

Adaptive Clothing Project

Final Report



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In partnership with:

- **Pleasant Valley Manor**
- **Juniper Court**

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Introduction

Repositioning and manual handling of patients accounts for the largest percentage of injuries to nursing staff in British Columbia. The Workers' Compensation Board (WCB) of B.C. (2000) reports that approximately 57% of injury claims to registered nurses (RN's), licensed practicing nurses (LPN's), care aides, and nurse's aides were due to overexertion from patient handling.

Repositioning patients has been found to be the second most stressful task for nursing staff (Owen et al. 1992; Garg and Owen 1992), and studies have shown that up to 24% of all low back injuries to nursing staff are due to repositioning (Vasiliadou et al. 1995).

Nursing staff at intermediate and long term care facilities are frequently required to help dress residents. Due to the limited physical capabilities of many of the residents, dressing often entails repositioning and manual handling. Handling residents who are completely non-weight bearing or who suffer from dementia can be a further challenge to nursing staff. This can add to the difficulty already experienced while dressing residents, and may increase the risk of injury to staff.

Background

The adaptive clothing program focused on the prevention and reduction of musculoskeletal injuries (MSIs) related to dressing residents. It was initiated in response to the high number of injuries to nursing staff that perform dressing tasks, and the fact that many residents consider dressing an unpleasant or painful experience. The program was trialed in two extended care facilities, Pleasant Valley Manor and Juniper Court. It was a joint venture between the Interior Health Authority and the Occupational Health & Safety Agency for Healthcare (OHSAH) in B.C. The program was initiated in August 2000, and involved: the design of suitable clothing adaptations, assessment of eligible residents, education and training for staff on dressing techniques using adaptive clothing, and the evaluation of program effectiveness.

Objectives

The objectives of the program were to:

1. Reduce the incidence of musculoskeletal injury to staff associated with dressing residents
2. Examine the effects of the adaptive clothing program on:
 - a. Resident pain and discomfort
 - b. Staff work routines
 - c. Staff pain and discomfort
 - d. Staff perceptions of workload using adaptive and non-adaptive clothing

Study Design and Methodology

Overview

The program was conducted at two extended care facilities in the Interior Health Authority, Pleasant Valley Manor and Juniper Court. An Occupational Therapist from the region was consulted to deliver the project. An initial needs assessment was conducted to determine program feasibility and which residents were suitable for the program. This included a questionnaire and job shadowing and observations of the staff performing dressing tasks. Permission was obtained from the families of the residents identified to participate in the adaptive clothing program.

Volunteer seamstresses were gathered to perform the actual clothing modifications, and to help determine which changes to the clothes would be most beneficial. Staff input on clothing design was collected through informal interviews and focus groups. Specific clothing adaptations were subsequently developed.

Patient handling education sessions were conducted for nursing and care staff, which included techniques on dressing residents using the adaptive clothing. Training sessions for the volunteer seamstresses were also held on how to make the clothing alterations.

Once the participating residents were confirmed, a sewing protocol for modifying the clothes was determined, and the staff began to use the adapted clothing and dressing techniques in their daily work routines.

Program Evaluation

Staff and Volunteer Interviews:

Approximately five months after the program was initiated, evaluation of the adaptive clothing Program was conducted through telephone interviews with staff and volunteer seamstresses. The survey's consisted of both objective data and subjective observations regarding the effectiveness of the Program.

Timed Dressing Trials:

Timed dressing trials were performed to determine if using adaptive clothes reduced the time required to dress the residents. Trials were conducted with four residents and four staff members. Each resident was dressed and undressed twice by a staff member, with both adapted and non-adapted clothing. The time for each trial was measured and used for comparison.

Case Studies:

Two case studies were completed for an observational comparison. In the first case study, the resident was dressed with adaptive clothing. In the second case study, the resident was dressed using non-adapted clothing. The same staff member performed the dressing task in both studies.

Study Participants*Staff:*

Thirty (30) staff participated in the program, and twenty-one (21) staff were interviewed for program evaluation (14 care aides, 4 LPN's, and 3 RN's). The interviewed staff had an average of 12.15 years experience (SD = 9.79).

Volunteers:

Six (6) volunteer seamstresses were utilized, with one person acting as the volunteer coordinator for the project. The skill level of the volunteers ranged from very experienced to moderately experienced.

Residents:

Sixteen (16) total residents participated in the study, eight (8) from Pleasant Valley Manor, and eight (8) from Juniper Court. The residents ranged from normal to severe dementia, and had a variety of physical capabilities.

Resident Selection

Staff were interviewed to identify potential residents suitable for the adaptive clothing program. In order to qualify for the program, the resident must have been observed to have at least two of the following criteria:

- They have reduced mobility in the shoulders
- They experience pain or discomfort when joints are moved during dressing
- They are heavy, difficult to move, or non-weight bearing
- Staff have noted that the resident is "difficult to move"
- They exhibit resistance to being dressed

No resident was forced to participate, and family permission was also obtained prior to the residents inclusion in the adaptive clothing program.

See Appendix 1 for a detailed resident selection criteria sheet.

Education and Training Sessions

All staff participating in the adaptive clothing program were provided with education in-services. The occupational therapist coordinating the project conducted all sessions, which covered:

- General back care and lifting review
- Discussions on the need for an adaptive clothing program
- Instruction on proper dressing techniques using adaptive and non-adaptive clothing
- Problem solving on specific resident issues

Volunteer Coordination Procedure

The volunteers worked on an "on call" system. When a garment required adapting, the volunteers were contacted by the nurse, and were given the amount of clothing that could be completed in one week's time. Most of the volunteers worked from home, and returned the finished clothes within the week. Sewing supplies and materials were provided to the volunteers on an as needed basis.

Results

Clothing Adaptations

For general sewing instructions, see Appendix 2.

Design Considerations:

The two most important considerations when adapting the clothing were to reduce resident pain by minimizing joint movements, and to decrease the amount of manual repositioning of the residents by the staff. The dignity of the residents was also a consideration, as it was essential that the adapted clothing did not make the residents feel institutionalized or embarrassed in any way.

General Look and Appearance:

It was decided that the residents' personal clothing would be modified, to allow them to continue to wear clothes they were familiar and comfortable with. The clothes were altered as minimally as possible to maintain a neat and tidy appearance. Raw seams were made neat or intact to preserve the original look for the clothing. The "snap" closures added to fasten the clothing were hidden on the inside of the clothes, also to maintain the original look. Clothes that were modified to open from the back were sewn shut in the front, to prevent accidental exposure.

Shirts, Dresses, Blouses:

Shirts, dresses, and blouses were split down the back, and sewn shut on the front. The decision was made to fit the clothes with "snaps" as opposed to ties or Velcro fasteners. Ties were not used as they are considered less dignified than snaps, and Velcro was not used as it tends to wear out after several washes. The necklines were either left intact or fitted with "snaps", depending on the particular garment. These adaptations allow a resident to be dressed with minimal shoulder movements, and limits the amount of repositioning required by staff.

Pants:

Pants were split down both legs, and fitted with snaps. This would allow staff to dress residents while sitting or lying down, with minimal repositioning or supporting of the resident's body weight.

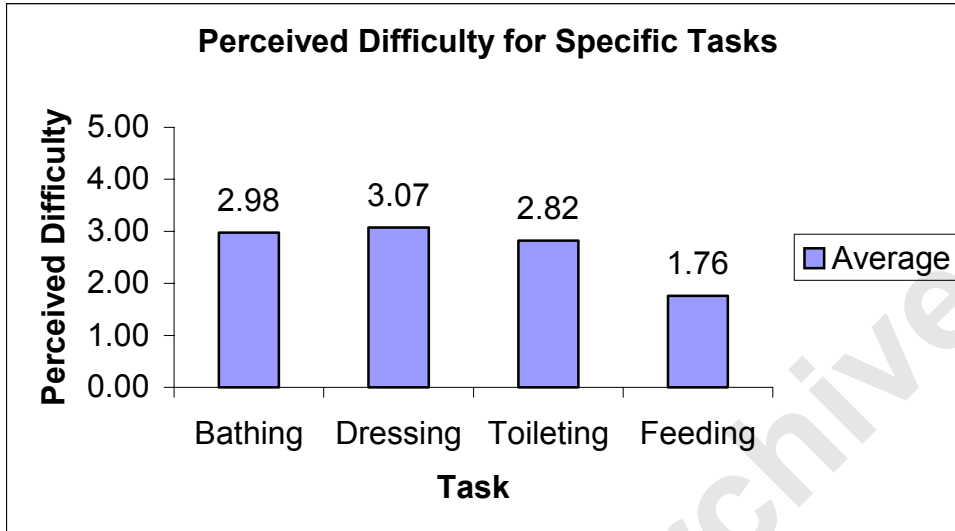
It was discovered during the project that adapted pants with side snaps were not as effective as anticipated. Staff on one unit developed a pant adaptation not originally included as part of the study. The pants were split down the rear seam, from waistband to crotch. A piece of bias tape was sewn to the top of the opening, creating a tie to hold the garment in place. This type of adaptation proved to be more successful in the eyes of the staff, and still reduced the

amount of manual handling required while dressing residents. Subsequently, both units began to use the rear-split adaptation over the side-split. However, as this was an internal undertaking, only informal interviews and staff comments were used to evaluate rear-split pants.

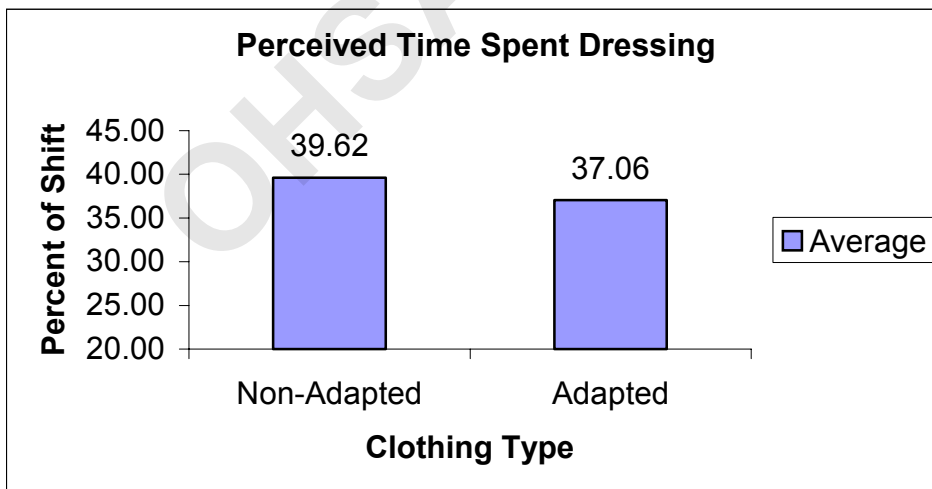
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Staff Interviews

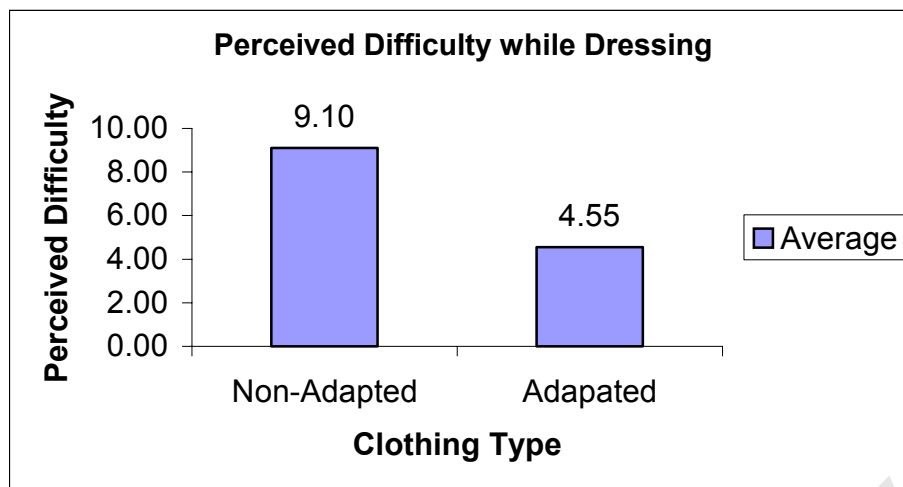
The results of the staff interviews are discussed below. Note that the majority of the interviews were related to staff perceptions as opposed to objective data.



The staff dress 6-8 residents per shift (mean = 7.29, SD = 1.71), and indicated that 63% (SD = 29.16) of the residents were "difficult" to dress. However, there was no significant difference in perceived difficulty between bathing, dressing, toileting, or feeding ($p > 0.05$).



There was a significant difference ($p < 0.05$) in the perceived time it took to dress residents using non-adapted (mean = 39.62, SD = 20.88) versus adapted clothes (mean = 37.06, SD = 21.14). Staff indicated that using adapted clothes only marginally reduced the time they spent dressing the residents.



The survey also revealed a significant difference ($p < 0.05$) in the perceived difficulty of dressing a resident with non-adapted (mean = 9.10, SD = 0.91) versus adapted clothing (mean = 4.55, SD = 2.28). Staff indicated it was less difficult to dress residents using adaptive clothing.

Volunteer Interviews

The interviews consisted of subjective questions regarding the volunteer's experiences throughout the adaptive clothing program. This feedback was used to identify the problems (and solutions) they encountered with adapting the clothes. In general, the experiences of the volunteers were positive, and all would recommend using a similar sewing system at other facilities.

The training and education sessions were suitable for most volunteers, but it was noted that novice seamstresses would likely have more difficulty learning how to sew the clothing adaptations. Future training sessions should allocate more time to learning the sewing techniques. The volunteers also indicated that they wanted to be given an opportunity to provide more input into the design of the clothes.

The volunteers indicated that having one person coordinate all the volunteers worked well. Communication between the volunteers and coordinator was very good. This allowed for an efficient sewing process and quick resolutions to any problems that were encountered by the seamstresses.

The availability of financial resources and materials were adequate, however, initially there was some difficulty in anticipating the required supply of materials. This became easier as the project participants became more familiar with the

types of adaptations they were making. At the start of the program, the volunteers indicated that the time it took to adapt the clothing was greater than expected, but improved with experience.

The on-call system of pick up and delivery worked well for the volunteers; no one expressed a need to change this process. Most of the volunteers enjoyed working from home, as it allowed for more flexibility in their work schedule and they were able to use their own sewing machines. One volunteer preferred to come to the facility and perform the adaptations on site, as this allowed her to socialize with the residents.

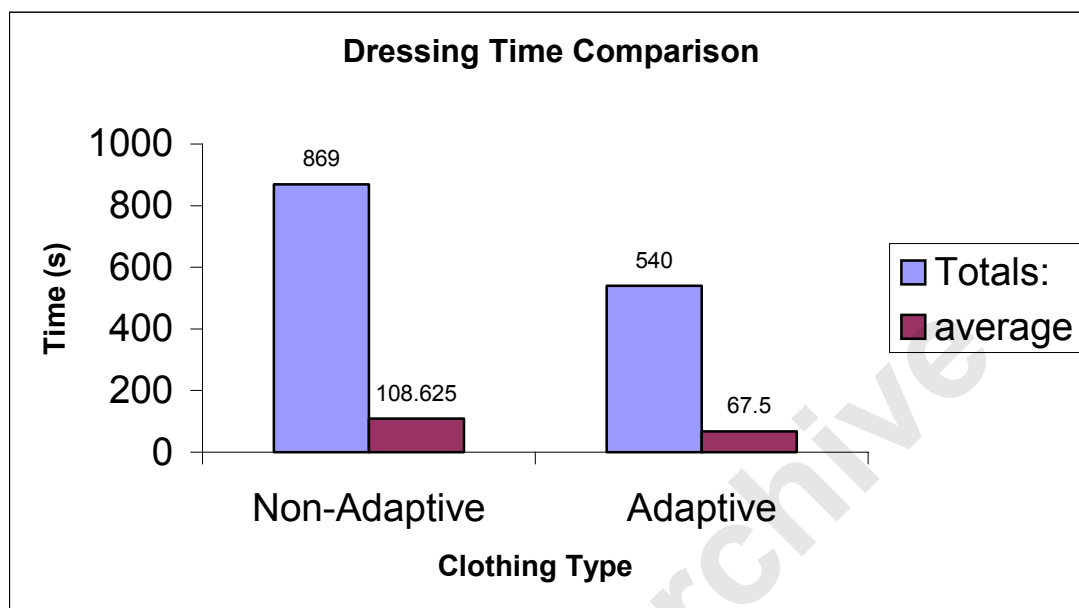
Although the volunteers knew that staff appreciated the quality of their work, most of the feedback was communicated through the volunteer coordinator. Many of the volunteers expressed a desire to have more direct interaction with the staff and residents.

The interviews and the volunteer coordinator provided the following suggestions that other facilities should consider:

1. Know the skill level of the volunteers. Difficult adaptations should be given to more experienced seamstresses.
2. All volunteers should be experienced working with stretchy materials.
3. Have a good feedback process in place involving the staff and volunteers. Ensure there is more direct feedback to the volunteers from the staff.
4. Have all of the sewing materials ready for the volunteers from the outset of the project. Some items, such as twill tape and snaps should be purchased in bulk.
5. Provide a detailed description that outlines exactly what is expected of the volunteers.

Time Trials

The results of the time trials are summarized in the chart below:



A statistical analysis of the time trials revealed that there is a significant difference ($p < 0.05$) between the dressing times using adaptive clothing (mean = 67.5, SD = 22.41) versus non-adaptive clothing (mean = 108.63, SD = 25.21). It appears that using adaptive clothing saves a substantial amount of time as compared to non-adapted clothes. However, the results should not be considered precise, as there were several confounding factors. For instance, each resident was not dressed with the same type of clothes (some had shirts and pants, others only had shirts), nor were they dressed using the same techniques (three were lying in bed, one was in a wheelchair). Also, the residents varied in their physical capabilities, as some were non-weight bearing, while others were able to help the staff in the dressing process. As well, the trials were conducted in an artificial setting, which may have influenced the results.

The observations recorded during the trials provide a better indication of the effectiveness of adaptive clothing. The staff were observed to perform less manual handling, rolling, and repositioning of the residents. When being dressed with adaptive clothing, the residents' shoulder and other joint movements were considerably reduced, which helps to minimize resident pain and discomfort. In addition, the residents were noticeably less agitated and nervous, and appeared to be more comfortable throughout the dressing process.

Case Studies

The following chart outlines the observations made during the dressing of the two residents. Resident A was dressed using adaptive clothing, while resident B was dressed using non-adapted clothing.

	Resident A (Adaptive Clothing)	Resident B (Non-Adaptive)
OBSERVATIONS	<ul style="list-style-type: none"> No rolling or lifting was required to place on dress The residents joint movements were minimal Buttoning of the snap closures were performed easily and without rolling or lifting of the resident The staff member exhibited considerable bending of the back while dressing the resident 	<ul style="list-style-type: none"> Some lifting and twisting required to place on pants While placing on shirt, the residents joint movements were awkward The resident appeared to have some difficulty moving her arm into the sleeve of the shirt The staff member exhibited considerable bending of the back while dressing the resident
COMMENTS	<ul style="list-style-type: none"> Using adapted clothing decreased the number of times the resident was rolled or lifted The staff member exhibited some poor body postures and dressing techniques For optimal benefits from using adapted clothes, proper body postures and dressing techniques must still be used – forward bending of the back is a high risk posture, especially if pulling or rolling the resident is performed while in this position 	<ul style="list-style-type: none"> Resident B required more rolling, supporting, and lifting to dress Some awkward body postures and repositioning used to dress this resident would be minimized or eliminated with adapted clothes The staff member was observed to use some poor body postures The body postures used greatly increased the risk of injury, due to the amount of manual handling required for this resident

The observations from the case studies showed that dressing residents, regardless of clothing type, involves a risk for MSI. Dressing residents using adaptive and non-adaptive clothes both bring about poor postures; this may be alleviated by the use of height adjustable beds, which was noted in the case study comments. However, the use of adaptive clothing does lessen the amount of rolling and repositioning required while dressing the resident.

Discussion

The results of this project are positive, with most of the evaluation indicating that adaptive clothing is effective in reducing the risk of injury to staff, and decreasing resident discomfort. Staff generally approved of the adaptive clothing, provided that each resident's garments are adapted with the individual in mind. For example, some residents felt that the snap closures in the back of their clothes were uncomfortable when lying down; the staff responded by having the seamstresses sew an extra layer of fabric over the buttons as padding for some residents. For others, only one or two snaps were added at the top of the garment; appearance, warmth, and dignity were maintained by tucking the garment edges behind the resident while they sat in their chairs. A personalized adaptation of clothing is an important consideration for any adaptive clothing program. The care staff, the resident, and their family should all have input into the modification of the clothing.

Observations of staff using adapted clothes showed that the residents could be dressed while lying down or sitting in bed. This resulted in less rolling, lifting, and repositioning of the resident, which is expected to reduce the risk of injury to staff. The adapted clothes also minimized awkward joint movements in the residents, especially in the shoulder area; this should help decrease resident pain and discomfort while being dressed.

In the time trials, adaptive clothing reduced the time required to dress the residents. However, in a practical setting, the staff noted that they spent the same time dressing regardless of clothing style. This discrepancy was attributed to the fact that the staff could spend more time with the resident after they were dressed. When a resident was dressed faster than usual, more time and care would be spent in other areas of grooming, which was enjoyable for both the resident and the staff.

Adapted shirts and dresses were well received, with two notable exceptions. The first was the irritation of the snap closures while the resident was lying down. This was resolved by adding extra padding along the seam, or avoided by leaving an intact collar or splitting the collar with only one or two snaps. Another option briefly considered was to use Velcro instead of snaps, to make the clothing smoother and more comfortable; however, Velcro wears down too quickly during the laundering process, and was thus not feasible. The second concern with the shirts and dresses was that the slit opening in the back leaves the resident slightly exposed. Most staff did not feel this was a serious problem, as the exposure was minimal, particularly for residents sitting in Geri-chairs.

Pants adapted with side snaps met with limited success, and it is unclear if they would be effective in reducing the risk of injury to staff. The major concern with

the pants was that they fit the resident in an unmodified form, but there was usually not enough material in the pants to allow for snaps to be added. The adapted pants were generally too tight, and the snaps came undone on their own as a result. The staff were repeatedly buttoning up the pants throughout the day. Staff commented that the adapted pants did not seem to reduce the time they spent dressing, as there was a lot of buttoning along both pant legs; adding snaps along one leg only would be sufficient, and still reduce the amount of rolling and repositioning for residents preferring dress pants. Otherwise, staff noted that the use of sweat pants makes dressing easier without adaptation.

The adapted pants with side snaps did reduce some of the manual handling involved in dressing the resident. Pants could be placed on the resident while they were lying down, reducing the need to support their legs and body weight. There was also less rolling involved, which was deemed to be an uncomfortable procedure for the majority of the residents, as well as a high-risk task for care staff.

The rear-split pants were better received than the side snap version. The rear split pants also reduced the amount of rolling, repositioning, and manual handling. The residents that used this style of pants were all non-ambulatory, so exposed areas were not a concern. Staff indicated that they found toileting from a sling lift was easier, as was dressing the resident in either a sitting or lying position.

Due to the limited timeline of the study, an accurate prediction of the effects of adaptive clothing on injury rates cannot be determined. However, based on observations of staff dressing residents using adaptive clothes, there is a clear reduction in the amount of repositioning, lifting, and rolling. This decrease in the risk factors associated with resident handling and dressing should reduce the number of reported MSI's.

Conclusion

The use of adaptive clothing appears to be effective in both reducing the risk of injury to staff and the time spent dressing residents. However, much of the data gathered in this study was subjective; more objective measures would be needed in order for a definitive conclusion to be made regarding the use of adaptive clothing risk of injury. A comprehensive and long-term analysis of injury rates should be conducted to determine if there is indeed a reduction in MSIs in association with the use of adaptive clothing. An in-depth biomechanical analysis of the interaction between staff and residents would also help establish whether the use of adaptive clothing decreases the risk of injury. Multiple time trials should be performed in a clinical setting, to get a better idea of the actual effect of adaptive clothing on the time spent dressing residents.

The program was improved by incorporating rear-split adapted pants, which were demonstrated to be quite successful. This highlights the importance of a continual evaluation throughout each step of the project. Other improvements to the program could include identifying an alternative to snaps as a fastener, splitting pants down one leg only for side-split adaptations, and ensuring adequate training on sewing and dressing techniques.

The project over-all was appreciated and well supported by staff, the residents, and the families of the residents. The two facilities that trialed the program continue to use adaptive clothing in their daily routines, and recommend a similar program for other extended care facilities.

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Appendices

1. Resident Selection Criteria Sheet
2. General Sewing Instructions for Adaptive Clothing

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Resident Selection Criteria Sheet

The following checklist can be used to help determine whether a resident is appropriate for adaptive clothing use, and if so, what type of clothing will be needed.

1. Does the resident require adapted shirts and/or dresses?

- a. Does staff have a difficult time putting shirts and/or dresses on the resident?
- b. Does the resident have reduced ability to move his or her arms independently?
- c. Is the resident in pain when his or her arms are moved?
- d. Is the resident resistant to being dressed?

If you have answered "yes" to two or more of the questions above, then the resident is appropriate for adapted shirts and/or dresses.

The following will help determine the type of adapted shirts and/or dresses that should be used:

Adapted shirt/dress – Full back opening:

- Does the resident have fixed contractures in his or her arms?
- Does the resident experience pain when raising or moving his or her arms?
- Is the mobility reduced such that it is difficult to lift the resident's head and/or arms when they are being dressed in bed?

If you answered "yes" to two or more of the above, use full back openings in the adapted clothes.

Adapted shirt/dress – Cut up to the collar:

- Does the garment in question slip over the residents' head without discomfort?
- Is the resident likely to experience discomfort or skin irritation in the presence of snaps (on the collar)?

If you answered "yes" to either question above, use adapted clothes cut only up to the collar.

2. Does the resident require adapted pants?

- a. Does staff have a difficult time putting pants on the resident?
- b. Is this resident wheelchair dependent or unable to stand up without assistance?
- c. While being dressed, is the resident unable to lift his or her hips?
- d. Does the resident have a preference for trousers rather than sweat pants?

If you have answered "yes" to two or more of the questions above, then the resident is appropriate for adapted pants.

3. Which particular clothes are appropriate for being adapted?

- a. Pants to be adapted should be fairly loose fitting (not snug)
- b. No knitted sweaters should be adapted. Any materials other than knits are appropriate for adaptation.
- c. Shirts should not be too tight – these will continue to shrink after adaptation.

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Sewing Instructions for Adaptive Clothes

General Information:

- Choose thread that is as close to the colour of the garment as possible.
- Choose twill tape that is similar to, or goes with, the garment being sewn.
- Snaps are white or black – choose a colour that matches as close as possible.
- Any name tags in clothes that need to be removed, should be replaced so that clothing can be identified.
- Some garments may require minor repairs; do these before beginning modifications. Any garment that is too difficult to repair should not be adapted.
- Each garment is slightly different and has different challenges. The following instructions are only general guidelines. Slight variations may be necessary for various garments; use your own discretion or ask for help if necessary.

Side-split Pants:

1. Undo seams using a seam ripper, 1" past crotch level on both sides of the pants
2. Use serger to finish both seams along both edges
3. Use iron to turn edge over along original seam line (approx. ¼ inch)
4. Cut twill tape 1" longer than the opening of the seam
5. Place twill tape on underside of front pants, so it is not visible from the outside
6. Place twill tape on the back of the pants so that it extends ¾" out from the edge of the seam
7. Top stitch the twill tape onto the seam
8. Bring two twill tapes together at the bottom of the seam; sew together
9. Finish bottom edge of seam with a serger or zig zag stitch
10. Turn pants right side out and top stitch horizontally across the bottom to secure twill tape
11. Space snaps no less than 3 inches apart along seams, matching front and back
12. Sew on snaps (male on the back, female on the front)
13. Sew light duty snaps down the sides of the pants where there is no tension, and heavy duty snaps at the top, where there is tension
14. Try to secure snaps where the pant seams are not bulky
15. Hemming of pants may be required – the amount to be hemmed (if at all) will be indicated on the pants

Rear-split pants

As this style of pants was not originally part of the study, only generalized sewing instructions were available.

1. Split pants down the rear seam, from waistband to crotch
2. Stitch the edges, or apply bias tape to finished edges
3. Sew a 6-8" piece of bias tape to the top of the opening on each side to create a tie to hold garment in place

Shirt, Dress, or Blouse:

As was the case at the test sites, the majority of residents will likely use a split back with an intact collar, or 1-2 snaps only at the top. The following instructions explain how to modify the entire garment with snaps; however, individual discretion is recommended before adapting any clothing.

1. Sew any buttons or openings closed along the front of the garment. Keep stitching as unobtrusive as possible. Depending on the style of garment, you may keep the top one or two buttons free to open
2. Take out any bulk, for instance shoulder pads
3. Fold dress, matching side seams and shoulder seams, pinning side seams and collar to secure
4. Cut along the centre of the back (along the fold line)
5. Use serger to finish both seams all the way down
6. Use iron to turn seam over ¼" along the edge
7. Serger the end of the twill tape
8. Fold under ¼" at top; top stitch
9. If there is a collar:
 - i. Remove top stitch from last inch of collar
 - ii. Fold cut edges of collar inward ¼", in line with the seam of the garment
 - iii. Iron
 - iv. Top stitch
 - v. Repeat for both sides
10. Match twill tape to seams up to neck level
11. Left seam has twill tape out ¾" from edge
12. As you sew twill tape, be careful not to stretch the fabric
13. Cut twill tape ½" below bottom hem of dress, fold under, and sew
14. Male snaps are matched to male along left seam. They are set closer to the edge of seam line to leave room for top stitching twill tape on the inside edge
15. Place snaps approximately 4" apart at even intervals all the way down the garment
16. Snaps may be placed at greater intervals from crotch level down
17. Top stitch the twill tape

Ideas for various clothes:

- If collars are bulky, consider using bias tape to finish edges
- For robes that do not already have buttons (i.e., just a tie in front), the front overlap and amount to be sewn in front should be indicated prior to being given to the seamstress
- Ask whether or not the belt should be sewn onto the garment. This can be sewn into the sides or to the back of the robe
- Any elastic on the garment should be taken out of the back and allowed to remain in the front. You may have to secure the front elastic so that it does not pull out
- Buttons or sleeves (at wrists) may be replaced with snaps or elastic – this will be indicated on the garment if necessary

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ABOUT THIS DOCUMENT

The Occupational Health and Safety Agency for Healthcare (OHSAH), which operated from 1998-2010, was a precursor to SWITCH BC. Conceived through the Public Sector Accord on Occupational Health and Safety as a response to high rates of workplace injury, illness, and time loss in the health sector, OHSAH was built on the values of bipartite collaboration, evidence-based decision making, and integrated approaches.

This archival research material was created by OHSAH, shared here as archival reference materials, to support ongoing research and development of best practices, and as a thanks to the organization's members who completed the work.

If you have any questions about the materials, please email hello@switchbc.ca or visit www.switchbc.ca