2.5 beds (including replacement bins), and approximately 600 staff using the system. St. Paul's Hospital did not require a motorized puller, due to relatively short transport distances within the facility.

### **Campbell River Hospital**

An 8-week trial of the bagless laundry system began in November 2001 on one floor of the acute care unit. At the end of the trial, the Occupational Health and Safety (OH&S) committee requested an evaluation by OHSAH to determine the feasibility of implementing the system hospital-wide. The evaluation consisted of informal interviews with workers and videotaped observation of laundry collection, transportation, and dumping procedures.

Hospital-wide implementation began in July 2002. To evaluate the effectiveness of the system over a period of one year, pre- and post-intervention questionnaires examining perceived discomfort, risk of injury, and job satisfaction were administered to 50 participants including nursing staff, ward aides, housekeepers, and laundry workers. A random sample of 10 staff and 3 management personnel were interviewed at the conclusion of the study to further identify advantages and disadvantages of the system (Appendices IV & V).

Campbell River Hospital required 48 60-gallon bins for 107 in-patient beds, or approximately one bin for every 1.8 beds (including replacement bins), with approximately 500 staff using the system. Campbell River Hospital did not require a motorized puller, due to relatively short transport distances within the facility.

### Cost-effectiveness Evaluation

The cost-effectiveness of the bagless laundry system at St. Paul's Hospital and Campbell River Hospital was examined by comparing their respective injury claims and material costs for 5 years prior to and one year following hospital-wide implementation.

## RESULTS

### St. Paul's Hospital

The pre-intervention questionnaire was completed by 39 of 50 staff members and the post-intervention questionnaire was completed by 32 of 50 staff members. Approximately 58% of pre- and 55% of post-intervention respondents were Registered Nurses, with the remainder identified as either Ward Aides or Licensed Practical Nurses.

The bagless laundry system at St. Paul's Hospital was effective in reducing the frequency and severity of physical discomfort and perceived risk of injury to the shoulders and low back of staff for all tasks related to soiled laundry collection and transportation, with the exception of perceived risk to the low back while moving laundry carts (Table 1).

Table 1. Perceived discomfort and risk of injury associated with specific laundry handling tasks at St. Paul's Hospital. Ranking scale: 0 = never/none to 10 = always/severe.

Task:	Handling Soiled Laundry			Moving Laundry Carts			Lifting Laundry to Carts or Chutes		
	Pre	Post	p-value*	Pre	Post	p-value*	Pre	Post	p-value*
Physical discomfort frequency	5.28	2.28	<b>0.0001</b>	3.39	1.36	<b>0.004</b>	5.19	2.58	<b>0.003</b>
Physical discomfort severity	5.04	2.54	<b>0.0001</b>	3.00	0.92	<b>0.003</b>	5.00	2.54	<b>0.006</b>
Risk to head and neck	3.37	2.52	0.175	3.03	1.73	<b>0.050</b>	4.83	2.26	<b>0.005</b>
Risk to shoulders and arms	4.66	2.97	<b>0.011</b>	3.43	1.57	<b>0.021</b>	5.35	2.65	<b>0.002</b>
Risk to the lower back	5.17	3.31	<b>0.009</b>	2.08	0.96	0.071	6.12	2.80	<b>0.001</b>
Risk to elbows and forearms	2.70	1.56	0.102	2.29	0.83	<b>0.008</b>	3.25	1.15	<b>0.024</b>
Risk to wrists and hands	2.82	1.64	<b>0.050</b>	2.04	0.96	0.660	3.47	1.26	<b>0.031</b>
Risk to hips	2.70	2.00	0.159	1.75	0.92	0.166	3.55	1.55	<b>0.018</b>
Risk to thighs and knees	1.92	1.39	0.264	1.83	0.67	<b>0.049</b>	2.95	1.30	0.650
Risk to legs and feet	2.46	1.58	0.085	3.39	1.36	<b>0.004</b>	2.55	1.15	<b>0.095</b>

\*p-values of  $\leq 0.05$  were considered statistically significant and are presented in bold type.

Staff also reported that their laundry handling work was less physically demanding (pre=8.6; post=7.3; p=0.003), that they were less tired at the end of their shift (pre=8.0; post=6.0; p=0.0001) and that they felt safer from injury while handling laundry (pre=5.8; post=2.7; p=0.0001).

There was an average of 4.0 time-loss claims per year for the 5 years pre-intervention; however, no injuries related to laundry handling were reported during the first year after implementing the system hospital-wide.

### Campbell River Hospital

Several barriers to implementation of a bagless laundry system were initially experienced at Campbell River Hospital during the 8-week trial, but were resolved through consultation with OH&S committee members and with workers. As a result of this 8-week trial, tips for successful implementation of the bagless laundry system were developed (Appendix II). The 90-gallon bins were too large to fit into some of the smaller patient rooms, and the height of the bins required shorter workers to adopt awkward shoulder postures to open and close the lids. The use of smaller bins (60-gallon) alleviated these problems. Another concern was repeated opening and closing of the bins while holding soiled laundry. This resulted in awkward shoulder postures and contamination of the lid. The hospital resolved this issue by developing a policy that bins were brought into the patient rooms during bed change with the lids in the open position until all of the soiled laundry had been deposited. Odour from soiled

laundry was a concern but was dealt with by ensuring that housekeeping staff removed bins from the wards when they were 3/4 full.

Twenty staff who handle laundry at Campbell River Hospital responded to both pre- and post-intervention questionnaires. Seventeen of these respondents lifted laundry into carts or chutes, 14 transported laundry carts, and 4 lifted laundry from carts or from the chute room. There was a significant reduction in workers' perceived discomfort in the low back region related to lifting laundry into carts or chutes, but no statistically significant change in the perceived discomfort for other body parts or other laundry handling tasks (Table 2).

Table 2. Perceived discomfort associated with specific laundry handling tasks at Campbell River Hospital. Ranking scale: 0 = never/none to 10 = always/severe.

Task:	Lifting Laundry to Carts or Chutes (n=17)			Moving Laundry Carts (n=14)			Lifting Laundry from Carts/Chute Room (n=4)		
	Pre	Post	p-value*	Pre	Post	p-value*	Pre	Post	p-value*
Discomfort to neck	2.59	1.29	0.079	2.08	0.85	0.200	6.50	2.00	0.226
Discomfort to shoulders	3.12	2.18	0.303	2.15	1.00	0.209	7.25	2.25	0.197
Discomfort to lower back	3.93	1.33	<b>0.021</b>	2.38	1.15	0.256	7.00	2.25	0.164
Discomfort to elbow/forearm	3.06	2.12	0.312	2.36	0.86	0.073	7.00	1.75	0.087
Discomfort to wrists and hands	2.94	1.65	0.229	2.14	0.93	0.159	6.50	1.75	0.091

\*p-values of  $\leq 0.05$  were considered statistically significant and are presented in bold type.

Staff perceived the risk of injury due to laundry handling to be significantly lower one year post-intervention (pre=5.25; post=2.58; p=0.03), were more satisfied with the way that laundry was collected and removed from the units (pre=3.10; post=1.50; p=0.0001), and more satisfied with the manner in which laundry tasks were organized (pre=3.11; post=2.15; p=0.002). Despite these benefits, staff did not report a decrease in tiredness (pre=7.60; post=7.00; p=0.323) or in the overall physical demands of their job (pre=8.85; post=8.45; p=0.237).

There were no injuries related to laundry handling during the first year after implementing the system hospital-wide (previously averaging 2.6 time-loss claims per year for the 5 years pre-intervention).

Staff interviewed at Campbell River Hospital indicated the following advantages and disadvantages of the new laundry system.

1) Advantages:

- a) Increased satisfaction;
- b) Increased productivity (more time for other tasks);
- c) No manual lifting involved;
- d) More hygienic; and
- e) More aesthetic.

2) Disadvantages:

- a) If overfilled, bins can become top heavy making them easier to tip; and
- b) Requirement to push one bin at a time (results in more frequent pick-ups than if a number of bins could be linked together).

Possible solutions to the above concerns could include the following:

- a) Policy that states that the bins should not be filled beyond a specific level (Campbell River implemented a policy that states that the bins should not be filled more than ¾ full); and
- b) A motorized puller to transport a number of bins linked together; however, Campbell River management feel that use of the puller is not feasible due to short hallways and lack of space in the elevators.

Management personnel interviewed at Campbell River Hospital indicated the following advantages and disadvantages of the new laundry system.

1) Advantages:

- a) Fewer MSI complaints;
- b) Increased productivity;
- c) Improved morale;
- d) Increased satisfaction;
- e) No additional manpower required (work is redistributed over more staff);
- f) No manual lifting; and
- g) Elimination of large linen carts.

2) Disadvantages:

- a) More frequent pick-ups required because of inability to use motorized puller (restricted space in elevators).

**Cost Effectiveness Evaluation**

The bagless laundry system proved to be a cost-effective intervention at both facilities, with the direct costs associated with implementing the new system recovered within the first 18 months (Table 3). The cost recovery was based on elimination of costs associated with musculoskeletal injuries that were caused by handling laundry, and elimination of costs associated with laundering the laundry bags. There was no change and no associated cost or savings in the level of staffing required.

Table 3 Direct costs and savings attributable to the bagless laundry system at St. Paul's and Campbell River hospitals.

	St. Paul's		Campbell River	
	Pre-study	Post-study	Pre-study	Post-study
Annual MSI costs*	\$11,400	\$0	\$10,400	\$0
Linen bag laundering	\$54,202	\$0	\$40,515	\$0
Plastic liners (new system)		\$21,900		\$6,480
Total annual costs	\$64,602	\$21,900	\$50,915	\$6,480
Net annual savings		\$43,702		\$44,435
Savings due to laundering alone		\$32,302		\$34,035
Cost of equipment		\$57,000		\$60,000
Payback period		1.30 years		1.35 years
Payback period (laundering savings alone)		1.76 years		1.76 years

\* Average costs associated with laundry handling for 5 years pre-study

**DISCUSSION AND CONCLUSIONS**

The new bagless laundry system was successful in reducing both the perceived risk of injury and the actual injury rates associated with handling laundry. This was primarily due to the elimination of manual lifting and carrying of linen bags. Staff reported that they were more satisfied with their work and more productive after the intervention. Staff at St. Paul's Hospital also reported a significant decrease in physical discomfort associated with laundry handling. While there was an improvement in low back discomfort at Campbell River Hospital, the lack of statistically significant changes in the perceived discomfort associated with handling laundry appears to be related to the small number of individuals who previously handled full bags of laundry (n=4). The ratings of discomfort severity reported by these individuals was consistently lower post-implementation, but was not sufficiently large enough to establish a reliable result at the 95% confidence level.

The elimination of injury claims associated with laundry handling and the elimination of costs associated with laundering laundry bags resulted in a conservatively estimated payback period of less than 18 months at both

sites. The total savings due to the elimination of laundering alone was approximately 75% of the total cost savings at each site, with a payback period of approximately 20 months.

Ongoing collaboration and communication between all departments was critical to the successful implementation of the bagless laundry system (Newlands, 2002). Conducting a preliminary trial within one area of the hospital was valuable in refining the system, developing policies and safe work procedures, and determining appropriate bin sizes prior to hospital-wide implementation. The practice of testing a new system such as bagless laundry is recommended to other facilities considering implementation of such a system.

Campbell River Hospital management was so satisfied with the performance of the bagless laundry system that they are planning to implement a similar system to collect and transport garbage within their facility.

The bagless laundry system was proven to be a cost-effective intervention to reduce injury rates associated with manual handling of laundry bags.

## **REFERENCES**

Newlands T. (2002) *The World Without Linen Bags: A Workers' Compensation Board of British Columbia Funded Injury Prevention Intervention – Nanaimo Regional General Hospital*. Richmond: WCB of BC.

## APPENDIX I - OPERATING GUIDELINES AND EQUIPMENT

Prior to use, a plastic liner is placed inside to prevent contamination of the bin. At least 12 inches of liner is pulled over the outer lip of the bin to prevent the liner from falling off into the bin during the dumping procedure. Empty tote bins are delivered to each ward by laundry or housekeeping staff prior to collection of soiled laundry and are typically stored in the hallways. During collection, a nursing staff member takes the bin into a patient's room, opens the lid, and deposits soiled laundry into the bin. Once the bins are more than 3/4 full, laundry or housekeeping staff replace the bins with empty ones and transport the bins containing soiled laundry to the laundry/dumping area. To transport the bins, they can be linked together and pulled with a motorized puller or they can be pushed individually.

In the laundry/dumping area, a hydraulic lifter is used to dump the contents of the bin. If the laundry is cleaned at an external laundry facility, the bags are typically tied off prior to dumping, and then dumped into a transport cart. The transport cart is then wheeled into a laundry truck and transported to the off-site laundry facility. Once the contents of the bin have been dumped, a new liner is placed inside the bin. If the laundry is cleaned in-house, laundry can be dumped directly onto a sorting table or into carts if pre-sorting has already taken place on the wards. In this case, the plastic liner can be left inside the bin.

### Tote Bins

The tote bins are easy to maneuver because they have wheels. While bins come in different sizes, two of the most common sizes for hospital laundry systems are the 60 and 90 gallon bins (the 60 gallon bin holds approximately 2 times as much as a traditional cloth linen bag; the 90 gallon bin holds approximately 3 times as much). The 90-gallon bin (Fig. 1) takes up no more floor space than one traditional double laundry bag hamper.



Figure 1. 90-gallon bins

### Garbage Bin Attachments

Small garbage bins can be attached to the front edge of the bin opening (Fig. 2). A small bin is used to reduce the weight of the full bags, however it is recommended that larger garbage bags be used because the small bags have a tendency to fall off into the bin when they become full. The larger bags are also easier to tie off. The garbage bins should be removed from the tote bins prior to dumping.



Figure 2. Garbage bin attachment

### Motorized Puller

A motorized puller can be used to transport a number of bins linked together. The bins can be linked together with the towing hitch at the front and rear of each bin. When linking the bins together, the worker should take care to use proper hitch mechanics. During operation of the motorized puller (Fig. 3), the worker should be positioned behind the control handle (Fig. 4). The worker should not walk ahead of the control handle, as this will place the shoulder in an awkward posture (Fig. 5).



Figure 3. Motorized puller



Figure 4. Correct technique



Figure 5. Incorrect technique

If using a motorized puller similar to the one pictured, the control handle should be gripped with a palm-down grip and abrupt acceleration and deceleration of the puller should be avoided. Wall-mounted mirrors should be placed at hallway intersections to avoid collisions with oncoming traffic. Corners should be approached with a wide turn to avoid hitting walls, etc. Some pullers, such as the one pictured, have a fold-up handle to decrease storage space (e.g. when transporting with bins on elevators).

### HYDRAULIC LIFTER

The hydraulic lifter should be placed near the washing machines (if laundry is washed in-house) or near the loading dock (if the laundry is washed externally). Adequate clearance height of the ceiling for the dumping procedure should be determined prior to purchase. Each bin should be pushed into the receiving area of the lifter and then the lid of the bin should be opened fully. Prior to use, ensure that no one else is within 6 feet of the lifter. To avoid movement of the receiving cart during the dumping procedure, brakes or some form of braking mechanism should be used against the wheels of the cart. Awkward postures should be avoided when apply the braking mechanism.



Figure 6. Hydraulic lifter

## APPENDIX II - IMPLEMENTATION TIPS

- 1) Ongoing collaboration and communication between all departments is critical to the successful implementation of the system (Newlands, 2002).
- 2) Test the system and available bin sizes in one area of the facility.
- 3) Keep a record of daily pick-up times so that staff can determine the best times for pick-up of bins containing soiled laundry and delivery of replacement bins.
- 4) If pre-sorting of laundry is done on the wards, color-coded bins can be used to distinguish between different types of laundry.
- 5) Bring each bin into the patient's room and leave the lid open while stripping laundry from the bed. This will eliminate the need to open and close the lid while stripping the bed. Opening and closing the lid while carrying soiled laundry can result in awkward postures and can contaminate the lid if the laundry comes into contact with it.
- 6) The bins should be cleaned periodically to prevent contamination and odor build-up.
- 7) Purchase bins with drainage holes so that water can be drained during cleaning.
- 8) Place odor-eaters under the lid of the bin to prevent odors from soiled laundry – a naturally scented, non-allergenic odor eater can be obtained for use in healthcare facilities.
- 9) To prevent overfilling and excess odor, replace the bins when they are just over 3/4 full.
- 10) Use proper technique when transporting bins by hand; push only one bin at a time, using two hands; avoid pulling because this may place the shoulder in an awkward posture.
- 11) For facilities that send their laundry for external cleaning, the plastic liner on the inside of the bins should be tied off prior to dumping. If the laundry contained in the plastic liner misses the cart and falls onto the ground during the dumping procedure, do not attempt to lift the bag by yourself; call for assistance and lift the bag into the cart using proper body mechanics.
- 12) For facilities that clean their laundry in-house, laundry can be dumped directly onto a sorting table or into carts if pre-sorting has already taken place on the wards; the plastic liner can be left inside the bin if so desired.
- 13) Isolation rooms – avoid moving bins into isolation rooms to prevent contamination. Instead, an impermeable bag can be used to collect the soiled laundry in a hamper in the patient's room. The impermeable bag is then removed from the hamper and placed into an open tote bin that is placed just outside the patient's room. Care should be taken not to touch the sides or lid of the bin during this procedure.

**Section I: Demographic Profile**

1. Age (in years):    19–29    30–39    40–49    50–59    60 +    2. Gender:     M     F

3. Unit: \_\_\_\_\_    4. Height:    \_\_\_\_\_ ft.    \_\_\_\_\_ in.    5. Weight:    \_\_\_\_\_ lbs.

6. Job Title:     Ward Aide    7. Status:     Full Time    8. Shift:     07:00 – 15:00  
 RN     Part Time     15:00 – 23:00  
 LPN     Casual     23:00 – 07:00  
 Laundry worker     08:00 – 12:00  
 Housekeeping     08:00 – 16:30  
 Other \_\_\_\_\_     Other \_\_\_\_\_

9. Average number of hours worked per pay period at St Paul’s:    \_\_\_\_\_ hrs/2weeks

10. Average number of hours worked per pay period at other healthcare facilities:    \_\_\_\_\_ hrs/2weeks

11. Years working in this kind of work:    \_\_\_\_\_ years    12. Years working at St. Paul’s:    \_\_\_\_\_ years

**Section II: Staff Perceptions**

Circle the number that best fits your response to questions #13 to 17.

13. How often do the following tasks cause you physical discomfort?

a) Handling soiled laundry in the patient care areas/wards

Never causes discomfort	0	1	2	3	4	5	6	7	8	9	10	Always causes discomfort
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If this activity causes discomfort, how much discomfort?

No discomfort	0	1	2	3	4	5	6	7	8	9	10	Severe discomfort
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b) Lifting laundry bags into laundry carts

Never causes discomfort	0	1	2	3	4	5	6	7	8	9	10	Always causes discomfort
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If this activity causes discomfort, how much discomfort?

No discomfort	0	1	2	3	4	5	6	7	8	9	10	Severe discomfort
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c) Moving laundry/laundry carts

Never causes discomfort	0	1	2	3	4	5	6	7	8	9	10	Always causes discomfort
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14. How tired are you at the end of your shift?

Not tired at all	0	1	2	3	4	5	6	7	8	9	10	Totally exhausted
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15. How physically demanding is your work?

Not demanding at all	0	1	2	3	4	5	6	7	8	9	10	Extremely demanding
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16. How safe from injury do you feel when handling laundry?

Always safe	0	1	2	3	4	5	6	7	8	9	10	Never safe
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## Section II: Staff Perceptions (con't)

Do you have any discomfort anywhere? NO  YES   
 If YES, please shade in the appropriate area(s) on the body diagram and  
 mark on a line the amount of discomfort you feel for each body part which presently feels discomfort.

	Right	
Head & Neck	no discomfort	extreme discomfort
Shoulder & Arm	no discomfort	extreme discomfort
Lower Back	no discomfort	extreme discomfort
Elbow & Forearm	no discomfort	extreme discomfort
Wrist & Hand	no discomfort	extreme discomfort
Hip	no discomfort	extreme discomfort
Thigh & Knee	no discomfort	extreme discomfort
Leg & Foot	no discomfort	extreme discomfort
Shoulder & Arm	no discomfort	extreme discomfort
Elbow & Forearm	no discomfort	extreme discomfort
Wrist & Hand	no discomfort	extreme discomfort
Thigh & Knee	no discomfort	extreme discomfort
Leg & Foot	no discomfort	extreme discomfort

### Section III: Perceived Risk of Injury

For each activity below, indicate the level of risk of injury you feel by circling the appropriate number by each body part. On the scale, 0 indicates no risk at all and 10 indicates the absolute highest level of risk possible.

No Risk    0    1    2    3    4    5    6    7    8    9    10    Most Risk

17. Handling soiled laundry

Head & Neck	0	1	2	3	4	5	6	7	8	9	10
Shoulders & Arms	0	1	2	3	4	5	6	7	8	9	10
Lower Back	0	1	2	3	4	5	6	7	8	9	10
Elbows & Forearms	0	1	2	3	4	5	6	7	8	9	10
Wrists & Hands	0	1	2	3	4	5	6	7	8	9	10
Hips	0	1	2	3	4	5	6	7	8	9	10
Thighs & Knees	0	1	2	3	4	5	6	7	8	9	10
Leg & Feet	0	1	2	3	4	5	6	7	8	9	10

18. Laundry bag to cart transfers

Head & Neck	0	1	2	3	4	5	6	7	8	9	10
Shoulders & Arms	0	1	2	3	4	5	6	7	8	9	10
Lower Back	0	1	2	3	4	5	6	7	8	9	10
Elbows & Forearms	0	1	2	3	4	5	6	7	8	9	10
Wrists & Hands	0	1	2	3	4	5	6	7	8	9	10
Hips	0	1	2	3	4	5	6	7	8	9	10
Thighs & Knees	0	1	2	3	4	5	6	7	8	9	10
Leg & Feet	0	1	2	3	4	5	6	7	8	9	10

19. Moving/repositioning a laundry cart

Head & Neck	0	1	2	3	4	5	6	7	8	9	10
Shoulders & Arms	0	1	2	3	4	5	6	7	8	9	10
Lower Back	0	1	2	3	4	5	6	7	8	9	10
Elbows & Forearms	0	1	2	3	4	5	6	7	8	9	10
Wrists & Hands	0	1	2	3	4	5	6	7	8	9	10
Hips	0	1	2	3	4	5	6	7	8	9	10
Thighs & Knees	0	1	2	3	4	5	6	7	8	9	10
Leg & Feet	0	1	2	3	4	5	6	7	8	9	10

### Section IV: Frequency of Laundry Handling Methods

Thinking about your last week at work, please indicate how often you performed each task during each shift:

20. Laundry into bag initial loading

	0	1-5	6-10	11-15	16-20	21-25	26-30	30 +
a. Unassisted (alone, no equipment)								
b. Assisted (with co-worker, no equipment)								
c. With non-mechanical equipment								
d. With mechanical equipment								
e. Other (specify) _____								

21. Loading/transferring laundry bags to laundry carts on wards

	0	1-5	6-10	11-15	16-20	21-25	26-30	30 +
a. Unassisted (alone, no equipment)								
b. Assisted (with co-worker, no equipment)								
c. With non-mechanical equipment								
d. With mechanical equipment								
e. Other (specify) _____								

### Section V: Preferred Laundry Handling Methods

For each of the laundry handling activities listed below, check (✓) the box next to the method you prefer to use most often. *Please check only one box.*

22. Transferring laundry bags to carts

- a. Unassisted (alone, no equipment)
- b. Assisted (with co-worker, no equipment)
- c. Not applicable

23. Moving/repositioning laundry carts

- a. Unassisted (alone, no equipment)
- b. Assisted (with co-worker, no equipment)
- c. Not applicable

### Section VI: Work Information

24. For each statement below, check (✓) the category that best describes your work situation. *Please check only one box.*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. I decide how to organize my work tasks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. My job is hectic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. My job requires a lot of physical effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. My co-workers are helpful in getting the job done	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I like my job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section VII: Comments**

Please provide any additional comments or concerns you would like to express. Remember, all responses will remain strictly confidential.

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## **APPENDIX IV - STAFF INTERVIEW QUESTIONS**

1. What do you like about the bagless laundry system?
  
2. What do you dislike about the bagless laundry system?
  
3. If you dislike anything about the bagless laundry system, do you have any suggestions for improvement?
  
4. Are you satisfied with the bagless laundry system? If no, explain.
  
5. Has the bagless laundry system resulted in an increase, decrease, or no change in your daily productivity?
  
6. If there has been a decrease in your daily productivity, do you have any suggestions for improvement?
  
7. Has the use of the bagless laundry system changed the way you organize your work? If yes, explain.
  
8. Additional comments?

## **APPENDIX V - MANAGEMENT INTERVIEW QUESTIONS**

1. What do you like about the bagless laundry system?
2. What do you dislike about the bagless laundry system?
3. If you dislike anything about the bagless laundry system, do you have any suggestions for improvement?
4. Do staff seem satisfied with the bagless laundry system? If no, explain.
5. Do you feel that staff are more productive, less productive, or there has been no change in productivity using the bagless laundry system in comparison with the old system?
6. Do you feel that the bagless laundry system has changed the way that staff organize their work? If yes, explain.
7. Do you feel that the bagless laundry system has been cost effective? Explain.
8. Have you required additional manpower to use the bagless laundry system in comparison to the old system? If yes, explain.
9. Additional comments?