



Penn Medicine
Lancaster General Health

Nursing Research

GENERATING EVIDENCE TO SUPPORT PRACTICE

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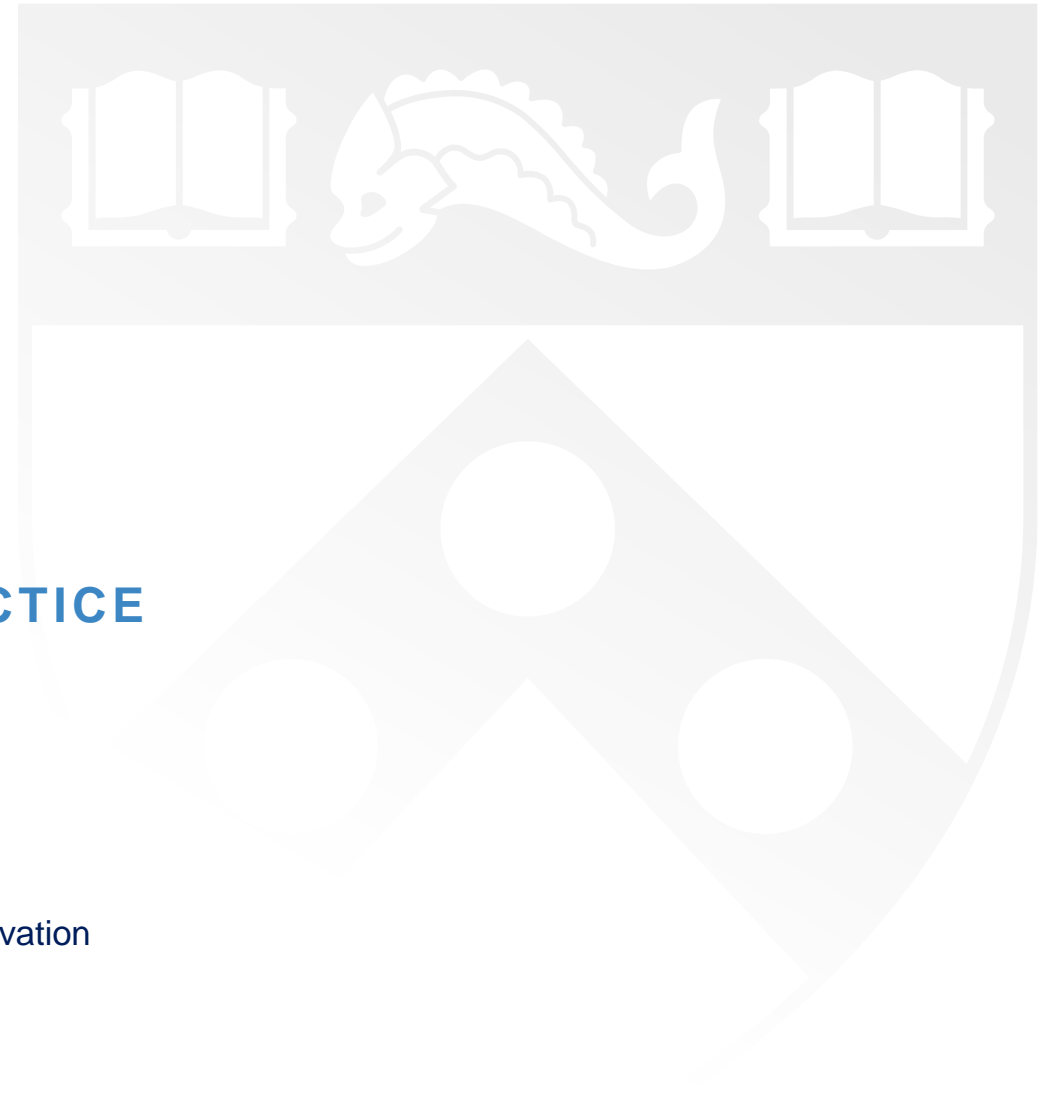
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Conflict of Interest & Financial Disclosure

I have nothing to disclose and no conflict of interest to report.

Objectives

- Define nursing research
- Discuss how nursing research has an impact on patient and healthcare provider outcomes
- Describe how nursing research results can be applied to daily practice

What is Nursing & Nursing Research?

Nursing integrates the art and science of caring and focuses on the protection, promotion, and optimization of health and human functioning; prevention of illness and injury; facilitation of healing; and alleviation of suffering through compassionate presence. Nursing is the diagnosis and treatment of human responses and advocacy in the care of individuals, families, groups, communities, and populations in recognition of the connection of all humanity.

ANA (2021). *Nursing: Scope and Standards of Practice, Fourth Edition*, p. 1. <https://www.nursingworld.org/practice-policy/nursing-excellence/ethics/code-of-ethics-for-nurses/>

Nursing research is systematic inquiry designed to generate evidence about issues of importance to the nursing profession, including nursing practice, education, administration, and informatics.

Polit, D. E. & Beck, C. T. (2021). *Nursing Research, 11th ed.* Wolters Kluwer.

Nursing Research Facts & Figures

- Florence Nightingale (1820-1910)
- National Institute of Nursing Research/National Institutes of Health (1993)
 - Research lenses – health equity, SDOH, population & community health, systems and models of care, prevention & health promotion
- University of Pennsylvania School of Nursing
 - Highly ranked in education and research
- Penn Medicine/UPHS
 - 7 entities with at least 1 PhD-trained nurse scientist embedded at each entity

Teamwork & Patient Outcomes in ICUs

Wheelan, S., Burchill, C. N., & Tilin, F. The link between teamwork and patient outcomes in intensive care units. *American Journal of Critical Care*, 2003, 12 (6), 527-534

- Aim: Examine associations between ICU staff members' perceptions of group development level (amount of teamwork) and APACHE III standardized mortality ratio (SMR)
- Research design: Descriptive correlational with cross-sectional survey
- Setting: ICUs in hospitals that agreed to participate in the study
- Sample: Convenience sample of physicians, registered nurses, nursing assistants, unit clerks
- Instruments: Group Development Questionnaire™ (GDQ), demographic survey; APACHE III Standardized Mortality Ratio (SMR)
- Analysis: Correlations between GDQ developmental stage
 - SMR ICU groupings of high SMR, mid-range SMR, and low SMR

Scales in the GDQ

Stage	Stage of Group Development
1	Dependency/Inclusion
2	Counter-dependency/Fight
3	Trust/Structure
4	Work/Productivity

Teamwork & Patient Outcomes in ICUs

9 participating hospitals (1 rural, 5 community, 3 urban) from 4 states on the east coast, 17 ICUs, 5 teaching hospitals

Characteristic (n=394)	N(%)
Registered Nurse Role	287(75)
Female Sex	308(79)
30-39 Age Group	152(38)
White, Non-Hispanic Race/Ethnicity	284(72)
Predominant Shift Days	250(65)
	Mean
Years in Profession	24
Years in ICU	12

Teamwork & Patient Outcomes in ICUs

GROUP LEVEL ANALYSIS

Table 5 Intercorrelations for number of respondents, standardized mortality ratio (SMR), and developmental stage

Variable	Respondents	SMR	Stage
Respondents	1.00	0.164	0.246
SMR	0.164	1.00	-0.662*
Stage	0.246	-0.662*	1.00

* $P = .01$.

Teamwork & Patient Outcomes in ICUs

9 participating hospitals (1 rural, 5 community, 3 urban) from 4 states on the east coast, 17 ICU, 5 teaching hospitals

Performance	SMR Range	SMR Mean	Development Stage Range	Development Stage Mean
Low SMR (High Performing)	0.134-0.619	0.32	2-3	2.7
Mid-range SMR (Mid-range Performing)	0.66-0.81	0.72	2-3	2.4
High SMR (Low Performing)	0.88-1.40	1.10	1-2	1.7

Teamwork & Patient Outcomes in ICUs

INDIVIDUAL LEVEL ANALYSIS

Table 7 Analysis of variance for standardized mortality ratio (SMR) and stage of development in low-SMR/high-performing vs middle-SMR/middle-performing vs high-SMR/low-performing intensive care units

Variable	Sum of squares	df	Mean square	F	P
Stage					
Between groups	3.192	2	1.596	5.779	.015
Within groups	3.867	14	0.276		
Total	7.059	16			
SMR					
Between groups	1.661	2	0.831	23.821	.001
Within groups	0.488	14	3.487 x 10 ⁻²		
Total	2.149	16			

Teamwork & ED Patient Outcome

Kipnis, A., Rhodes, K., Burchill, C. N., & Datner, E. The relationship between patients' perceptions of team effectiveness and their care experience in the emergency department. *Journal of Emergency Medicine*, 2013, 45(5), 731-8. doi: 10.1016/j.jemermed.2012.11.052

- Aim: Characterize the effectiveness of the ED's teamwork from the patients' perspectives and to explore the association with satisfaction with care, confidence in providers, and likelihood to follow treatment recommendations
- Research design: Descriptive correlational with cross-sectional survey
- Setting: One Philadelphia ED
- Sample: Convenience sample of those capable of completing survey
- Instruments: 4 items derived from the Group Development Questionnaire™ (GDQ) that are the hallmarks of high performing groups (role clarity, goal clarity, joy at work, job satisfaction); demographic survey; care experience survey (overall satisfaction, satisfaction with pain treatment, care team inspires trust, likelihood to follow treatment recommendations)
- Analysis: Multivariate regression models

Teamwork & ED Patient Outcome

1,600 surveys distributed; 1,010 returned; 900 with completed survey responses for teamwork and care experience

Table 1. Characteristics of Survey Participants and All ED Patients

Category	Survey*		All ED Patients†	
	n	Percent	n	Percent
Age (mean)	780	43.6%	25,253	38.4%
Gender				
Female	501	60%	14,524	58%
Male	329	40%	10,729	42%
Primary language				
English	763	94%	24,427	97%
Spanish	12	1%	144	1%
Other	33	4%	682	3%
Race				
Asian	25	3%	621	2%
African-American	462	59%	15,809	63%
White	256	33%	7,072	28%
Multi-racial	24	3%		
Other	18	2%	1,869	4%
Marital status				
Single	364	47%	16,917	67%
Married	267	35%	5,872	23%
Separated	35	5%	488	2%
Divorced	59	8%	979	4%
Widowed	45	6%	797	3%

* Unknown category has been removed for comparability with full Emergency Department (ED) data.

† All ED patients between 8:00 a.m. and 6:00 p.m. between August 8, 2011 and December 3, 2011.

Teamwork & ED Patient Outcome

Table 4. Relationship between Teamwork Rating and Care Experience Outcome

Care Experience Outcome	% High Response on Teamwork Measure			Adjusted* Risk Ratio (High vs. Low Rating of Teamwork) (95% CI)
	Low	Medium	High	
Overall satisfaction	20%	53%	81%	4.06 (2.78–5.94)
Satisfaction with pain treatment	20%	54%	78%	3.92 (2.66–5.79)
Providers inspire confidence and trust	17%	59%	90%	5.25 (3.55–7.77)
Likely to follow-up	43%	78%	88%	1.95 (1.50–2.54)

CI = confidence interval.

* Adjusted for age, gender, race, and education.

Emergency Nurses Knowledge, Attitudes, and Practices (KAP) Related to Blood Sample Hemolysis Prevention

Burchill, C. N., Seballos, S. S., Reineks, E. Z., & Phelan, M. P. Emergency nurses' knowledge, attitudes, and practices related to blood sample hemolysis prevention: An exploratory descriptive study. *Journal of Emergency Nursing*, 2021, 47(4), 590-598. doi: 10.106/j.jen.2020.12.015

- Aim: (1) Describe emergency nurses' knowledge, attitudes, and practices (KAP) related to blood sample hemolysis prevention; (2) Explore associations between nurse demographic characteristics and KAP related to blood sample hemolysis prevention
- Research design: Exploratory descriptive correlational with cross-sectional survey
- Setting: Emergency Nurses Association
- Sample: Convenience sample of those capable of completing survey
- Instruments: 3 multiple choice knowledge items, a series of 5 attitude items each answered on a 1 (totally disagree) to 5 (totally agree) Likert scale, 7 multiple choice practice items, and 8 personal and departmental demographic items
- Analysis: Correlational analyses with Bonferroni correction for multiple analyses

Emergency Nurses Knowledge, Attitudes, and Practices (KAP) Related to Blood Sample Hemolysis Prevention

Distributed to 5,000 ENA members via email request to participate; 524 unique views; 461 surveys initiated; 427 completed

Table 1. Participant characteristics (n=427)

Variable	Mean (SD)
Years as an emergency nurse	13.86 (10.75)
ED yearly volume	53,353 (27,914)
	n (%)
Current role	
Clinical staff nurse	314 (73.5)
Other*	113 (26.5)
Highest level of nursing education	
Diploma/associate degree	68 (15.9)
Bachelor degree	255 (59.7)
Graduate degree	104 (24.4)
Holds certification in emergency nursing (CEN)	226 (52.9)
ENA's Clinical Practice Guideline: Prevention of Blood Sample Hemolysis	
Aware of it and have accessed it	31 (7.3)
Aware of it and have not accessed it	82 (19.2)
Not aware of it	314 (73.5)
Employed in a teaching ED	235 (55.0)
ED patient population served	
Adults only	41 (9.6)
Pediatrics only	12 (2.8)
Adults and pediatrics	374 (87.6)
Reported a blood sample hemolysis prevention initiative occurred in their ED	118 (27.6)

*Other roles include Clinical Nurse Specialist, educator, advanced practice nurse, manager/administrator, other

Emergency Nurses Knowledge, Attitudes, and Practices (KAP) Related to Blood Sample Hemolysis Prevention Knowledge

Only 19% of respondents answered all three knowledge test items correctly.

Emergency Nurses Knowledge, Attitudes, and Practices (KAP) Related to Blood Sample Hemolysis Prevention Attitude

Table 2. Respondents choosing *Agree* or *Totally agree* to attitude items

Attitude statement	n (%)
Patients expect to be stuck only once for both blood and intravenous catheter placement when presenting to an emergency department.	369 (86.4)
Sticking patients more than once will impact patient satisfaction scores for nursing care.	354 (82.9)
The number of times that I have to repeat phlebotomy on a patient due to hemolyzed samples interferes with my care for other patients.	355 (83.1)
Hemolyzed lab samples contribute to delays in care for emergency department patients.	409 (95.8)
Sometimes the lab reports a hemolyzed sample when they have mishandled the sample.	256 (60.0)

Emergency Nurses Knowledge, Attitudes, and Practices (KAP) Related to Blood Sample Hemolysis Prevention Practices

Table 3. Responses to phlebotomy practices questions

Item	n (%)
What is the most common way blood samples are drawn in your emergency department?	
During peripheral IV insertion	372 (87.1)
Using a steel straight needle	55 (12.9)
Who is the person who usually performs phlebotomy for lab samples in your emergency department?	
Phlebotomist	47 (11.0)
ED technician	79 (18.5)
Nurse	301 (70.5)
What size tube do you use to draw comprehensive metabolic panel (CMP) samples in the emergency department?	
Small	222 (52.0)
Large	161 (37.7)
Not sure	44 (10.3)
Does your hospital or emergency department have a specific policy or standard of practice for the method by which basic laboratory blood samples, such as a metabolic panel, are to be drawn?	
No policy or procedure	189 (44.3)
Yes, steel straight needle only	11 (2.6)
Yes, either steel straight needle or IV catheter	147 (34.4)
Not sure	80 (18.7)
“Yes” to having a policy or procedure for the order in which lab tubes are filled?	348 (81.5)
Which of the methods listed below does the lab use to notify the emergency department that a lab sample is hemolyzed? (Choose all that apply.)	
Phone call to the nurse	317 (74.2)
Phone call to unit clerk/secretary	152 (35.6)
Notification via electronic medical record	91 (21.3)
Phone call to provider	47 (11.0)

Pilot study for a multisite retrospective study on ED blood sample hemolysis – Research in Progress

Principal Investigator: Christian N. Burchill, PhD, MSN, RN, CEN

Co-Investigators: Lorelei Ferre, BSN, BA, RN, SAFE, Clinical Nurse, LGH Emergency Services; Christina Pierre, PhD, DABCC, FAACC, Director, Chemistry Section, Department of Pathology & Laboratory Medicine, Penn Medicine Lancaster General Health; Daniel Herman, PhD, MD, Assistant Professor of Pathology and Laboratory Medicine, Hospital of the University of Pennsylvania

- Aim: (1) Establish a model for data abstraction that can be applied to a larger UPHS study of patient and organizational predictors of blood sample hemolysis in the ED; (2) Explore predictors and covariates of blood sample hemolysis in the ED
- Research design: Exploratory descriptive correlational with retrospective data
- Setting: LGH EMR
- Sample: Records of patients in the managed lives cohort for one year of ED visits
- Analysis: Feasibility outcomes; logistic regression models

Postoperative Constipation Study

Gonzalez, K., Sanchez, K., Mauch, K., Burchill, C. N., Bena, J. F., Morrison, S. L., & Distelhorst, K. S. Efficacy of one dose of laxative on postoperative constipation following total knee arthroplasty. *Orthopaedic Nursing*, 2023, 42(5), 304-309.
doi.org/10.1097/NOR.0000000000000971

- Aim: Determine effectiveness of administration of the osmotic laxative polyethylene glycol (PEG) on postoperative day 1 compared with usual care with docusate sodium on self-reported BM within 3 days after surgery
- Research design: Quasi-experimental
- Setting: One postoperative arthroplasty surgery unit in community hospital in Cleveland, Ohio
- Sample: Convenience sample of single knee arthroplasty with no known contraindication to PEG
- Instruments: Follow up phone call asking about if they had a normal for them BM within 3 days after surgery
- Analysis: Logistic regression models

Postoperative Constipation Study

TABLE 1. SAMPLE CHARACTERISTICS

Factor	Overall (<i>n</i> = 118)	Docusate Sodium (<i>n</i> = 60)	PEG (<i>n</i> = 58)	<i>p</i> Value
Age	65.0 ± 8.8	64.8 ± 8.2	65.2 ± 9.5	.76 ^a
Sex, female	67 (56.8)	30 (50.0)	37 (63.8)	.13 ^b
Race/ethnicity				.56 ^c
Hispanic/Latino	1 (0.85)	1 (1.7)	0 (0.00)	
Black/African American	14 (11.9)	7 (11.7)	7 (12.1)	
Asian American	2 (1.7)	1 (1.7)	1 (1.7)	
White	93 (78.8)	49 (81.7)	44 (75.9)	
Other	8 (6.8)	2 (3.3)	6 (10.3)	
Saphenous nerve block				.74 ^c
Yes	116 (98.3)	59 (98.3)	57 (98.3)	
No	1 (0.85)	1 (1.7)	0 (0.00)	
I don't know	1 (0.85)	0 (0.00)	1 (1.7)	
Type of anesthesia, spinal	103 (87.3)	54 (90.0)	49 (84.5)	.37 ^b
Length of surgery (minutes)	98.3 ± 18.8	100.8 ± 20.3	95.7 ± 17.0	.14 ^a
Comorbidity Index	0.00 [0.00, 1.00]	0.00 [0.00, 1.00]	0.50 [0.00, 1.00]	.37 ^d
Laxative use within 3 days after surgery (yes)	35 (29.7)	16 (26.7)	19 (32.8)	.47 ^b
Opioid use within 3 days after surgery (yes)	115 (97.5)	58 (96.7)	57 (98.3)	.99 ^c
Bowel movement by postoperative day 3 (yes)	61 (51.7)	29 (48.3)	32 (55.2)	.46 ^b

Note. Statistics presented as mean ± SD, median [P25, P75], *n* (column %). PEG = polyethylene glycol.

^a*t* test.

^bPearson's χ^2 test.

^cFisher's exact test.

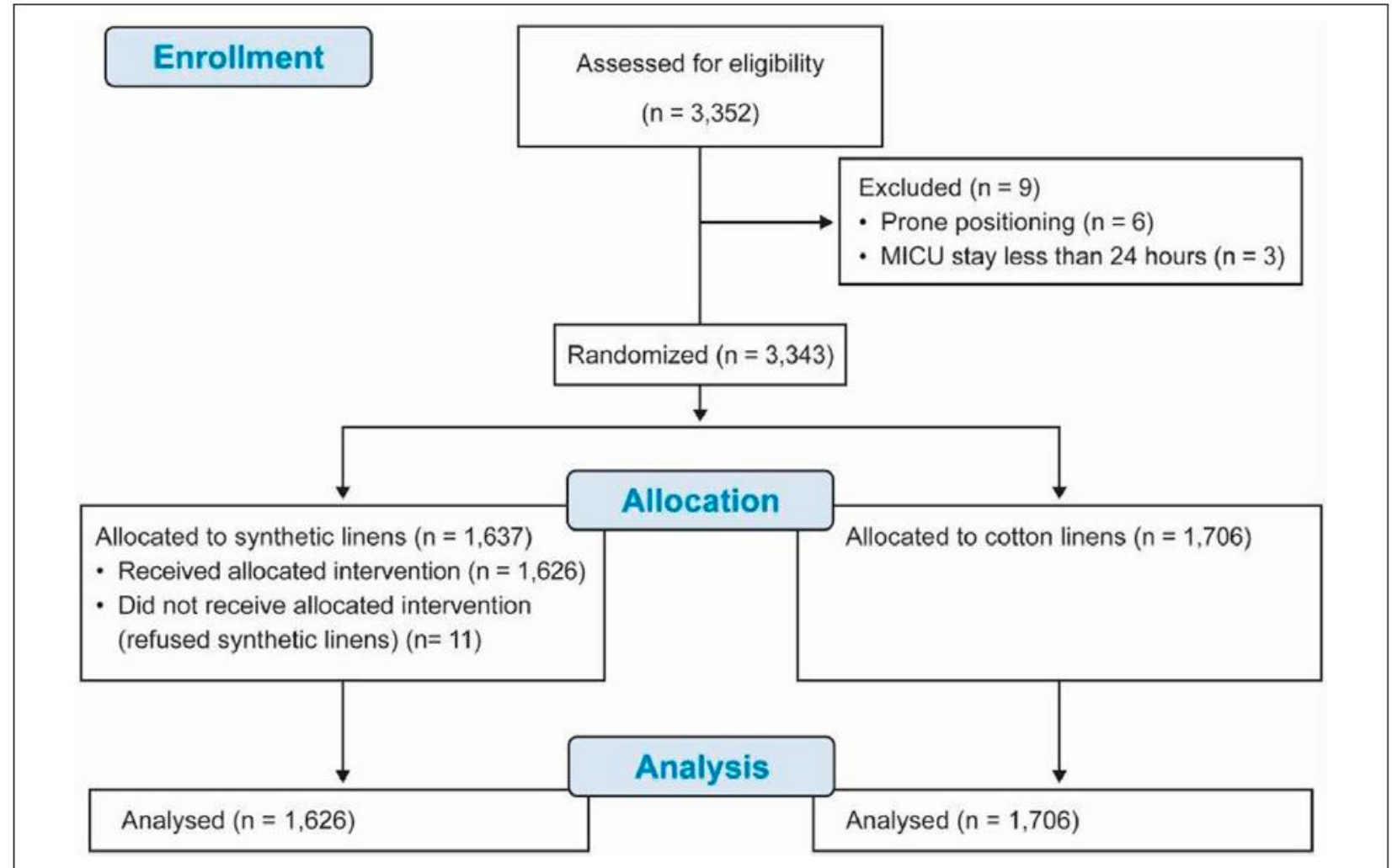
^dWilcoxon rank sum test.

Effect of Hospital Linens on Unit-Acquired Pressure Injuries for Adults in Medical ICUs

Montague-McCown, M., Bena, J., & Burchill, C. N. Effect of hospital linens on unit-acquired pressure injuries for adults in medical ICUs: A cluster randomized controlled trial. *Critical Care Explorations*, 2021, 3(3), e0336. doi:10.1097/CCE.0000000000000336

- Aim: Compare the occurrence rate of UAPI for patients using traditional cotton linens and newly developed synthetic linens; secondary aims were to compare time to develop the first UAPI and maximum severity of UAPI
- Research design: Cluster randomized trial
- Setting: 5 medical ICUs within one quaternary care hospital in Cleveland, Ohio
- Sample: Random assignment of patients to units, random assignment of units with a crossover design
- Instruments: Data pulled from EMR skin assessments documented every shift, only UAPI on body surfaces in contact with sheets were used (no device-related UAPI were included)
- Analysis: Generalized linear, mixed effect, and Poisson regression models

Effect of Hospital Linens on Unit-Acquired Pressure Injuries for Adults in Medical ICUs



Effect of Hospital Linens on Unit-Acquired Pressure Injuries for Adults in Medical ICUs

Summaries of Demographic Characteristics From Imputed Datasets

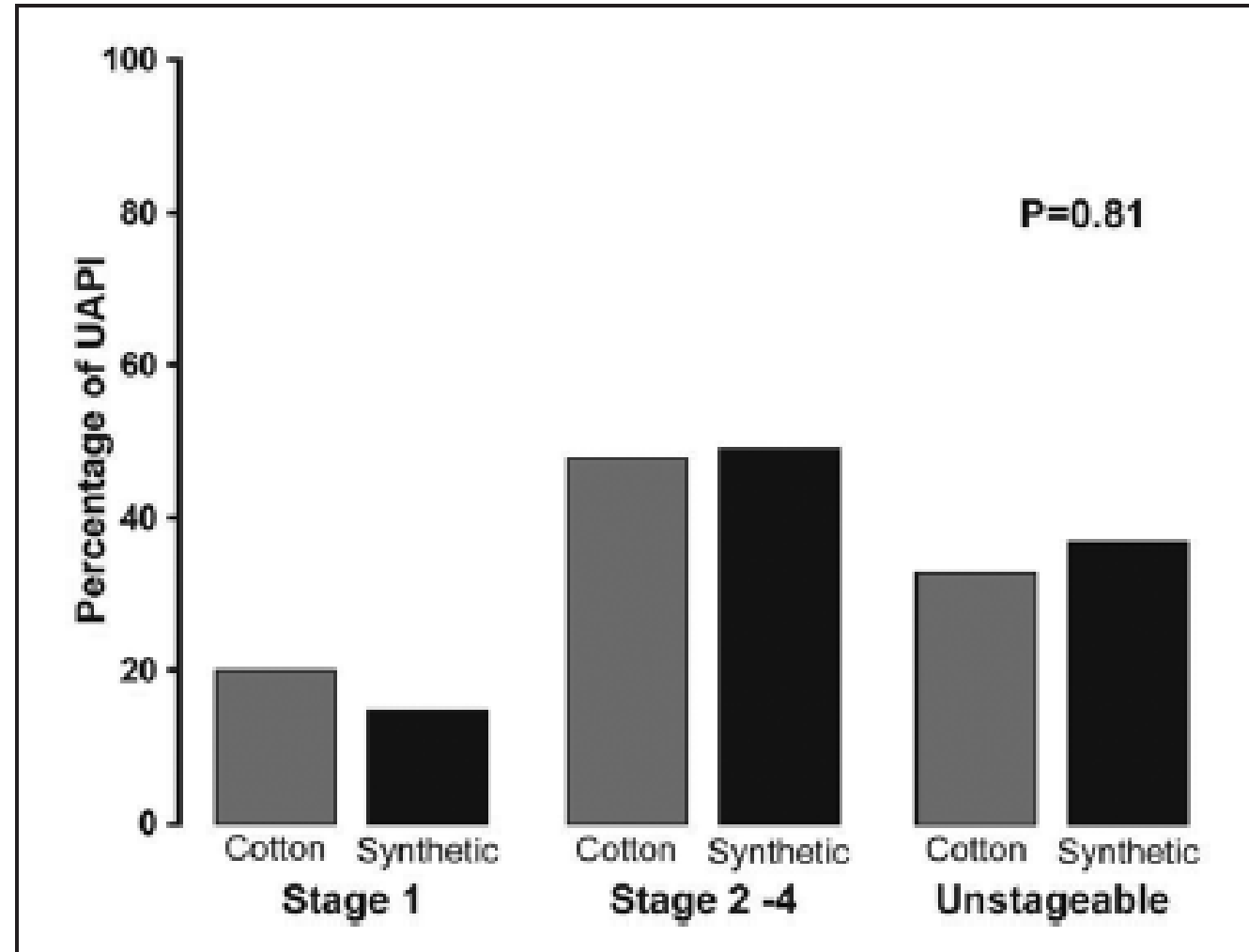
Baseline Factors	Total (n = 3,332)	Cotton (n = 1,706)	Synthetic (n = 1,626)	p
Age, yr, mean ± SE	60.14 ± 0.28	60.31 ± 0.39	59.97 ± 0.40	0.55 ^a
Sex, n (%)				
Male	1,766 (53.00)	909 (53.31)	857 (52.69)	0.72 ^b
Race/ethnicity, n (%)				
White	2,115 (63.48)	1,104 (64.74)	1,011 (62.16)	0.028 ^b
Black	1,038 (31.14)	500 (29.28)	538 (33.09)	
Other	179 (5.38)	102 (5.98)	77 (4.74)	
Unit length of stay, d, mean ± SE	6.17 ± 0.12	6.27 ± 0.17	6.07 ± 0.17	0.42 ^a
Weight (kg), mean ± SE	85.38 ± 0.54	85.36 ± 0.75	85.40 ± 0.80	0.97 ^a
Charlson Comorbidity Index category, n (%)				
0	592 (17.75)	282 (16.53)	310 (19.03)	0.56 ^c
1–2	1,292 (38.76)	691 (40.51)	600 (36.92)	
3–4	892 (26.76)	440 (25.78)	452 (27.79)	
5 or more	557 (16.73)	293 (17.18)	264 (16.25)	
Acute Physiology and Chronic Health Evaluation III score, mean ± SE	67.20 ± 0.50	66.79 ± 0.71	67.63 ± 0.71	0.40 ^a
Admission source, n (%)				
External transfer	946 (28.40)	485 (28.43)	461 (28.36)	0.48 ^b
Emergency department	1,452 (43.57)	730 (42.81)	721 (44.36)	
Direct admit	80 (2.40)	37 (2.17)	43 (2.65)	
Internal transfer	854 (25.63)	454 (26.58)	401 (24.63)	
Diagnosis categories, n (%)				
Cardiovascular	1,068 (32.05)	544 (31.88)	524 (32.23)	0.002 ^b
Gastrointestinal	485 (14.56)	261 (15.29)	224 (13.79)	
Respiratory	1,052 (31.56)	523 (30.66)	529 (32.52)	
Hematologic	261 (7.85)	110 (6.47)	151 (9.29)	
Other	466 (13.99)	268 (15.71)	198 (12.18)	
Medical ICU Braden score, mean ± SE	15.43 ± 0.05	15.42 ± 0.07	15.45 ± 0.08	0.82 ^a
Protein, g/dL, mean ± SE	6.18 ± 0.02	6.19 ± 0.03	6.17 ± 0.03	0.62 ^a
Albumin, g/dL, mean ± SE	3.07 ± 0.01	3.08 ± 0.02	3.05 ± 0.02	0.26 ^a

^aGeneralized linear model.

^bLogistic regression.

^cProportional odds logistic regression.

Effect of Hospital Linens on Unit-Acquired Pressure Injuries for Adults in Medical ICUs



Effect of Hospital Linens on Unit-Acquired Pressure Injuries for Adults in Medical ICUs

Pressure Injury Occurrence Rate and Time to First Pressure Injury After Adjustment

Parameter	Level	Pressure Injury Occurrence Rate		Time to First Pressure Injury	
		Rate Ratio (95% CI)	<i>p</i>	Rate Ratio (95% CI)	<i>p</i>
Linen	Cotton	1.00 (reference)		1.00 (reference)	
	Synthetic	1.00 (0.66–1.53)	0.99	1.06 (0.67–1.67)	0.80
Time period	First	1.00 (reference)		1.00 (reference)	
	Second	1.12 (0.73–1.71)	0.61	1.18 (0.75–1.84)	0.47
Body system	Cardiovascular	1.00 (reference)		1.00 (reference)	
	Gastrointestinal	0.66 (0.32–1.37)	0.27	0.95 (0.45–1.98)	0.88
	Respiratory	0.75 (0.47–1.21)	0.24	0.71 (0.43–1.18)	0.19
	Hematologic	0.43 (0.13–1.40)	0.16	0.57 (0.18–1.81)	0.34
	Other	0.66 (0.31–1.38)	0.27	0.70 (0.31–1.59)	0.40
Race	White	1.00 (reference)		1.00 (reference)	
	Black	0.51 (0.30–0.86)	0.012	0.56 (0.33–0.96)	0.03
	Other	0.63 (0.24–1.67)	0.36	0.48 (0.16–1.43)	0.19

Questions

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