



Nurses' perceptions of how job environment and culture influence patient handling

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Summary This article is two of a two part series examining the people and environment associated with patient handling. The approach used was that of an occupational injury investigation of a job class, which incorporates defining in the task, environment, tools, and worker health status. Hence, the objective of this study was to evaluate nurses' perceptions of how healthcare organization, environment, and culture influence a patient transfer. For this purpose, a postal survey was designed to collect data from Alabama nurses who had been registered in the state for at least one year. The potential participant pool included 1000 nurses randomly selected from the 49,000 registered. The return rate of 10% was expected based on nursing literature. One hundred and one surveys were returned with 86 being complete. Results showed nurses perceive bathroom transfers as being most difficult with 3 of the 4 significant transfers being associated with this location. Further, nurses reported they spend approximately 20% of their time performing patient handling tasks. Responses on job culture suggests in patient handling situations most nurses will place a patient's safety above their own, which is expected given the core concepts of healthcare, but represents a shift from other industries involving manual material handling. Further, over 40% of nurses stated sprains, strains and sore backs are just part of the job. Significant factors shown to influence patient

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handling were the patient's size and weight and understaffing. Reasons given for not using patient handling equipment were an emergency did not allow for time, equipment was unavailable, or the size, shape and/or congestion of space did not allow for use. Overall, responses suggest nurses are well educated regarding patient handling as it is a large part of the everyday job. However, job demands and culture often influence nurses to place patient safety ahead of their own. This suggests patient handling remains a problem that still needs to be addressed to find a proper balance between patient and provider safety before significant long-term advances are realized.

Significance to healthcare: Nurses constitute the largest proportion of the healthcare industry's workforce. Understanding job factors that impact the health and subsequent working life of this employee group is essential in order to sustain the contributions of nurses as the demands on the healthcare system increase with an aging population.

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Editor's comments

This is the second article of two looking at patient handling which investigates a range of issues that increase the risk of injury when undertaking patient transfers. The article also explores some interesting aspects in relation to the manoeuvres perceived to be the most difficult and why policies are often ignored when handling patients. Putting the needs of the patient first, over our own, is an ideal which can prove to have far reaching consequences.

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Introduction

In the United States, sprains and strains are very common workplace injuries (Jensen, 1985, 1990a,b), accounting for 85% of all injuries and are frequently associated with the back. In healthcare, moving, lifting and transferring patients, equipment or supplies have been perceived by healthcare workers to be the most frequent cause of back injury (Fuortes et al., 1994; Janizewski and Caley, 1995; CNA, 2005) with up to 89% of one hospital's claims implicating this cause. Nurses exposed to these types of job demands had a 26% higher risk of injury than those unexposed (Gimeno et al., 2006). Among nursing personnel, nurse assistants, or NAs, were found to be at greatest risk for back injury (Personik, 1990; CNA, 2005) with registered nurses, or RNs, maintaining a close second. In 1985, Patterson et al. (1985) stated that "most (back injuries) frequently occur while personnel are manipulating patients or equipment", a trend that continues today. So why has this problem persisted for more than 20 years? Most experts believe it is simply due to the multitude of complex factors, both direct and indirect, which must be assessed and balanced simultaneously. For example, organizational risk factors include type of healthcare setting (homecare, assisted living, emergency department, geriatric unit, operating room suite,

medical–surgical unit, critical care, etc.) due to their direct association with the job specific tasks as well as environmental conditions (Gimeno et al., 2006). Further, physical and environmental hazards are also commonly found in hospitals and include slippery floors, electrical hazards, noise, poor lighting, and inadequate ventilation (Triolo, 1989; Hignett and Richardson, 1995). The physical environment of care can also pose restrictions on managing a patient's care. Depending on the care setting (e.g., standard hospital patient room, skilled nursing facility, etc.), nursing staff must work within the constraints of the physical area in order to perform patient handling tasks. This is known as a 'space limitation' and is a very common issue in most healthcare settings. Common environmental issues are room dimensions and fixed architectural fittings, such as walls, cubicle rails, and floors (Hignett and Richardson, 1995; CNA, 2005). The result is that nurses may be forced, because of limited space to work in awkward and twisted postures. Hospital furniture and equipment as well as the presence of other hospital staff can create barriers that restrict movement (ANA, 2003). Additionally, congestion plays a similar role. Typical items found to cause congestion were: tables, wardrobes, trolleys, wheelchairs, and commodes (Hignett and Richardson, 1995). Other factors which contribute to the difficulty of managing a

patient, particularly with tasks requiring lifting, transferring, and/or moving, i.e. patient handling, include the size and weight of the patient, combativeness, propensity for the patient to fall, and 90% female nursing staff (BLS, 2004; CNA, 2005; Nelson et al., 2006).

In 2003, Stetler et al. determined that no simple solution or single intervention would be effective to solve the complex problem of patient handling. For this reason, many multi-level prevention programs have been, or are being, introduced around the world to avoid or decrease the manual lifting of patients. Administrative support for these programs is high due to the cost-benefit perspective that it is much less expensive to implement a comprehensive back injury prevention program than to pay for an employee's rehabilitation from a work-related back injury (Smith, 1995). Additionally, the cost and comprehensiveness of a program seems to be dictated by the type of healthcare organization. Of the injury prevention programs sampled, most were based on different concepts/approaches but were more or less comprehensive (Hignett, 2003; Nelson et al., 2006) in order to allow for not only horizontal implementation in the organization but vertical as well. However, a common primary flaw exists with the programs examined. They do not take into account the hierarchy of influence of how the type of organization, job environment, current situation, or safety culture influences how handling situations will be managed. Therefore, the goal of this study was to evaluate nurses' perceptions of how healthcare organization, environment, and culture influence a patient transfer using parameters predetermined from observations, focus groups and individual interviews (Holman, 2006).

Methodology

For this research, a survey instrument was developed to evaluate previously identified parameters influencing how patient transfers are performed. Survey parameters were determined based on a previous study encompassing multiple observations, focus groups and individual interviews of various healthcare personnel (Holman, 2006). The instrument's design captured nurses' perceptions of importance and/or difficulty of each parameter to understand its overall influence. Similarly, this approach follows a Delphi study where known experts (nurses) were used to develop and guide the study (Last and Fulbrook, 2003). The instrument was then piloted and refined over a period of six

months to its final form. Primary information/questions meant to be answered with the instrument are:

- (1) What are the most difficult patient transfers performed?
- (2) Where are the most difficult locations to perform a transfer?
- (3) Who is performing these transfers?
- (4) What type of safety culture is present in nursing?
- (5) Why would a nurse choose to not use patient transfer equipment?
- (6) What are the most influential factors controlling a patient transfer?

The survey instrument utilized collection methods associated with multiple choices, ranks, True/False, weighted comparison, and self-reported work measurement. Instrument validation was determined using Pearson Correlations and Cronbach's Coefficient Alpha for three outcomes: safety culture, work environment, and influencing factors. For which, three to five items/questions were scored for each outcome. Additional sociodemographic information was collected including height, weight, age, gender, race, certificate/diploma, years of experience, and type of healthcare organization. Administration of the survey instrument was accomplished via a hard copy mailer with pre-paid self-addressed return envelopes enclosed. Alternate methods of return were fax or email. A deadline return date of six weeks was placed on the survey. A reminder postcard was sent two weeks after the initial survey mailing, which contained a basic reminder to complete and return the survey and a backup website address. The website was available for anyone who had misplaced their survey to download an electronic copy.

The state of Alabama (US) was chosen to be the testing population based on regional consideration and follow-on studies. From an international perspective, the state of Alabama is equivalent to the size of Greece with a general population of approximately 4.5 million people. Potential subjects were chosen randomly by computer from a pool of approximately 49,000 registered nurses in the state of Alabama. Subject selection was based on one criterion: subjects must have been registered with the Alabama Board on nursing for at least one year. One thousand nurses were selected. This number was based on the number of returns needed to gain statistical significance relative to the minimum expected return rates, which traditionally are approximately 10% (Nelson, 2005). Approval of the study was received from the

University's Institutional Review Board (IRB) for Human in Research.

Results

A total of 101 questionnaire returns (10.1%) were received with 86 having completed all sections. All information recorded was categorized as self-reported. All items and scales were scored from 0 to 100 with 100 being the best possible score. General sociodemographics of respondents was viewed as normal with gender and age distributions being equivalent to both the state of Alabama and US statistics (BLS, 2004). Table 1 shows the distribution of sociodemographic data.

Validation of the survey instrument was accomplished using a Cronbach's Coefficient Alpha and Pearson Correlation Coefficient procedure for each of two scale outcomes with three and four items. In each case, scale outcomes had a low but acceptable raw alpha score (range 0.72–0.76). Normal range for Cronbach's Alpha is from 0 to 1. Low alphas occur when grouped responses to similar questions do not correlate, which in this case was considered to be a product of the range of healthcare settings reported. Specifically, healthcare setting is important when considering environmental factors for nurses, a point that is illustrated throughout this paper.

Following confirmation of scale reliability, the data were analysed as a population and then stratified for sample comparison. Items examined include type of transfer, location of transfer, factors considered when transferring, reasons not to use patient handling equipment, and general questions about job safety culture. Responses given for items were Yes/No, rankings (rank order), or weighted value using a six point Borg scale. Hence, statistical methods for analysing responses included both parametric and nonparametric tests. Tests were performed at a significance level of 0.05.

Results for the types of transfer considered to be the most difficult yielded a rank order of the 12 most common transfers, which were identified by focus groups prior to survey development. Analysis was done using a Kruskal–Wallis Test ($H = 374.33$, $p < 10^{-16}$) to determine overall significance with a post ANOVA to determine hierarchy and groups of related transfers, i.e. task or items that had similar responses and considered to be associated based on their importance to nurses. These groups are denoted by connected arrows in the tables following. A Z-statistic of the rank and variance was then used to show which transfers deviated from the average cumulative rank. Results showed four of the transfers were considered to be significantly more difficult than the other eight for both combined and stratified responses. Interestingly, three of these four are attributed to bathroom transfers. Table 2 gives an assessment of each transfer with a rank of one being most difficult. Stratified assessment of the transfers by healthcare organization yielded minor differences but no significant changes to the results. For the table, the associated z-value and p-value for significant transfers are displayed along with the post ANOVA groupings.

The next item examined was how much does the location of the transfer change the difficulty of the task. For this, six locations were ranked based on the focus groups. Of the six, two were considered to be a more difficult location to perform a transfer by Alabama nurses ($H = 112.56$, $p < 10^{-16}$). Table 3 gives both an assessment of each transfer location with a rank of one being most difficult. Similar to transfers, stratified assessment of locations by healthcare organization yielded minor differences but no significant changes to the results. For the table, the associated z-value and p-value for significant transfers are displayed along with the post ANOVA groupings.

After determination of what transfers and locations were believed to be the most problematic for nurses, attention was focused on the question of how much patient handling is involved in a typi-

Table 1 Sociodemographics of responding Alabama nurses ($n = 86$).

Age, year (%)	*Gender (%)	Race (%)	License/degree (%)	Experience, year (%)	Healthcare organization (%)
20–29 (5.9%)	Male (7.0%)	Caucasian (91.9%)	ADN (37.2%)	0–1 (2.3%)	Hospital (64.0%)
30–39 (24.4%)	Female (93.0%)	African-American (7.0%)	BSN (32.6%)	2–3 (9.3%)	Outpatient clinic (9.3%)
40–49 (34.9%)		Hispanic (1.1%)	MSN (12.8%)	4–6 (4.7%)	Rehabilitation clinic (1.1%)
50–59 (24.4%)			Other (17.4%)	7–9 (10.4%)	Homecare/hospice (9.3%)
>60 (10.4%)				10+ (73.3%)	Other (16.3%)

* Note: the 2004 BLS showed 92.2% of nursing personnel were female.

Table 2 Alabama nurse's average ranked response of most difficult transfer to perform.

^a Group	Transfer	^b All respondents, average rank (n = 86)	Median rank	Composite rank
→	Floor to toilet	2.32	1	1
	Floor to chair	3.12 (z = -10.39, p < 10 ⁻²⁴)	2	2
↔	Bathtub to chair/toilet	3.98 (z = -5.75, p < 10 ⁻⁸)	3	3
→	Chair/toilet to bathtub	5.02 (z = -2.93, p = 0.002)	5	4
	Car to chair	5.62	6	5
→	Chair to car	6.10	6	6
→	Toilet to chair	6.53	7	7
→	Chair to toilet	6.67	7	8
↔	Chair to bed	7.57	9	9
→	Bed to chair	8.86	9	10
	Chair to chair	8.98	11	11
	Bed to bed	9.32	12	12

^a Kruskal–Wallis post ANOVA groupings, $\alpha = 0.05$.

^b Z-statistic (one-sided), $\alpha = 0.05$.

Table 3 Alabama nurse's average ranked response of most difficult location to perform a patient transfer.

^a Group	Location	^b All respondents (n = 86)	Median rank	Composite rank
↔	Bathroom	1.98 (z = -8.18, p < 10 ⁻¹⁵)	1	1
↔	Hallway/lobby area	2.64 (z = -4.07, p < 10 ⁻⁴)	2	2
→	Patient's room (Main)	3.73	3	3
	Trauma unit/ICU	3.75	4	4
	Emergency room	3.77	4	5
↔	Operating room	4.49	5	6

^a Kruskal–Wallis post ANOVA groupings, $\alpha = 0.05$.

^b Z-statistic (one-sided), $\alpha = 0.05$.

cal nurse's workday. From the focus groups and one-on-one interviews, it was determined that this varies depending on education level and associated position in their respective organizations. However, an attempt was made to allow nurses to self-report the percentage of their workday spent on seven tasks commonly associated with nursing. Additionally, a catch all category, "other", was employed to allow for 100% of a day to be reported. Table 4 presents the distribution of responses by both nursing degree and healthcare organization. Further analysis of Table 4 yields three points of interest, the first is that most nurses will spend approximately 20% of their day performing tasks traditionally associated with patient handling. The second is nurses with a MSN or higher spend approximately half as much time as other nursing personnel doing tasks traditionally

associated with patient handling. Finally, the amount/frequency of tasks traditionally associated with patient handling seems to be a substantially less outside of hospital settings/organizations.

Following quantification of the hierarchy and daily magnitude of transfers and locations, questions regarding safety culture among nurses were addressed. For this, questions were asked in such a way as to avoid the standard status-quo response. This technique was necessary since nurses know from experience, education, and facility safety programs what they should do in most circumstances. However, procedures, circumstances, physical environment and personnel available do not always make this possible. Therefore, they were asked hypothetically about decisions they would make given circumstances or about their personal beliefs concerning patient handling or

Table 4 Average percentage distribution of time spent on common nursing tasks by Alabama nurses.

Task	All (<i>n</i> = 86) (%)	By degree				By health organization	
		ADN (<i>n</i> = 32) (%)	BSN (<i>n</i> = 28) (%)	MSN or higher (<i>n</i> = 11) (%)	Other (<i>n</i> = 15) (%)	Working in hospitals (<i>n</i> = 55) (%)	Working in other healthcare settings (<i>n</i> = 31) (%)
Administrative (filling, charting, etc.)	27.01	27.97	26.04	32.27	22.93	26.04	28.74
Administering medication	18.78	24.38	13.57	13.00	20.80	19.24	17.97
^a Toileting/bathing patient	6.01	6.59	6.04	3.64	6.47	8.56	1.48
Responding to calls	12.22	11.38	11.86	10.91	15.67	12.09	12.45
Responding to emergencies	5.85	7.47	6.50	4.64	0.87	7.89	2.23
^a Transporting patients	5.02	5.66	5.86	2.45	4.00	6.22	2.90
^a Moving/repositioning patients	8.44	9.34	7.86	5.64	9.67	11.22	3.52
Other	16.67	7.21	22.27	27.45	19.59	8.74	30.71
^b Tasks associated with patient handling	19.48	21.59	19.75	11.73	20.13	26.00	7.90

^a Tasks traditionally associated with patient handling.

^b Task/item is the sum of tasks traditionally associated with patient handling.

general safety. Responses to these questions were insightful about the internal safety culture of Alabama nurses. Table 5 gives a listing of True/False questions and the distribution of responses.

Examination of Table 5 shows that nurses were both personally risk adverse and aware of current patient handling guidelines. However, it also shows that most nurses believe they must place patient's safety over themselves with the consequences being "just part of the job". This assessment was then compared with another situational question, which asked "when in a normal situation of needing to lift a patient alone, you are more likely to _____". Responses to this question are found in Table 6 and were listed as a "mark all that applies" for participants. Responses showed that more than 85% would either "Use learned techniques" or "Seek out another person to assist". Notable is the fact that only 6.7% said they would go "Find and use the patient handling equipment". This response differs from the expectation implied in literature and documented safety programs. However, these responses are reflective of the dis-

cussions within the focus groups prior to survey development: "the idea of the immediate availability and use of patient handling equipment in healthcare is much different than the reality of the events which must occur in a given time", focus group B. Further conversation within the same group revealed that the use of patient handling equipment is related to whether the equipment fits the immediate situation rather than the premise that patient handling equipment is generic to all situations.

The final situational question was a direct assessment of why nurses do not use patient handling equipment. However, since nurses are conditioned by education and safety programs to respond that patient handling equipment is suited for and to be used in all circumstances given that it is not an emergency. This question was worded to allow nurses to answer based on their experience and opinions of why not to use the equipment. Table 7 gives the question and responses as ranked by Alabama nurses ($H = 130.10$, $p < 10^{-16}$). Under the same reporting criteria, Table 8 gives a strati-

Table 5 Response distribution of True/False questions relating to patient handling job culture of Alabama nurses.

Category	Question	True (%)	False (%)
General safety	I consider myself a responsible, safety conscious person	100	0.0
General safety	I wear my seat belt 100% of the time	71.6	28.4
Situational	I place my patient's safety above myself in most circumstances	85.7	14.3
Opinion	Strains, sprains, and sore backs are just part of the job (nursing)	40.5	59.5
Actual	Have you ever had a back or shoulder patient handling injury on the job	43.0	57.0
Opinion	Program taught safe lifting practices are real world practical	77.4	22.6
Knowledge	There are a set of OSHA guidelines on patient handling in nursing homes	88.1	11.9

Table 6 Distribution of responses to: "When in a normal situation of needing to lift a patient alone, you are more likely to".

Responses	True (%)
(a) Use techniques learned during hospital or college training	30.0
(b) Follow instruction/techniques shown to me by an experienced nurse	6.7
(c) Seek out another person to assist	55.5
(d) Use techniques learned in a CEU course on patient handling	1.1
(e) Find and use the patient handling equipment	6.7

fied assessment by healthcare organization, which did show significant differences in opinion on this subject. For each table, the associated z -value and p -value for significant transfers are displayed along with the post ANOVA groupings.

The last section in the survey allowed Alabama nurses to compare factors against one-another. Each subject was asked to rank the importance of eight criteria, i.e. influential factors of patient handling, through a series of two value weighted comparisons using a six point Likert scale (Likert, 1932; Woodworth, 1933). All factors were weighted against each other, giving a total of 28 comparisons throughout the survey. The following example gives the section's instructions with a sample of a normal response.

Please give your general beliefs about which of the pairs of factors are more influential concerning patient handling. Place an (X) between the pairs of criteria that follow, closest to the influencing factor:

Example, if you generally believe that "limited space" has a greater influence on patient handling when compared to patient cooperation, you might place a (X) as follows:

*Limited Space: ___ : X : ___ : ___ : ___ : ___ :
Uncooperative Patient*

The use of this method allows for several different types of statistical analysis. First using the weighting of each interaction, a composite score can be determined to gauge the level of influence of an individual factor. An example of how this method works is that the scale is a six point scale ranging from -3 to 3 . Therefore for the example above, "limited space" would receive a $+2$ and "uncooperative patient" would receive a -2 . Using all comparisons, a composite score can then be determined. Consequently, a t -statistic can then be used, testing a mean about zero with the assumption that all factors are of equal importance. Additionally, other analyses performed include a Kruskal–Wallis Test with post ANOVA groupings which utilizes the rank order of the values as determined by the each factors composite

score and a Mann–Whitney Test for comparing a factor's rank order between groups. Table 9 shows the significant results of all three tests performed.

Examination of Table 9 shows that "Understaffing" and "Weight/Size of Patient" are significant factors that control how a lift is performed, while the t_0 of "Lifting Polices of Facility" seem to show that it significantly has no effect on how the lift is performed. Reasons for differences in the two tests are that the Kruskal–Wallis Test is a one-sided test, while the t -test is a two-sided test. To further examine this, data was stratified by healthcare organization, for which only minor differences were seen. However, additional testing showed that "Space Congestion" was found to be significant at 0.10 using a Mann–Whitney test, $p = 0.088$, suggesting that congestion of space becomes more of an issue outside of a hospital in alternate healthcare settings such as nursing homes or home healthcare. However, this is not conclusive since it was not significant at the 5% level, but it does give merit to further investigation.

Discussion

The goal of this study was to evaluate nurses' perceptions of how healthcare organization, environment, and culture influence a patient transfer using parameters predetermined from observations, focus groups and individual interviews (Holman, 2006). For this purpose, a survey was administered to collect opinions about patient handling experiences with sufficient sociodemographic information to stratify the results. Results from the survey yielded insights on how Alabama nurses perceive patient handling tasks and the associated environment, as well as their role in the process. Nurses responded that there are four transfers of significant difficulty: floor to toilet, floor to chair, bathtub to chair/toilet, chair/bathtub to bathtub. Based on this, it was not surprising to find that nurses perceive bathroom and hallways/lobbies to be the worst locations to perform a needed transfer. Subsequently, reaction from nursing profes-

Table 7 Alabama nurses average rank response to: "Please RANK the issue or reason, based on experience, why NOT to use patient handling equipment from best (1) to worst (12)".

^a Group	Reason	^b All respondents, average rank (n = 86)	Median Rank	Composite Rank
•	No time, it is an emergency	3.30 (z = -7.95, p < 10 ⁻¹⁵)	2	1
↑	No room to use it (shape and size of room and/or door)	4.72 (z = -3.72, p < 10 ⁻⁴)	4	2
↑	No patient handling equipment	5.12 (z = -2.90, p = 0.002)	4	3
↑	Too congested in room (furniture, equipment, etc.)	5.29 (z = -2.28, p = 0.012)	5	4
↑	Patient is not large enough to justify use of equipment	6.27	6	5
↑	Patient handling equipment is in use somewhere else	6.28	6	6
↑	Two person lifting is better	6.47	7	7
↑	It is faster and more convenient without it	6.73	7	8
↑	It is safer to lift without	7.16	7	9
↑	Scheduling does not allow for time (staffing issue)	7.24	8	10
↑	It is difficult to operate	7.31	8	11
↑	It is too far away (distance to travel)	7.72	8	12

^a Kruskal–Wallis post ANOVA groupings, $\alpha = 0.05$.

^b Z-statistic (one-sided), $\alpha = 0.05$.

sionals was that most of the time there is insufficient room for assistance or mechanical lifts in bathroom areas, and three of the four transfers defined as most difficult are related to bathroom transfers. Further, two of the four significant reasons given for not using patient handling equipment were the space/room was too congested and size or shape of the room did not permit. However, in general, overall analysis shows these two factors are actually contributors to primary problems (factors) in patient transfer. The primary two factors, which nurses found to be most important in determining the difficulty of a transfer were the size and shape of the patient and the unavailability of staff for assistance (understaffing) (Marras, 2005). Interestingly though, lifting policies of the facility was also found to be significant in this grouping. However, it had a negative *t*-value indicating that it is significantly unimportant to nurses when performing a patient transfer. Follow-up inquires regarding lifting policies found that patient safety, well-being, and care needs are more likely to determine the methods used in transfers, not policies, which reinforces the fundamental difference between the healthcare and other industries. The product is a patient's health.

Other significant findings of interest were that in the event of an emergency there is insufficient time to use patient handling equipment. This finding supports the exceptions found in the no-lift policies found throughout the US, UK, and Australia (Engkvist, 2006). Another factor was that there are still healthcare environments with no patient handling equipment. And while patient handling equipment is not applicable for all lifting environment situations, it is still the best resource that nurses have available to them for performing most patient transfers.

Finally, job culture provided perhaps the most interesting insight into how nurses perceive their role in patient handling. In general, the surveys revealed that nurses for the most part are personally risk adverse and aware of current information/guidelines relating to patient handling. However, when it comes to performing their jobs and particularly patient handling task, they place their patient's safety above their own, thus reinforcing previous findings from focus groups. Therefore, it is not surprising that over 40% of nurses stated sprains, strains and sore backs are just part of the job and within the same sample, 42% state having had a shoulder or back injury on the job. And while these two results can not be directly correlated specifically to patient handling injuries, it is estimated that 40% of occupational nursing injuries in the US are attributed to some type of manual

Table 8 Alabama nurses average rank response to: "Please RANK the issue or reason based on experience why NOT to use patient handling equipment from best (1) to worst (12)" by healthcare setting.

^a Working in hospitals (<i>n</i> = 55, <i>H</i> = 80.25, <i>p</i> < 10 ⁻¹⁶)		^a Working in other healthcare settings (<i>n</i> = 31, <i>H</i> = 58.94, <i>p</i> < 10 ⁻¹⁴)	
^b Group	Reason	^c Average rank	Median rank
•→	No time, it is an emergency	3.28 (<i>z</i> = -5.25, <i>p</i> < 10 ⁻⁷)	3
→	No room to use it (shape and size of room and/or door)	4.33 (<i>z</i> = -3.67, <i>p</i> < 10 ⁻³)	4
→	No patient handling equipment	5.04 (<i>z</i> = -2.96, <i>p</i> < 0.002)	4
→	Too congested in room (furniture, equipment, etc.)	4.96 (<i>z</i> = -2.23, <i>p</i> = 0.013)	5
→	Patient is not large enough to justify use of equipment	6.63	6
→	Patient handling equipment is in use somewhere else	6.93	6
→	It is faster and more convenient without it	6.70	7
→	Two person lifting is better	6.80	7.5
→	Scheduling does not allow for time (manning issue)	7.00	7
→	It is difficult to operate	7.39	8
→	It is safer to lift without	7.44	8.5
→	It is to far away (distance to travel)	7.57	8
→	No time, it is an emergency	2.27 (<i>z</i> = -6.27, <i>p</i> < 10 ⁻⁹)	1
→	No room to use it (shape and size of room and/or door)	5.17	5
→	No patient handling equipment	5.59	5
→	Too congested in room (furniture, equipment, etc.)	5.59	5
→	Two person lifting is better	5.86	6
→	Patient handling equipment is in use somewhere else	5.93	5
→	Patient is not large enough to justify use of equipment	6.24	6
→	It is safer to lift without	6.62	6
→	It is faster and more convenient without it	6.76	7
→	It is difficult to operate	7.17	8
→	Scheduling does not allow for time (manning issue)	7.69	8
→	It is to far away (distance to travel)	8.00	9

^a Kruskal-Wallis Test, $\alpha = 0.05$.

^b Kruskal-Wallis post ANOVA groupings, $\alpha = 0.05$.

^c Z-statistic (one-sided), $\alpha = 0.05$.

Table 9 Alabama nurses average weighted and rank response for general factors influencing patient handling.

^b Group	Reason	^d Average weighted response (n = 86)	^{a,c} Average rank response (n = 86, H = 113.22, p < 10 ⁻¹²)	Median rank	Composite rank
↑	Understaffed	4.66 (t ₀ = 4.94, p < 10 ⁻⁵)	2.88 (z = -6.52, p < 10 ⁻¹⁰)	2	1
↑	Weight/size of patient	4.21 (t ₀ = 5.34, p < 10 ⁻⁶)	3.28 (z = -4.78, p < 10 ⁻⁶)	3	2
↑	Space congestion	-0.73	4.38	4	3
↑	Limited space	-0.57	4.50	4	4
↑	Patient handling equipment unavailable	-0.70	4.47	5	5
↑	Uncooperative patient	-0.92	4.63	5	6
↑	No patient handling equipment	-0.81	4.80	5	7
●→	Lifting policies of facility	-6.71 (t ₀ = -8.92, p < 10 ⁻¹³)	6.15	6	8

^a Kruskal–Wallis Test, $\alpha = 0.05$.

^b Kruskal–Wallis post ANOVA groupings, $\alpha = 0.05$.

^c Z-statistic (one-tailed), $\alpha = 0.05$.

^d t-test (two-tailed), $\alpha = 0.05$.

material handling (MMH), which is considered conservative by many professionals (ANA, 2003). In the healthcare industry, this refers to activities such as moving, repositioning and/or transporting of patients, transporting or moving carts or trays, and changing or transporting of bulk linen. Overall, these findings suggests patient handling remains a problem that still needs to be addressed to find a proper balance between patient and provider safety before significant long-term advances are made in reducing patient handling injuries.

Potential limitations

This study was based on a self-selected cross-sectional sample of 86 nurses of a possible 1000 nurses, which had been randomly selected to receive the survey from the pool of 49,000 nurses registered/licensed in the state of Alabama. This yielded an effective return of only 8.6%. However, with 86 participants, the minimum sample needed to get statistical power for the unstratified (population) results was achieved. Additionally, stratified results did reach the minimum sample size for all groups to support definitive conclusions about relationships between groups.

Survey validation yielded low Cronbach's Alpha Coefficients (range 0.6299–0.6584) when grouped responses to similar questions do not correlate. Analysis of why data were not correlating as predicted yielded a stratification of data by healthcare setting, which is a point that is illustrated throughout this paper. Hence, the alphas were deemed acceptable.

Other limitations are concerns related to self-reporting (Garrett et al., 1992; Holman, 2006) and are defined by the following. An issue related to the low response rate (10.1% returned, 8.6% useable) raises the question if "selection bias" has occurred within the study. Additionally, omissions in self-reported data have been known to cause reporting inaccuracies in this type of study. Finally, "response bias" is a known issue with performing surveys in healthcare, specifically problems with nurses under-reporting injuries and events leading to injury have be widely reported in multiple studies (Stetler et al., 2003; Nelson et al., 2006).

Conclusion

Methods that Alabama nurses use to handle patients are substantially impacted by a number of factors and these factors facilitate either positive or negative perceptions of job duties/tasks. One

negative perception is that the "floor to toilet lift" is the most difficult of the patient handling transfers. They also regard the location of the lift as important, perceiving bathrooms as the most desirable area to avoid. From survey and focus group data, we know that Alabama nurses are knowledgeable, and understand the importance of using patient handling equipment, but they also understand it is not always permissible or available. Further, nurses view their patient's safety and health to be of the utmost importance to the point that they will knowingly risk personal health and safety in order to provide timely and effective service to their patients, regardless of training, policies, or the availability of patient handling equipment. The nurses' responding to this survey took personal time and hence a vested interest in expanding the understanding of the problems nurses are confronted with regarding patient transfers. Based on their responses, this study was able to better define aspects of patient handling previously not addressed, which can be used reduce the number of obstacles in development of practical solutions to the patient handling problem. Unfortunately though, it is both understood and accepted among nurses, administration, and professionals that patient handling is a complex problem, which will not be solved simply by one catch-all solution (Stetler et al., 2003). Only through defining the problem from the perspective of the people currently doing the job will advances be seen. From this study, basic information about the what, where, and why particular transfers are difficult is available with an understanding of why current practices (patient handling equipment) are not being utilized. Now, the burden rests with the administrators, nurses, and healthcare professionals to contribute time and knowledge to quantify these factors for integration into models and equipment designs to give nurses and healthcare practitioners more options in patient transfer situations (Nelson, 2003).

Future research

This study has shown that job environment and culture play a large role in what methods are utilized by nurses to perform patient handling tasks. Therefore, future research should focus on quantifying these types of factors in order to understand their role in the patient care process. Specifically, controllable factors such as congestion and/or limited space should be address for the purposes of developing building standards related to minimum access/space needed to/around a patient during

care. Additionally, research should examine ergonomic and burnout stressors associated with all nursing tasks in order to understand the true burden being placed on nursing professionals, both physically and mentally. This understanding is critical to adequately addressing work environment issues that may be the key in reducing the incidence and severity of patient handling injuries.

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