



A NIOSH Center for Excellence to Promote a Healthier Workforce

Safe Patient Handling: Highlights of current research and U.S. public policy efforts to improve safety

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“HCSA [Healthcare and Social Assistance] is burdened by the historical and entrenched belief that patient care issues supersede the personal safety and health of workers and that it is acceptable for HCSA workers to have less than optimal protections against the risks of hazardous exposures or injuries.”



Identification of Research Opportunities for the Next Decade of NORA: State of the Sector | Healthcare and Social Assistance. NIOSH Publication No. 2009-138.

Promoting Caregivers' Physical & Mental Health via Transdisciplinary Intervention (“ProCare”)

- I. Evaluate a Safe Resident Handling program (& other employee health activities) in long-term care facilities.
- II. Examine inter-relationships of employee health & safety indicators with other facility characteristics.



Photo credits for Total Body Lift & Sit-Stand Lift: <http://www.invacare.com>



Background

A large chain of nursing homes implemented a Safe Resident Handling Program (SRHP) in >200 skilled nursing facilities (2004-2007):

- Needs assessment for each resident
- Resident lifting equipment purchased
- Protocols for battery re-charging, sling laundering, labels on residents' charts
- Staff training on policies, operation & maintenance



Questions for this presentation

1. Was the SRH program effective in this large long-term care company?
2. Did SRH program effectiveness vary?
If so, what were the sources of variability among centers? among workers?
3. Were the SRH program benefits associated with resident satisfaction or clinical outcomes?



Sub-topics and data sources

1. Ergonomic exposures

Direct observations of work tasks

2. Injury rates

3. Recurrent injuries

Workers' compensation claims and costs

4. Return on investment

Workers' questionnaire responses

5. Workers' use of equipment

6. Low back pain

Third-party surveys of employees & residents; CMS data

7. Relationship with residents' well-being

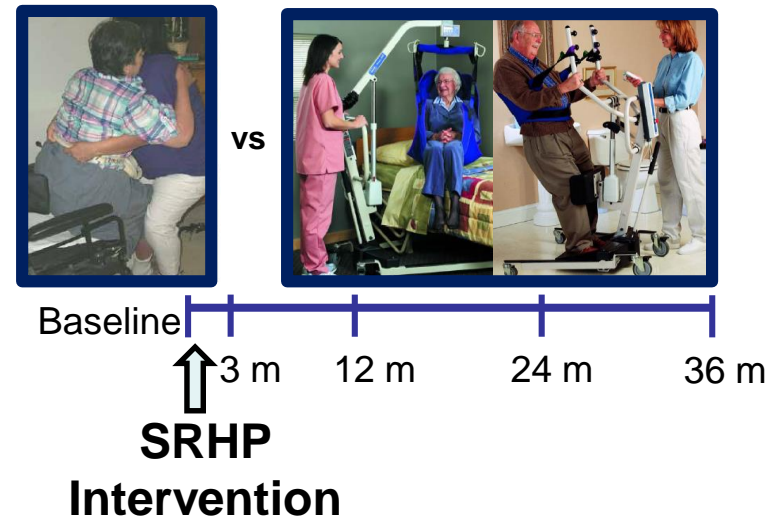
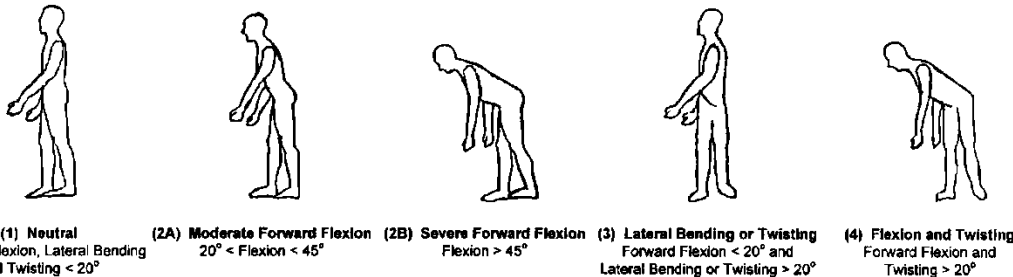


Direct Observations with PATH*

* *Buchholz et al., 1996*

Exposure Categories:

- Trunk, arm, leg postures
- Weight in hands
- Lifting equipment (yes/no)



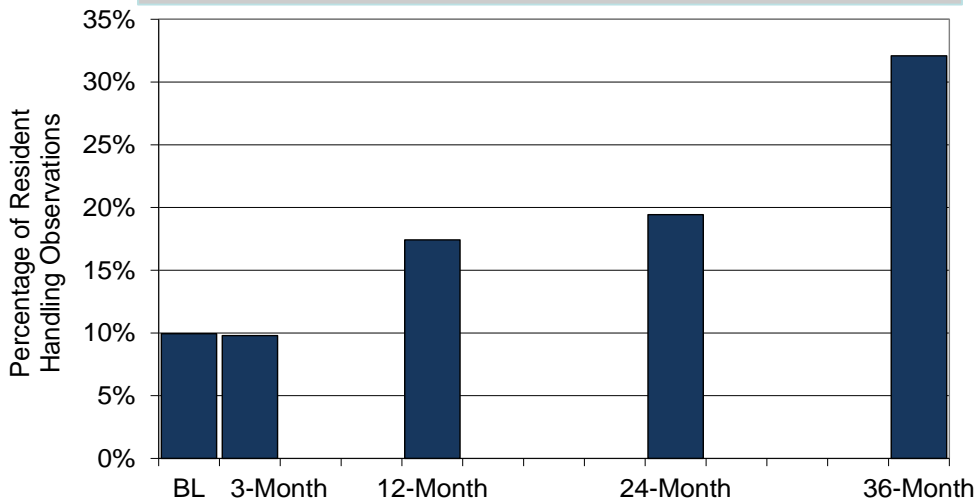
	Baseline (Pre-SRHP)	3 m post- SRHP	12 m post- SRHP	24 m post- SRHP	36 m post- SRHP
Total Obs. Periods	60	56	100	88	57
Total Obs. Moments	15,185	16,031	25,472	24,652	17,365



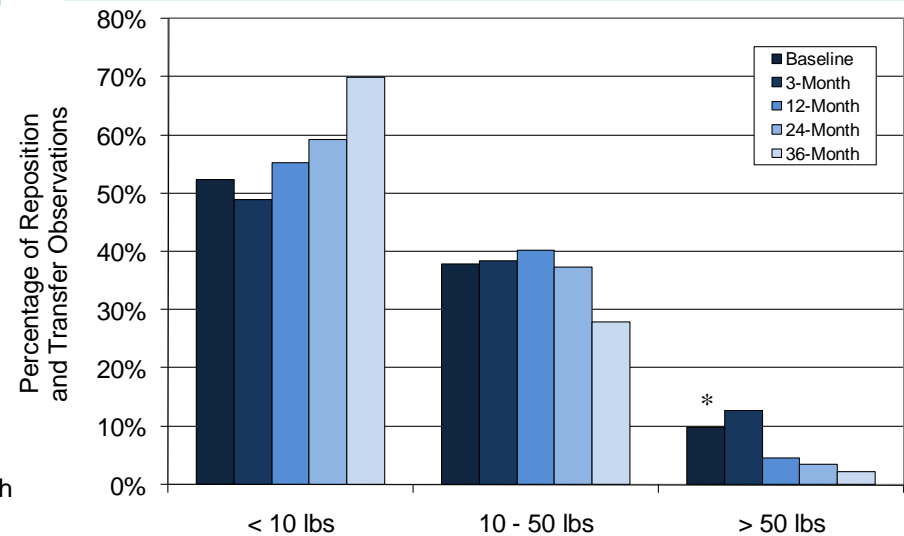
Equipment Use and Weight in Hands, before & after SRHP

(% of investigator observations)

Equipment Use in Resident Handling



Weight in Hands (Reposition/Transfer)



* $p < 0.001$ (Cochran-Armitage Test of Trend)

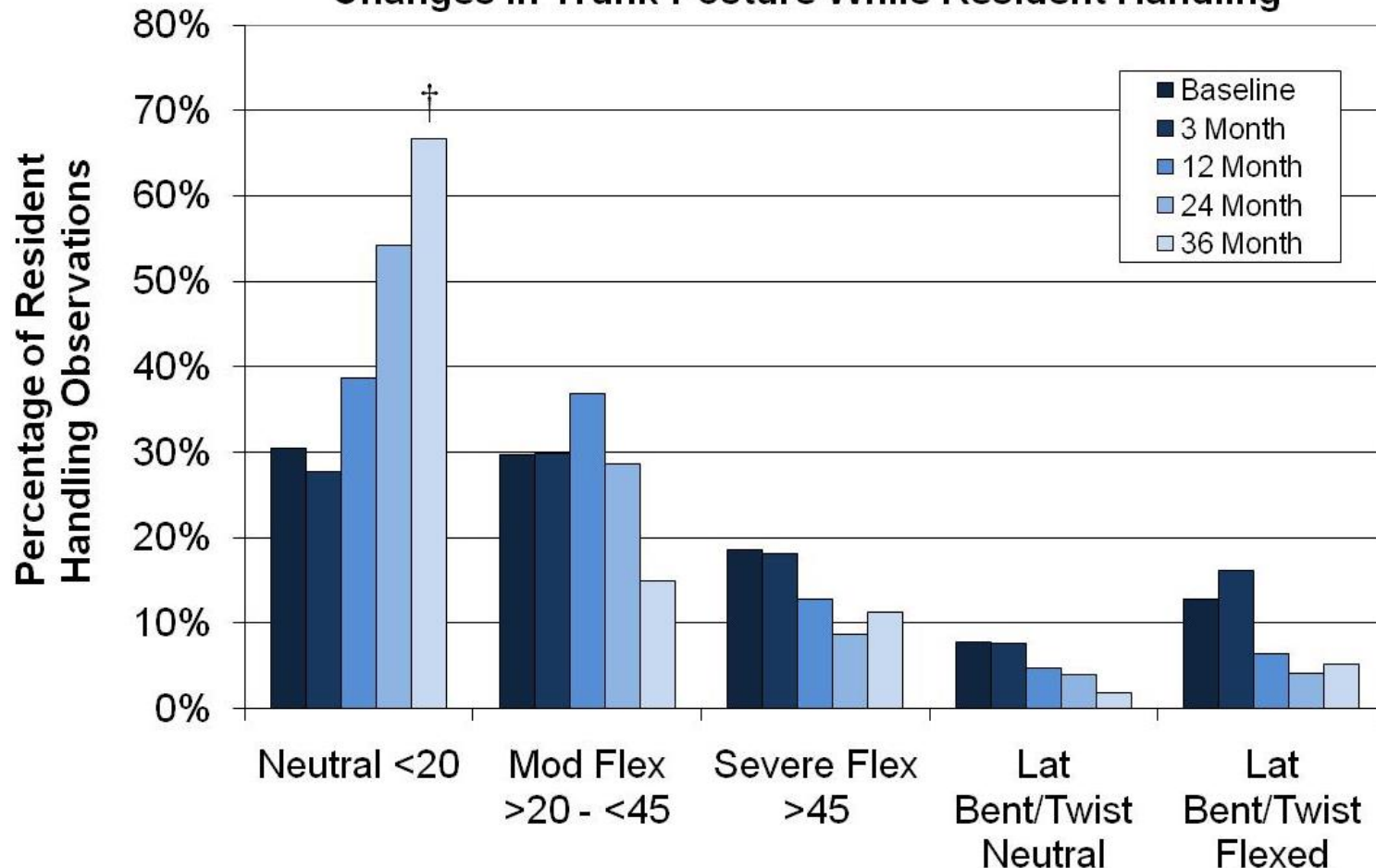
This increasing trend was more pronounced for transfers. Equipment use for repositioning was consistently low.



Kurowski et al. 2012a

Postures before & after SRHP (% of investigator observations)

Changes in Trunk Posture While Resident Handling*

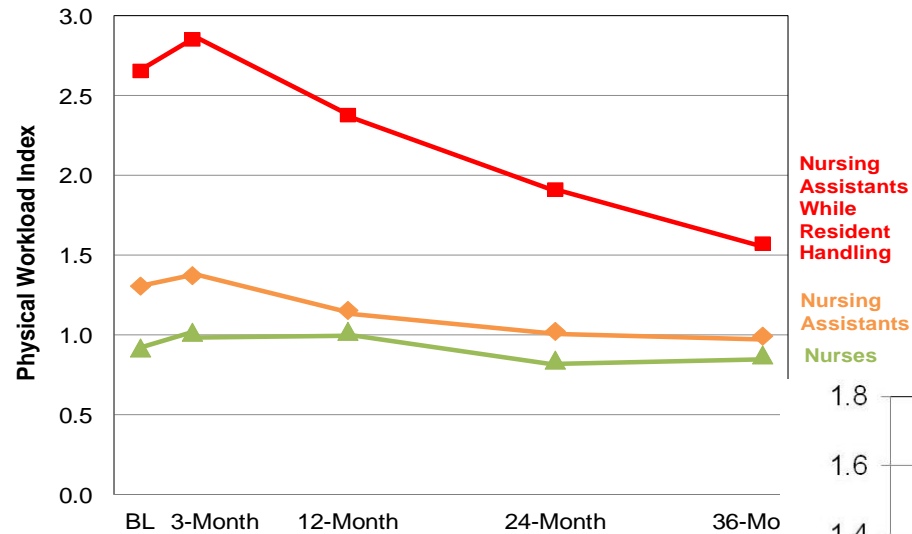


† p < 0.001 (Cochran-Armitage Test of Trend)

Kurowski et al. 2012a

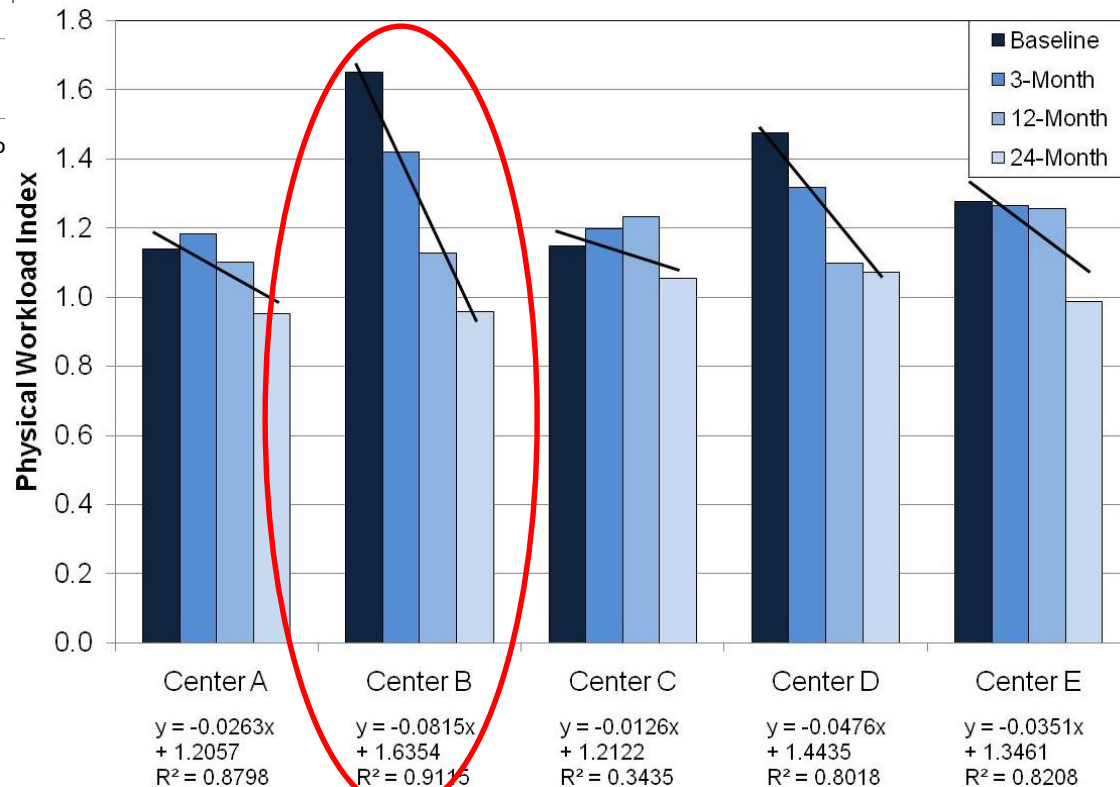


Physical Workload Index



Kurowski et al. 2014

Variability among centers in physical workload index (nursing aides)



Center B (largest decrease in physical workload) had more positive work organizational features: less time pressure, good staff communication, and more access to equipment.

[Kurowski et al. 2012b]



Rates of Injury Claims

Workers' compensation claims before/after SRHP (136 skilled nursing facilities)

- **Clinical staff**
- **Resident handling-related claims**

Before:

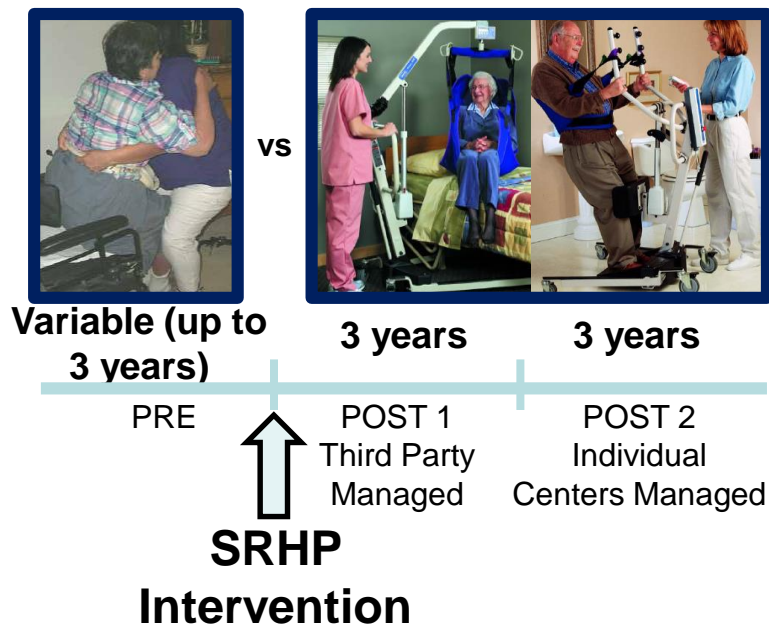
Total injuries (≤ 3 yr) = 2,551
 Total workforce* = 27,429
 FTE-years

Rate: 0.0930

After:

Total injuries (3 yr) = 2,200
 Total workforce* = 34,757
 FTE-yrs

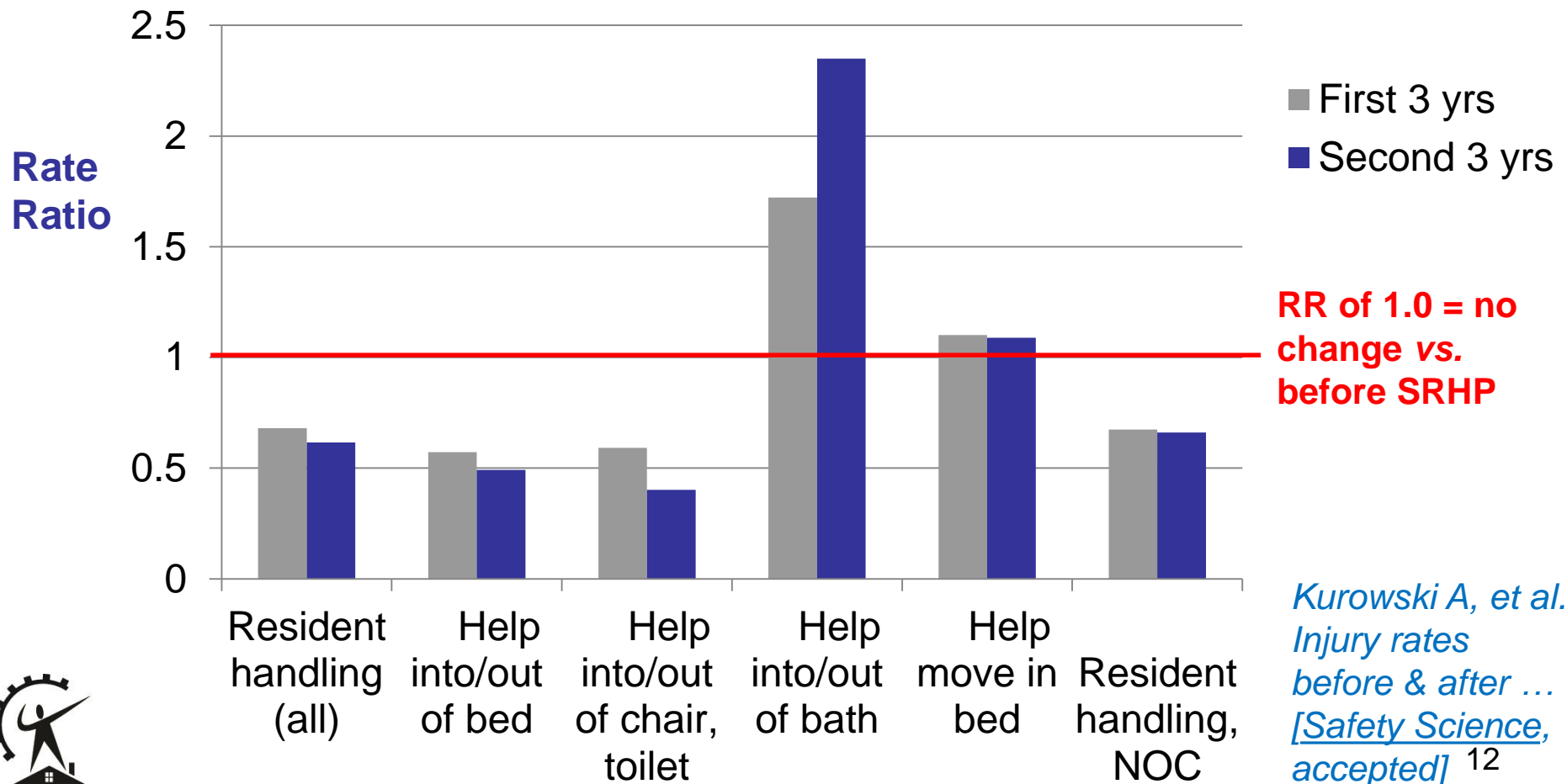
Rate: 0.0633



RR = 0.68 ¹¹

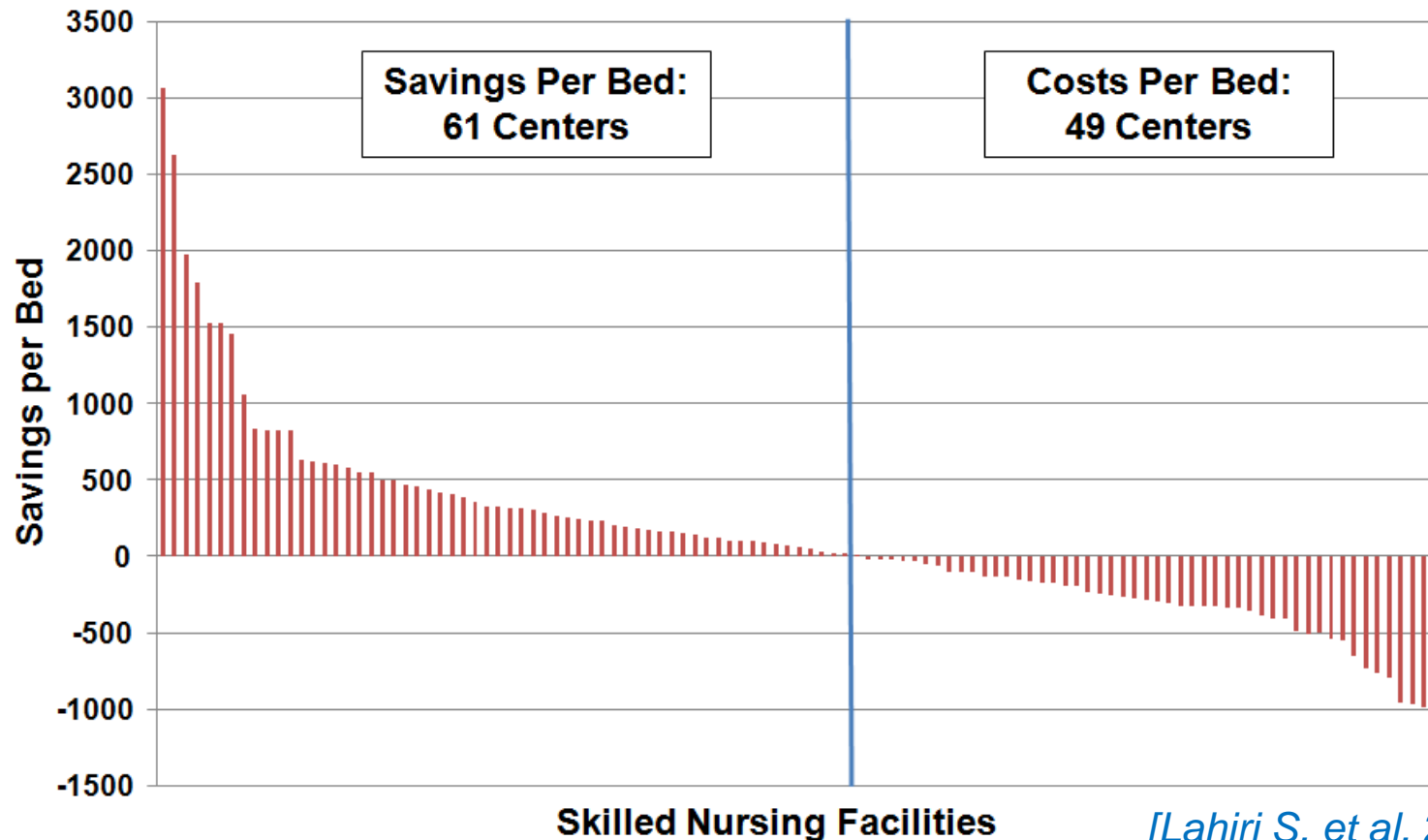


Workers' compensation claims for resident handling incidents (136 SNF's) before/after SRHP implementation



Total annualized net savings = US \$4.584 million
Overall benefit-to-cost ratio ≥ 1.68

Average net savings = \$143 per bed per year



[Lahiri S, et al. 2013. [AJIM](#)]

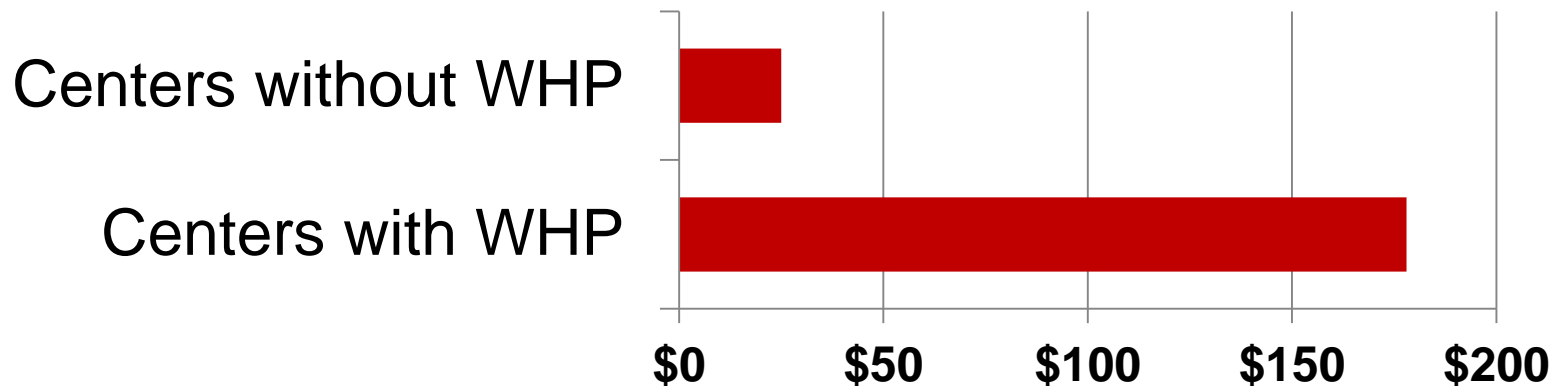


Average net savings per bed, after implementation of Safe Resident Handling Program

Time post intervention:	< 5 years (n = 38)	≥ 5 years (n = 72)
Avoided turnover costs	\$37	\$67
Avoided workers' comp.: Medical	\$124	\$257
Avoided workers' comp.: Indemnity	\$81	\$148
Average net savings per bed	\$83	\$258



Average SRHP net savings & Workplace Health Promotion (WHP)

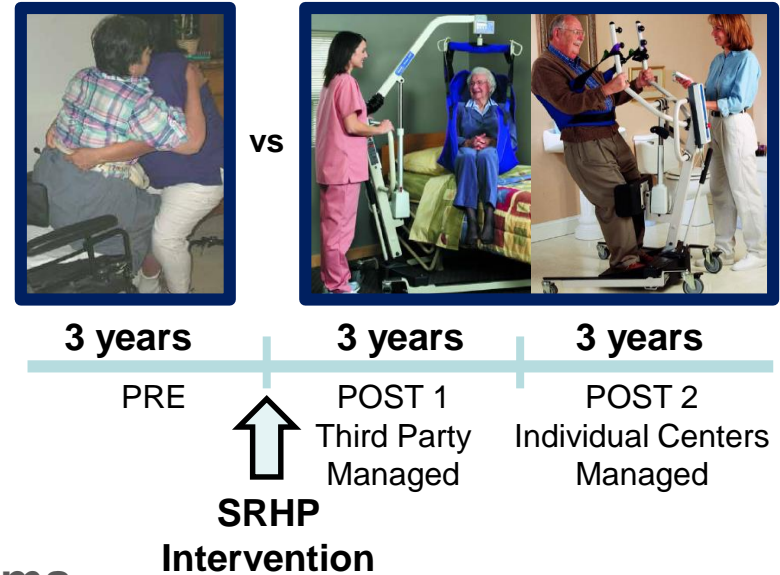


- Minimal evidence of WHP health benefits (similar prevalences of smoking, obesity, etc.)
- Perhaps those centers have other positive organizational features, which led to WHP activities and also more effective SRHP?
 - Better social support; lower intention to leave job

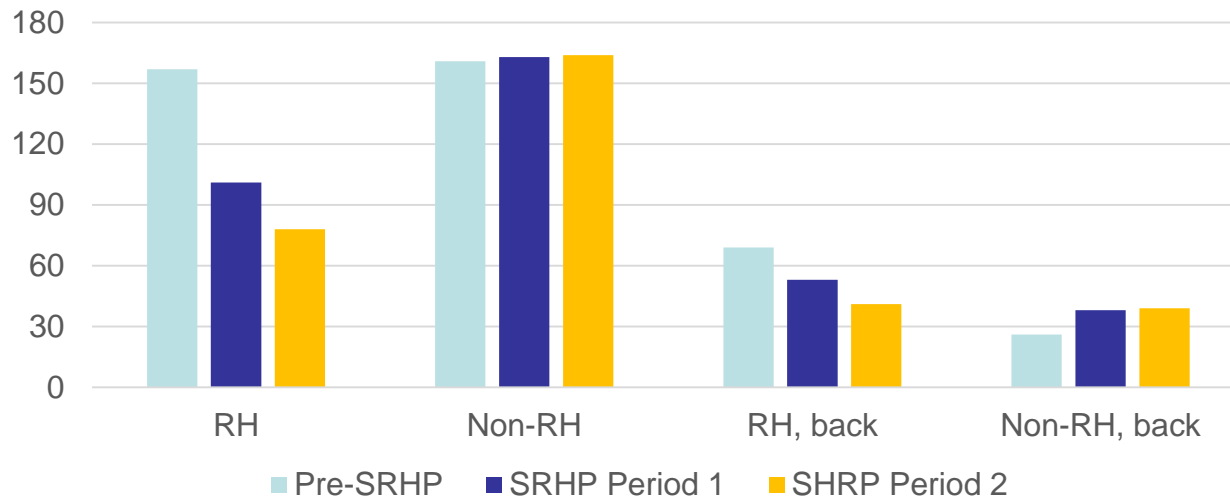


Recurrent injury claims

- Mean costs about 3x higher for claimants with recurrence:
 - Indemnity US\$ 30K vs 9K
 - Medical US\$ 21K vs 6K
- Fewer recurrent RH-related claims after SRHP.



Recurrent Lost-time Claims



Projected Savings

- Assume number of lost-time RH-related claims would have stayed constant over time without SRHP

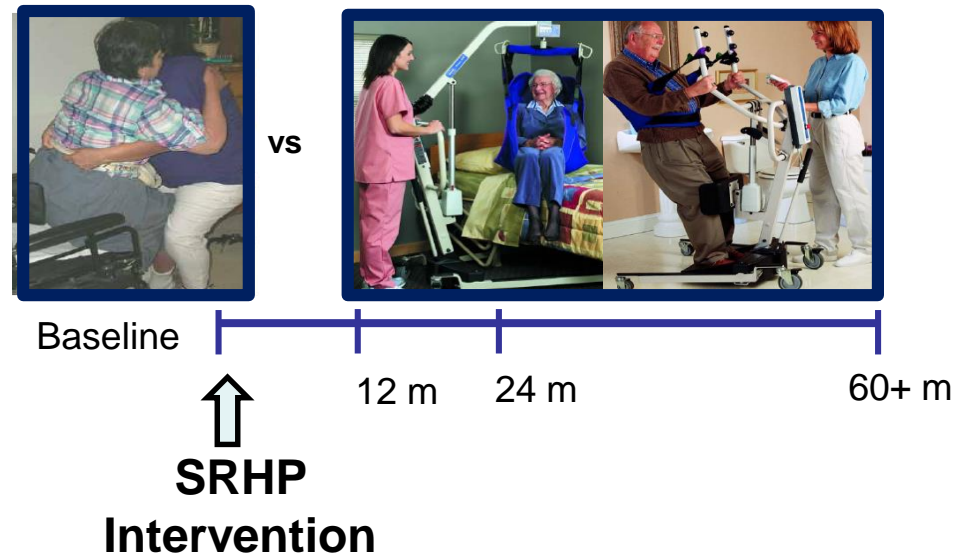
	Over 6 Years		
	"Avoided" Recurrent Claims	"Avoided" Days of Indemnity	"Avoided" Paid Loss
Claimants with RH-related recurrence (n=414)	135	29,177.55	\$3,829,450.50
Claimants with RH-related back recurrence (n=195)	44	10,301.72	\$1,334,340.92

- Avoided paid loss/year
 - All recurrences = \$638,242
 - Back recurrences = \$222,390
- Avoided paid loss/yr/center
 - All recurrences = \$4,693
 - Back recurrences = \$1,635

[Kurowski, Pransky, et al. (under review)] 17



Survey data: a) Use of handling equipment; b) Low back pain



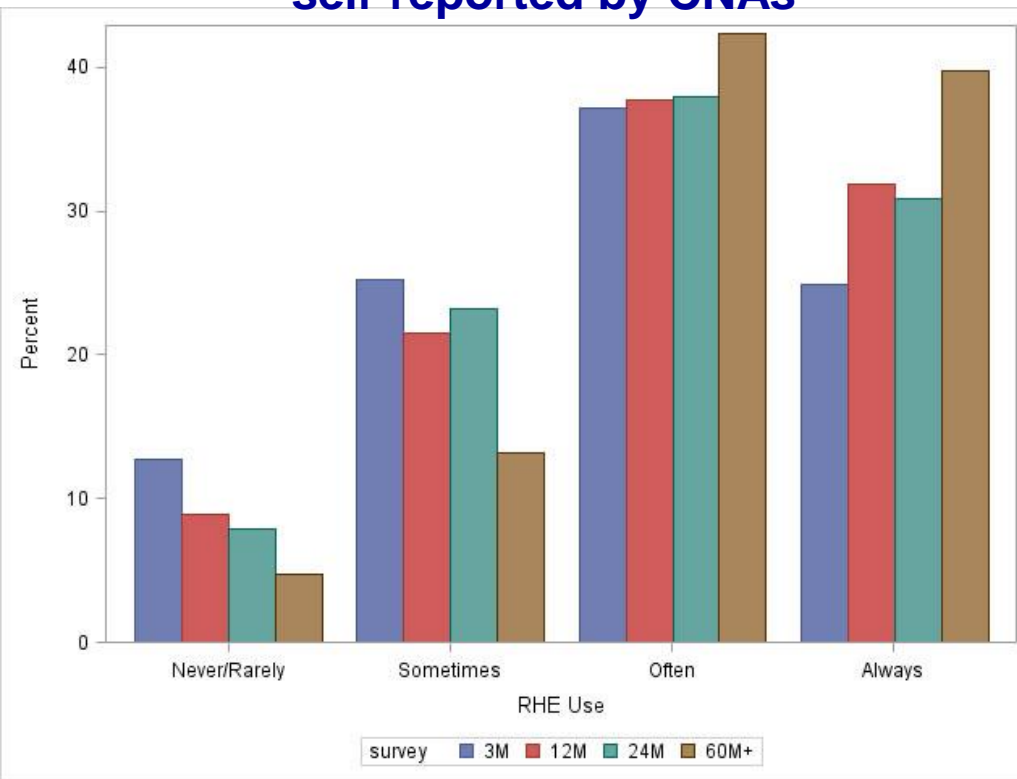
- Series of surveys:

- Self-administered questionnaires distributed and collected at the workplace
- Only clinical workers (about 88% RN's, LPN's, Nursing & Medical Aides) until 5 yrs post-SRHP.



Resident Handling Equipment Use (8 centers: 4 surveys over 5 yrs)

Frequency of RH equipment use, as self-reported by CNAs



GLM regression modeling
Factors related to *higher* use of equipment by individual workers:

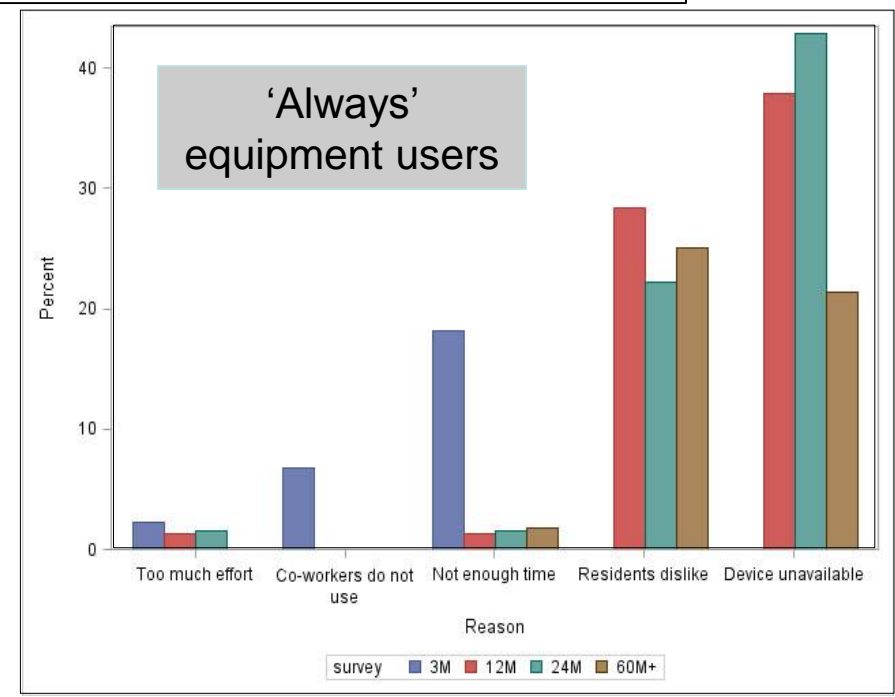
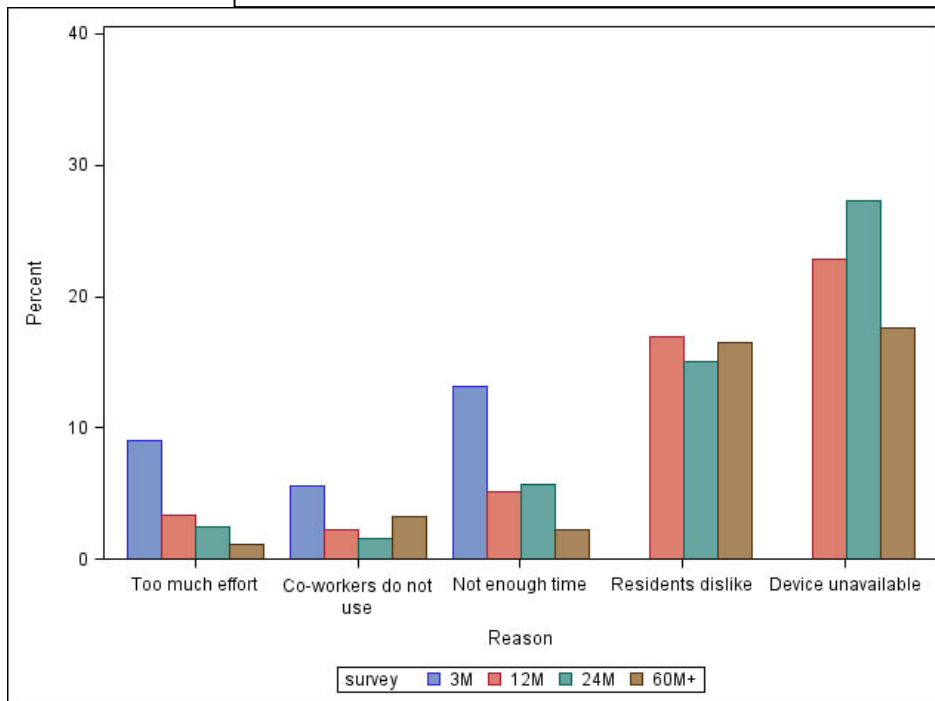
- Prior expectations of SRHP benefits
- Health self-efficacy
- Age
- Perceived institutional commitment to SRHP
- Less frequent workplace assault
- *Lower supervisor support*



Reasons for not using resident handling equipment (CNAs at 8 centers over 5 yrs)

If you don't use a lifting device every time, why not?

- Device unavailable when needed
- Residents dislike them
- Not enough time
- Too much extra effort
- My co-workers don't use them

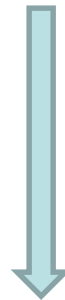


Low Back Pain

“In the past 3 months, have you had musculoskeletal symptoms in the low back?”

- a. Any LBP (yes/no)
- b. At least mild severity during the previous week

	Prevalence	
Survey period	Total eligible	% (n)
Baseline	805	42.7 (344)
12 months	1407	41.0 (577)
24 months	1154	37.4 (431)
60+ months	2409	35.9 (865)



Multivariable robust Poisson regression model of LBP prevalence after 2 yrs (n = 1154)

Covariate	Prevalence ratio	95% CI
Lift usage frequency		
rarely/never	1.0	
always/often/sometimes	0.83 *	0.71-0.96
Composite physical exposure score	1.03 *	1.01-1.05
Psychological job demands	1.10 *	1.03 -1.18
Social support	0.96 *	0.92-9.99
Physical assault in last 3 months		
None	1.0	
1-2 times	1.33 *	1.07-1.65
3 or more times	1.38 *	1.15-1.65



Also adjusted for age, prior back injury, and intensive leisure-time exercise.

Multivariable robust Poisson regression model of LBP cumulative incidence at F5 (n = 225)

Incidence: among those with no LBP in any prior survey.

Covariate	Prevalence ratio	95% CI
Lift usage frequency		
rarely/never	1.0	
always/often/sometimes	0.39 *	0.18-0.84
Work-family balance at F5	1.82 *	1.12 -2.98



Gold JE, et al. [OEM, accepted] Determinants of low back pain in nursing home workers after implementation of a safe resident handling program.

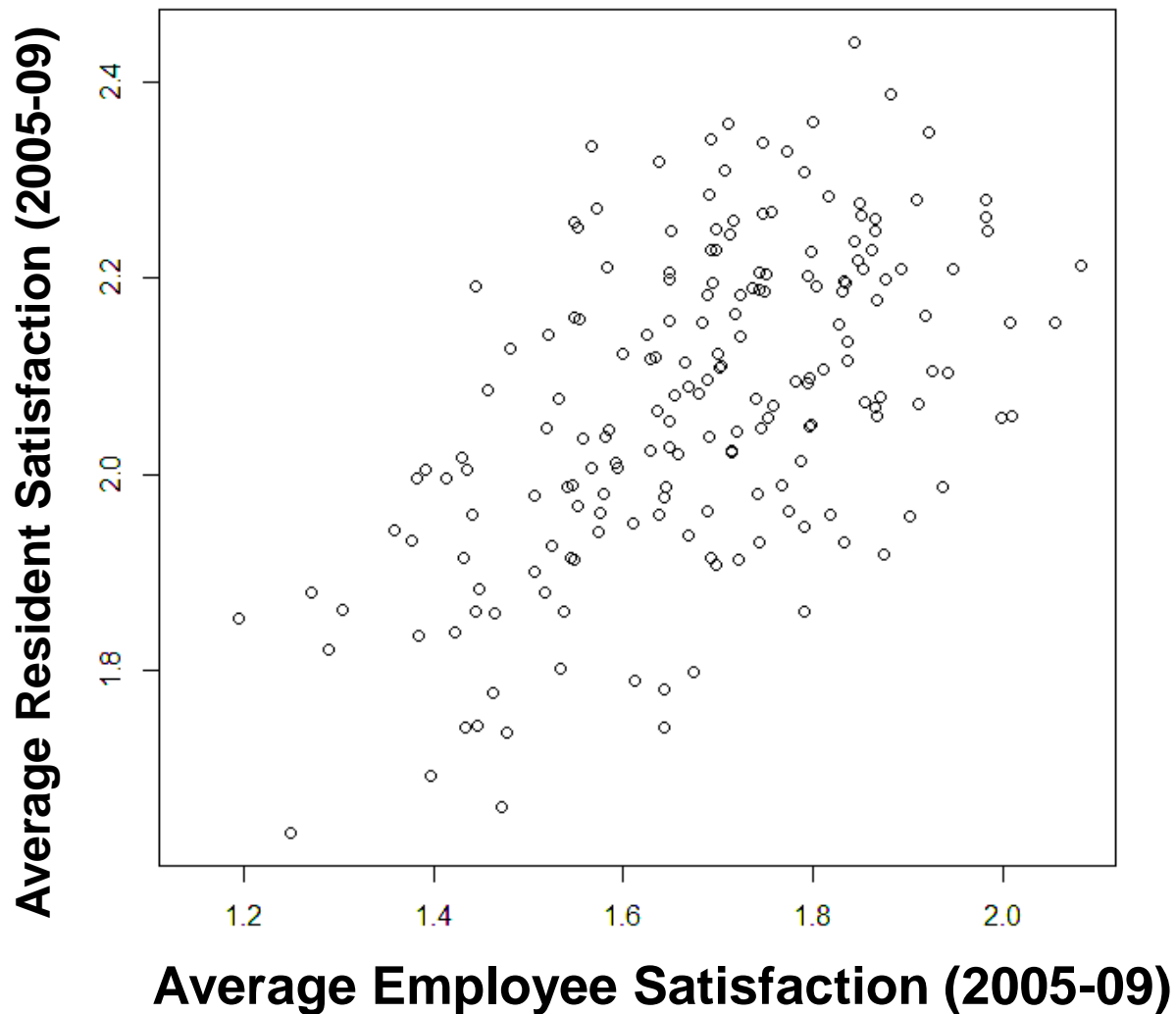


Relationship between experiences of nursing home workers & residents?

- Employee satisfaction: Third-party surveys of all employees (40% aides, 20% nurses)
- Resident satisfaction: Third-party surveys of residents (35%) or their family members (65%)
- Rates of resident falls, pressure ulcers, and unexplained weight loss: Data reported to CMS
- All variables summarized by center (n=194) for each year, 2005-09



Overall employee satisfaction and resident satisfaction, by center



Employee satisfaction and rates of adverse outcomes for residents (combined falls, pressure ulcers, weight loss)

Total Resident Outcomes, 2005-09

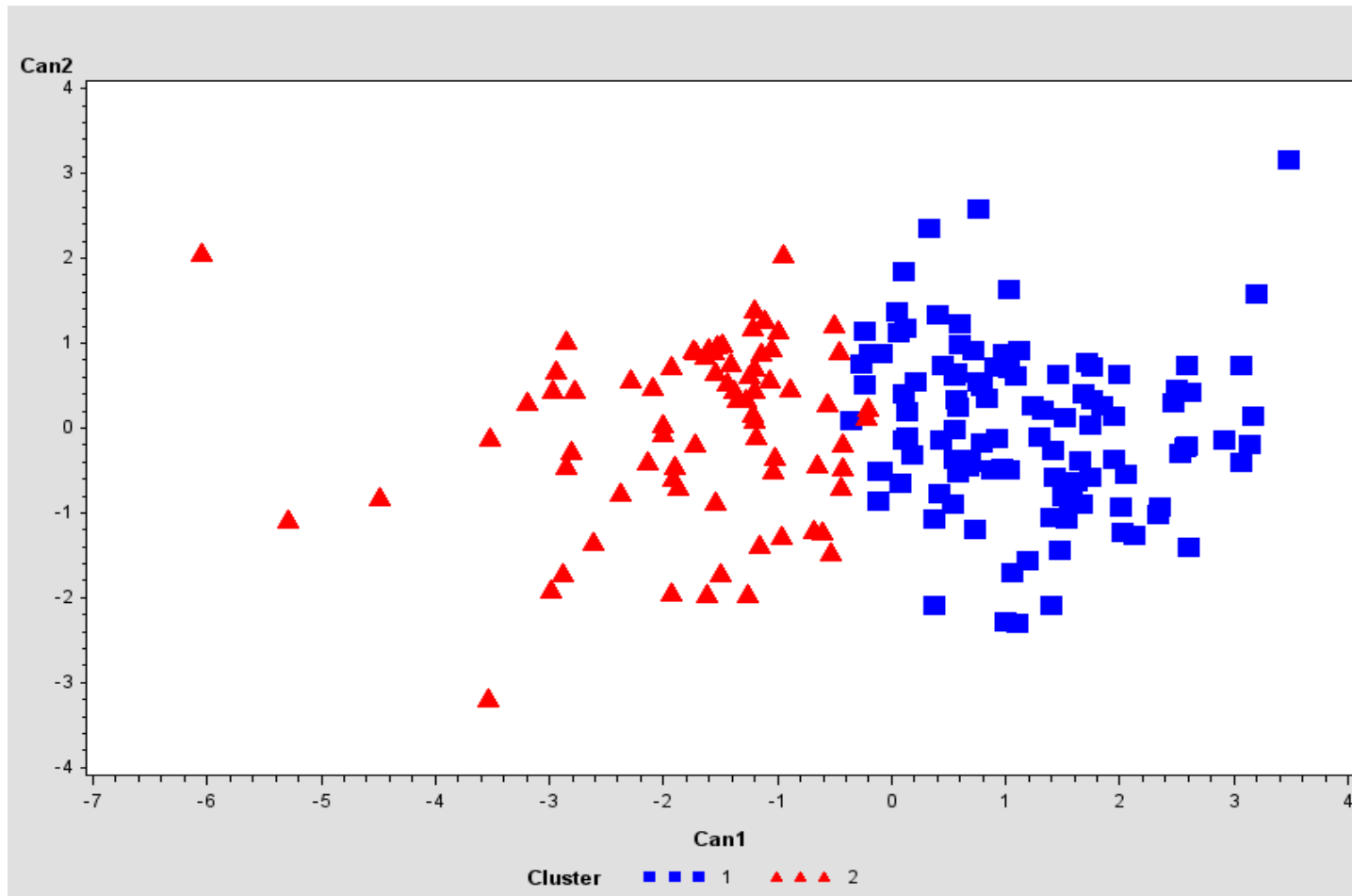
	RR (95% CI)
Mean employee satisfaction score	0.84 (0.83, 0.86)

(Poisson model controlled for: nursing payroll, %Medicare, %Medicaid)



Plaku-Alakbarova B, et al. [under review] Nursing home employee satisfaction and resident quality of care.

Cluster analysis: Canonical scatterplot of 184 skilled nursing facilities (2012 data)



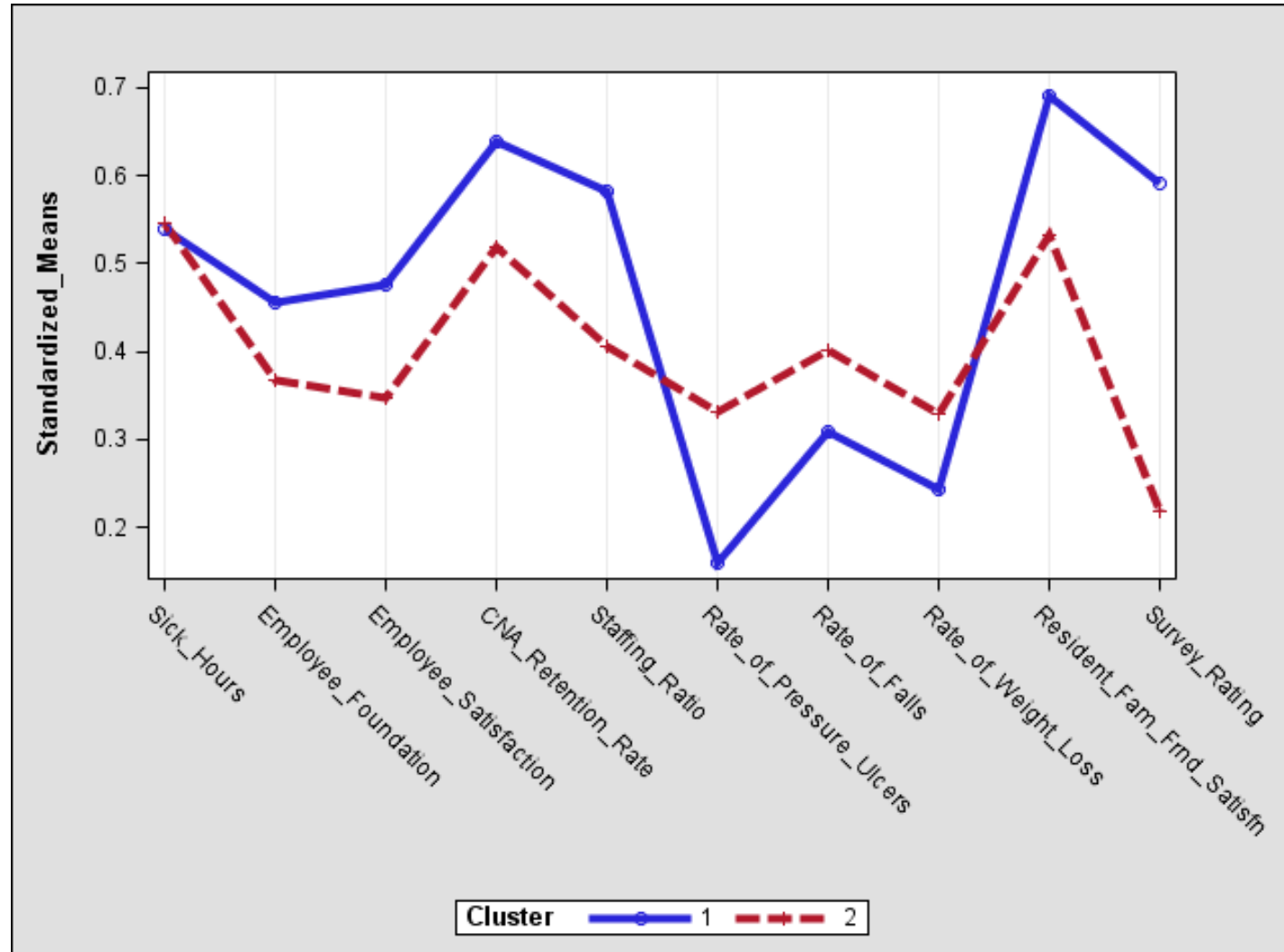
Punnett L, et al. [under review] How does the nursing home work environment affect nursing home residents?



Mean values of 10 standardized variables used to fit skilled nursing facilities into 2 clusters

Cluster 1:

- Higher employee satisfaction and retention
- Higher staffing ratios
- Fewer resident falls, pressure ulcers, or weight loss
- Higher resident satisfaction
- Higher CMS ratings



Other characteristics of 203 SNFs: Post-hoc comparisons of two clusters

	Cluster 1 (n=118) Mean (SD)	Cluster 2 (n=85) Mean (SD)
LPN retention rate *	0.82 (0.17)	0.74 (0.16)
RN retention rate *	0.69 (0.15)	0.57 (0.16)
Workers comp. claim rate	0.13 (0.06)	0.14 (0.08)
SRHP relative change in WC claim rate	0.85 (0.43)	1.13 (1.45) ★
SRHP return on investment *	0.81 (1.24)	0.06 (0.72) ★
CMS Quality Rating*	4.00 (0.90)	3.52 (0.97)
Discharge rate*	0.38 (0.18)	0.32 (0.17)
Unionization (Y/N)	23.7% (27)	13.4% (11)

* p < 0.05



Conclusions: Safe Resident Handling Program Effectiveness (I)

- Resident handling equipment use increased
- Ergonomic exposures decreased:
 - Time in resident handling
 - Weight in hands
 - Non-neutral body postures
 - Composite biomechanical load index
- Compensation claim rates and costs decreased
- Turnover rates in clinical staff decreased
(might not all be attributable to NLP)



Conclusions: Safe Resident Handling Program Effectiveness (II)

Center-level variability in program effectiveness:

- Less time pressure
- Better communication among staff
- Adequacy of supplies & equipment
- Organizational learning? Social support
- Residents' satisfaction with center
- Residents' medical outcomes



Conclusions: Safe Resident Handling Program Effectiveness (III)

- Between-worker variability in LBP
 - *Self-reported equipment use*
 - *Residual physical workload*
 - *Recent assault by resident or visitor*
- Between-worker variability in equipment use
 - *Workplace experiences: Resident assaults; Management commitment to the program*
 - *Personal characteristics: Health self-efficacy; Age*



Room for improvement

- WC claims for “move in bed” increased
 - Few slip sheets and transfer boards observed
- Still not enough equipment/supplies
 - Centers have to purchase replacement devices
- Adequate staffing (time pressure)
- Residents uncomfortable with or afraid of devices
 - Resident/family education
- Assault prevention as an OSH measure



Professional Organizations with SPH Policy Initiatives

- U.S. national organizations that provide detailed guidance for SPH programs
 - Veterans Health Administration
 - American Nurses Association
 - Facilities Guidelines Institute
 - Occupational Safety & Health Administration
 - Association of Occupational Health Professionals in Healthcare (AOHP)



Nurse and Health Care Worker Protection Act of 2015

- Would require OSHA to promulgate a national standard eliminating manual lifting of patients
- Health care employers would be required to implement a comprehensive safe patient handling and mobility program, including
 - Purchase, use, & maintenance of equipment within two years after standard established
 - Train health care workers annually on use of equipment



Overview of U.S. SPH legislative efforts

- Prompted by ANA's "Handle with Care" Campaign (2003), 12 states have enacted SPH laws, regulations, rules or resolutions:
 - CA, HI, IL, MD, MN, MO, NJ, NY, OH, RI, TX, WA
 - 10 states require a comprehensive program in health care facilities:
 - 1) Established policy
 - 2) Guidelines for equipment and training
 - 3) Data collection
 - 4) Evaluation



Massachusetts Hospital Ergonomics Task Force (2012-2014)

- High rates of MSDs in MA hospitals
 - Elevated compared to national rates
- Hospital survey about SPH activities
- 2014 Report, “Moving into the Future: Promoting safe patient handling for worker and patient safety in Massachusetts hospitals”
 - Recommendations to hospitals, DPH, and other stakeholders



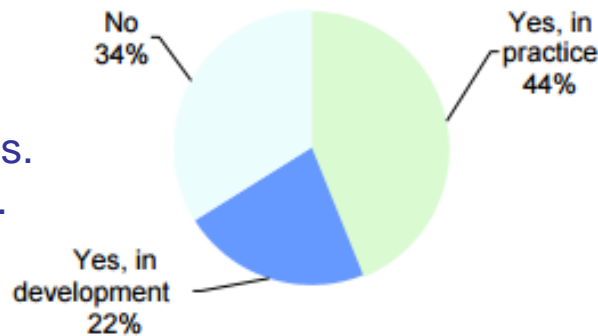
MA Department of Public Health survey of hospitals

- Surveys mailed to occupational health staff of the 98 MDPH licensed hospitals (April 2012)
 - 88/98 hospitals completed (90%)
- Goals:
 - Understand policy & practice in MA hospitals
 - Identify program components in place
 - Identify barriers to SPH implementation



Overview of Findings (1)

Figure 6-1: Percentage of hospitals with written SPH policies (n=85)



Among these 34% (29 hospitals), 13 had PH committees. But 16 had neither.

Department involved in the evaluation of patient lifting devices prior to purchase (n=88)³

Department	n	%
Front line nursing staff	74	84
Materials Management	59	67
Other direct patient care staff	59	67
Other	48	55

¹Excludes missing observation(s)

²Excludes "Not applicable" responses

³Respondents were asked to select all applicable responses; therefore, percentages may not add to 100

Table 6-9. Assessment of events relating to patient handling (n=87)¹

	n	%
Patient handling event assessment for patients		
Always	85	98
Sometimes	2	2
Patient handling event assessment for providers		
Always	76	87
Sometimes	10	12
Rarely	1	1

¹Excludes missing observation(s)



Overview of Findings (2)

Table 6-4. Safe patient handling policy components (n=35)¹

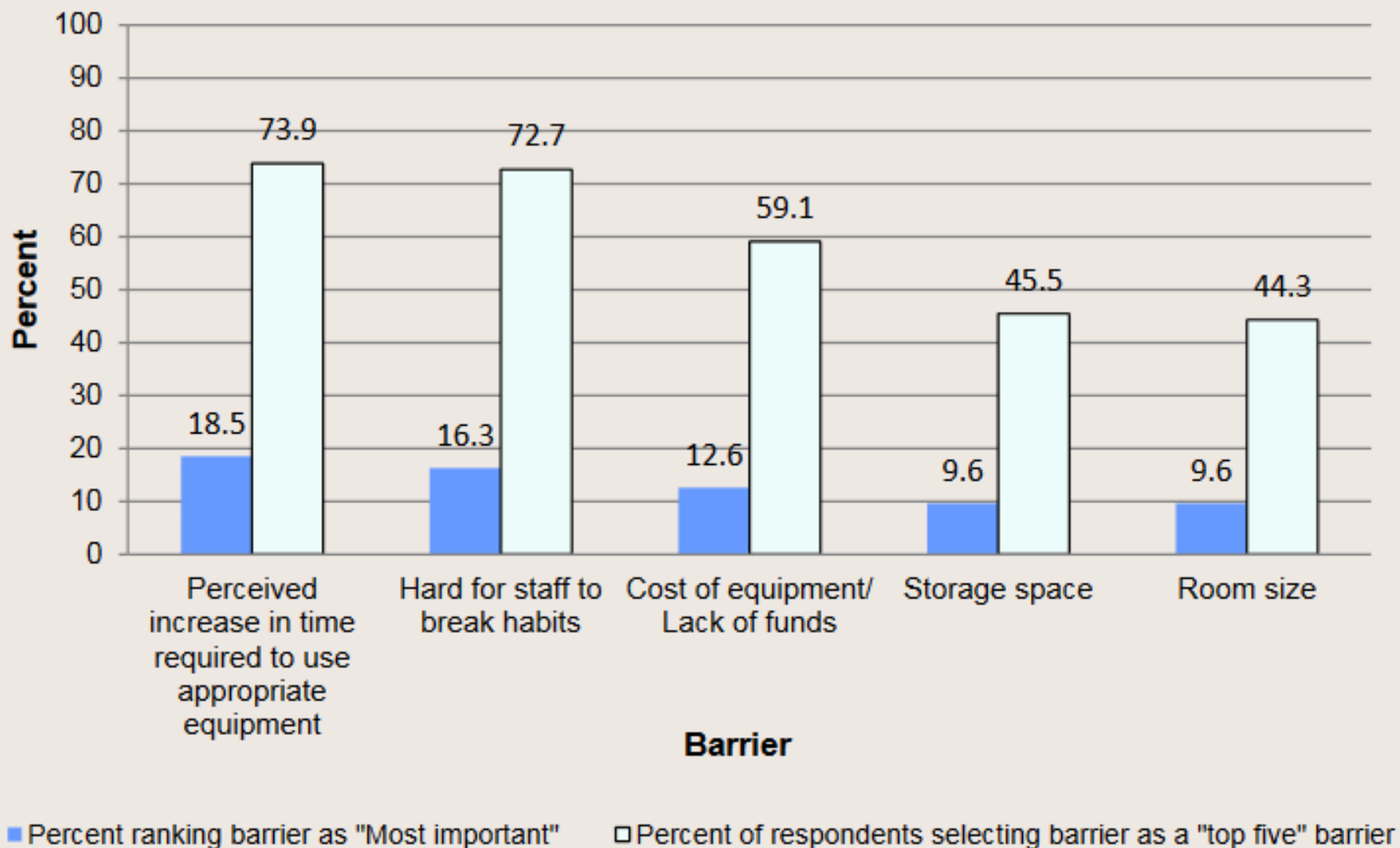
	n	%
Clinical Practice		
Assessment of patient functional mobility and transfer needs	30	86
Guidelines for selecting the appropriate patient handling method	26	74
★ Patient skin integrity/ prevention of breakdown	12	34
Prevention of patient falls	23	66
Equipment		
Accessibility, maintenance, and replacement of lifting equipment	22	63
Injury surveillance		
★ Reporting of injuries that are related to patient handling	22	63
★ Reporting of near misses or incidents without injury that are related to patient handling	15	43

	n	%
Training		
Training of employees on the use of lifting equipment	27	77
Training in assessment of patient mobility and transfer needs	23	66
★ Patient and family education	17	49
Other		
Compliance of employees with policy requirements	21	60
★ Special provisions for employees under the age of 18	3	9

¹Limited to hospitals with written SPH policies and excludes missing observation(s)



Figure 6-2. Top five barriers to addressing SPH in MA hospitals as perceived by respondents (N=88)¹



¹ Several hospitals tied multiple barriers as "most important"

MA Hospital Ergonomics Task Force Recommendations

To hospitals:

1. Implement comprehensive & sustainable SPH programs
2. Design injury surveillance systems to distinguish PH-incidents
3. Document a mechanism for communicating concerns about patient handling tasks that expose a patient or worker to risk of injury
4. Incorporate infrastructure needs for SPH into design & planning phases of new construction or renovation



MA Hospital Ergonomics Task Force Recommendations

To other stakeholders:

1. Organizations providing risk management services to hospitals should assist in developing/maintaining SPH programs
2. Training programs for direct care workers should include SPH education and training
3. Professionals involved in designing health care facilities should receive training on requirements for SPH to incorporate into building design



MA Hospital Ergonomics Task Force Recommendations

To DPH:

1. Produce annual report on PH-related MSDs
2. Maintain website with useful resources on SPH
3. Advise hospitals regarding data collection/analysis on PH incidents
4. Incorporate FGI 'patient handling & movement assessment' in design for construction/renovation
5. Issue guidance to promote hospital implementation of comprehensive SPH programs
6. Establish coalition of SPH stakeholders
7. Periodic stakeholder meetings to share information



Selected Publications

1. Kurowski A, et al. [2012] Changes in ergonomic exposures of nursing assistants after the introduction of a no-lift program in nursing homes. Internat J Industr Ergonomics 42:525-32.
2. Kurowski A, et al. [2012] Differences among nursing homes in outcomes of a safe resident handling program. J Healthcare Risk Management 32(1):35-51.
3. Kurowski A, et al. [2014] A physical workload index to evaluate a safe resident handling program for clinical staff in nursing homes. Human Factors 56(4):669-83.
4. Kurowski A, et al. [2016] Use of resident handling equipment by nursing aides in long-term care: Associations with work organization and individual level characteristics. Amer J Safe Patient Handling Movement 6(1): 16-24.
5. Lahiri S, et al. [2013] An economic analysis of a safe resident handling program in nursing homes. Amer J Industr Med 56(4): 469–78.
6. Miranda H, et al. [2014] Musculoskeletal pain and reported workplace assault: A prospective study of clinical staff in nursing homes. Human Factors 56(1):215-27.





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CPH-NEW primary website:

www.uml.edu/centers/CPH-NEW

CPH-NEW website at Univ. Conn.:

www.oehc.uchc.edu/healthywork/index.asp

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Health Care Worker (HCW) Safety and Patient Safety

- Patients (& residents) and employees occupy a common environment, with common hazards.
- Patients affect employees' health
- Employees affect patients' health

Patients and HCWs are both part of the same health care system. The environment of care and the environment of work are the same.

- Dr. Andrew Vaughn, Mayo Clinic



Worker Perceptions of SRH Pgm (1)

- Program Commitment:
 - Workers support each other to use devices
 - Employee suggestions are supported by management
 - I alert other employees when they place themselves at risk during a patient lift
 - Supervisor ensures that employees have what they need to be safe

Scale range = 1-4



Worker Perceptions of SRH Pgm (3)

- Prior Expectations:
 - If lifting devices were used with every patient lift, the risk of getting injured would be very low
 - I think that the Injury Reduction Program will help me and my co-workers avoid injuries

Scale range = 1-4

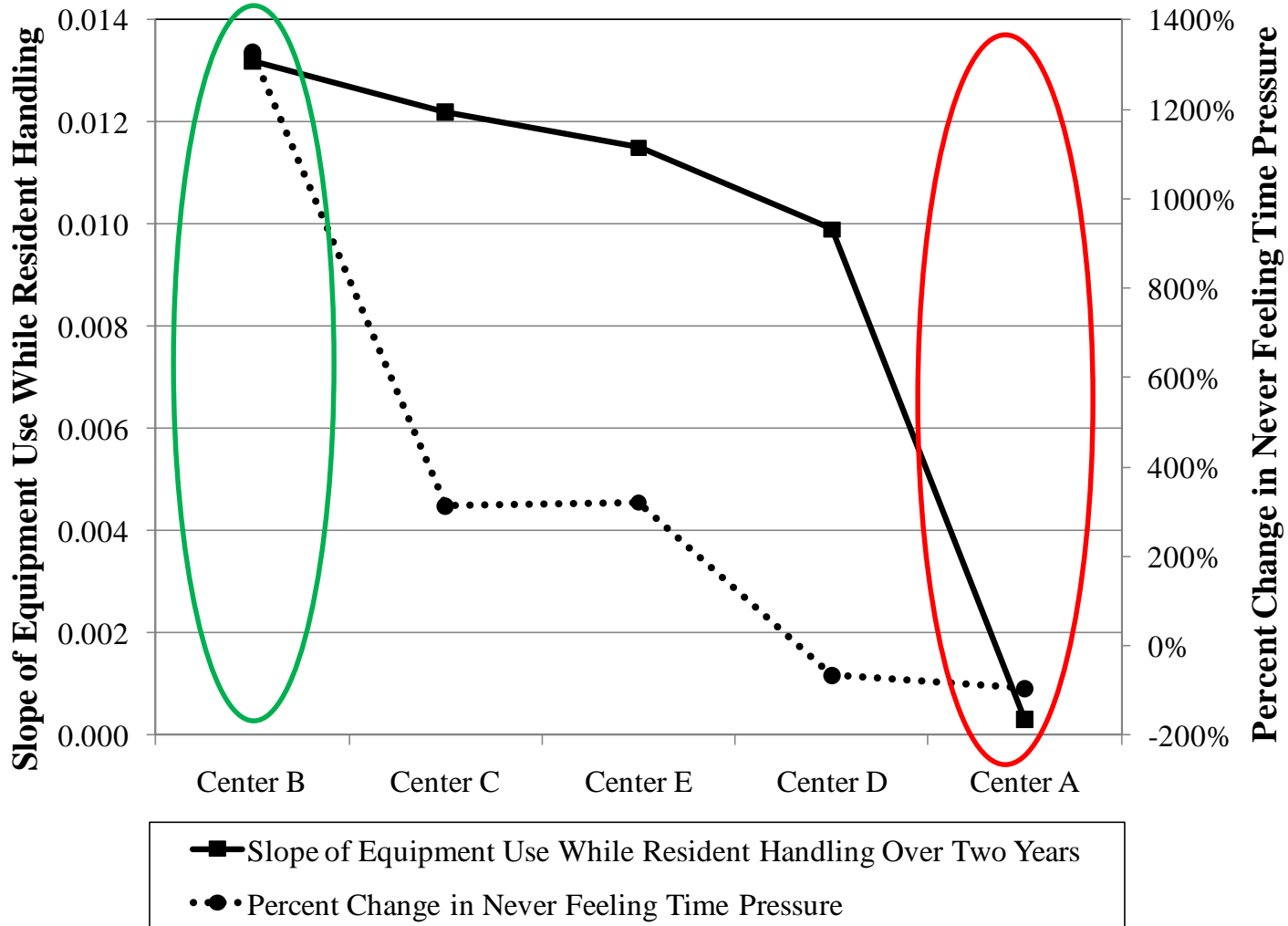


SRHP Effectiveness (cont'd)

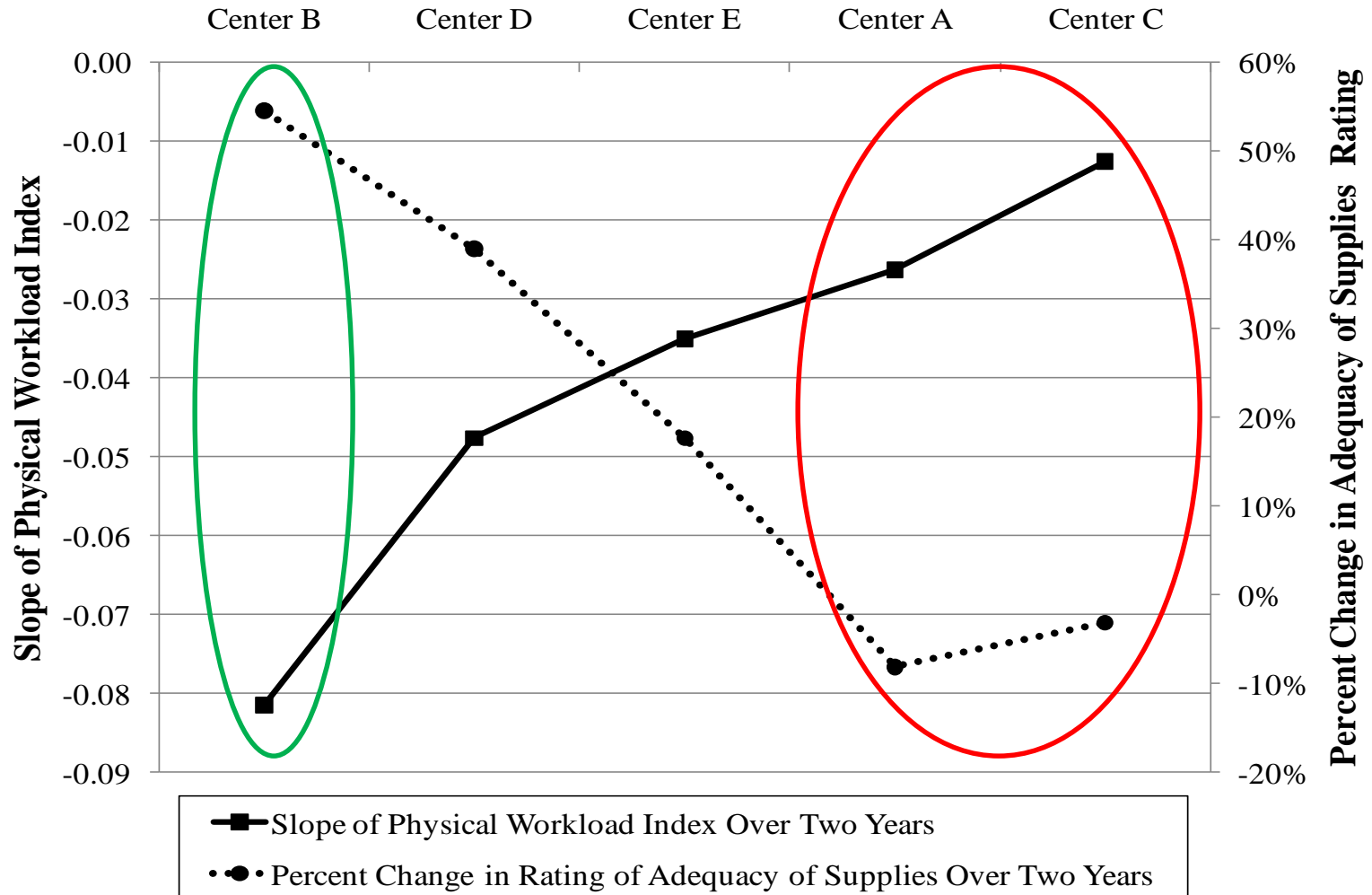
- Variability among centers
 - Is effectiveness associated with prior lift device usage, center size, workforce ethnicity, unionization, staff or administrator turnover rates, resident acuity or proportion on Medicare, etc.?
- ~~Variability among individuals~~
 - ~~Is lift usage associated with work environment features: time pressure, psychosocial strain (demands/control), supervisor/ co-worker support, etc.?~~
 - ~~Is lift usage associated with individual characteristics: seniority, perceptions of risk, internal health locus of control, self-efficacy, etc.?~~



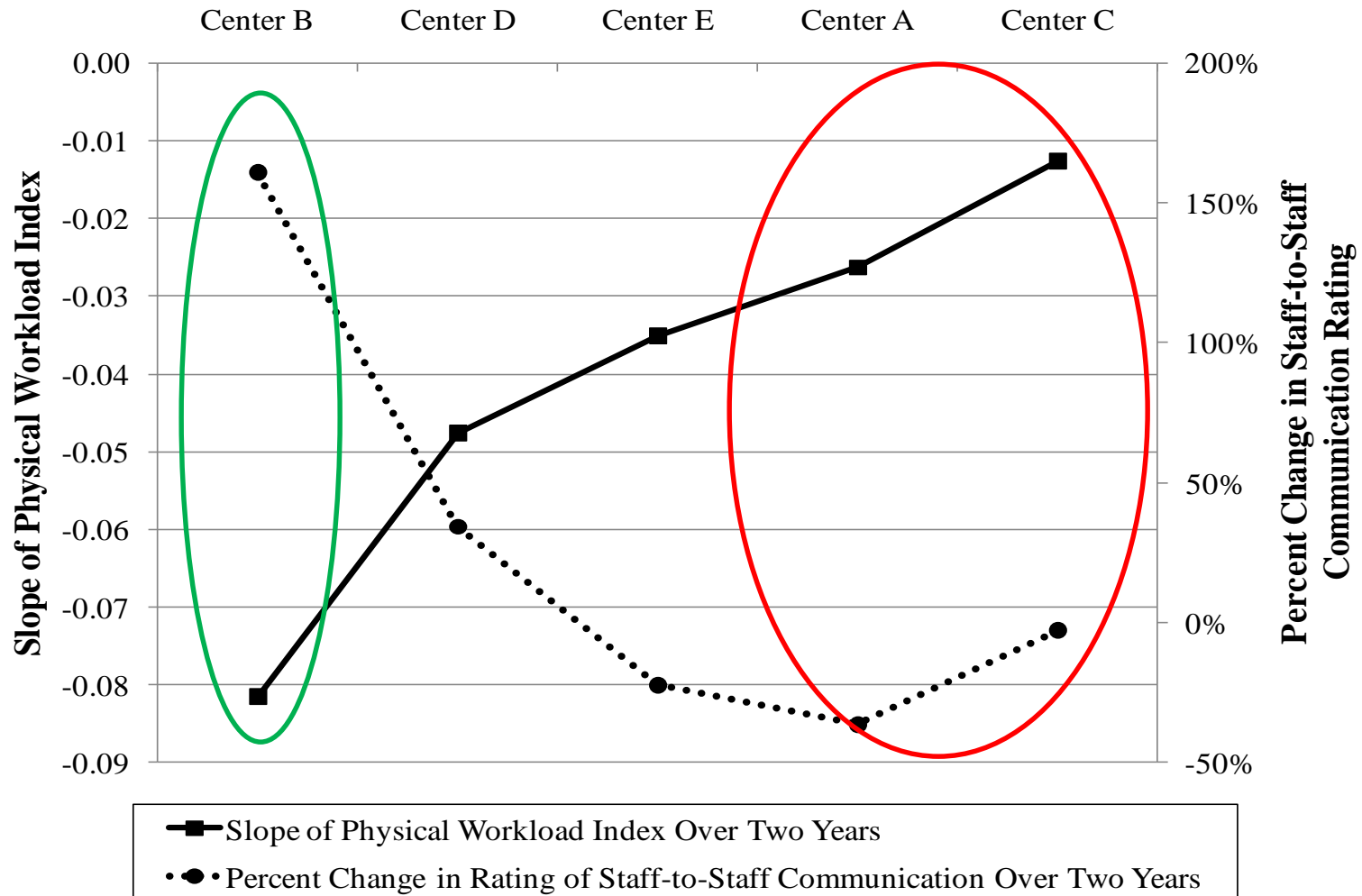
Observed Device Use in Resident Handling (change over time) vs. Perceived Time Pressure



Physical Workload Index (change over time) vs. Adequacy of Supplies and Equipment



Physical Workload Index (change over time) vs. Perceived Staff-to-Staff Communication



Ratio of compensation claim rates before/after SRHP implementation: All claims all employees

