J Wound Ostomy Continence Nurs. 2022;49(5):405-415.
Published by Lippincott Williams & Wilkins

OPEN

Incontinence Management and Pressure Injury Rates in US Acute Care Hospitals

Analysis of Data From the 2018-2019 International Pressure Injury Prevalence™ (IPUP) Survey

Kimberly Koloms ◆ Jill Cox ◆ Catherine A. VanGilder ◆ Laura E. Edsberg

ABSTRACT

PURPOSE: The purpose of this study was to identify and describe the prevalence of incontinence (urinary and/or fecal) and incontinence management practices among patients in US adult acute care settings, with and without hospital-acquired pressure injuries (HAPIs), using the data from the 2018/2019 International Pressure Ulcer Prevalence™ (IPUP) survey.

DESIGN: Observational, cohort study with cross-sectional data collection and retrospective data analysis.

SUBJECTS AND SETTING: The sample comprised 296,014 patients hospitalized in 1801 acute care facilities in the United States that participated in 2018 and/or 2019 IPUP survey. Of these, 192,852 (65%) patients had information recorded in the survey on incontinence status and were included in the analytical sample.

METHODS: Data from the 2018/2019 IPUP database were analyzed to evaluate the prevalence of incontinence (urinary [UI], fecal [FI], and dual [DI]), and the use of incontinence and moisture management strategies. Incontinence prevalence was analyzed between 3 groups of patients: (1) those without pressure injuries; (2) patients with stage 1 and 2 HAPIs; and (3) those with severe HAPIs (stage 3, 4, unstageable, deep tissue pressure injury). Analysis of the subgroups within acute care was also undertaken and included medical-surgical, critical care, and step-down units.

RESULTS: Incontinent patients were older (mean age 69-74 years depending on type of incontinence as compared to 62 years for continent patients) and had lower Braden Scale scores (range, 14.7-16.7, compared to 19.4 for continent patients). Half of the patients were female, 49.6% male, and 0.4% were unknown. Incontinence was identified in 32% of patients. Among patients with incontinence, 33% had UI, 12% had FI, and 55% had DI. Hospital-acquired pressure injuries were present in 27.4% of continent patients and 72.6% of incontinent patients, with DI having the highest rate of HAPIs. Analysis revealed a higher proportion of incontinent patients with unstageable HAPIs than continent patients (14.9% vs 9.6%, $P = .00$), as well as a higher proportion of incontinent patients with deep tissue HAPIs as compared to continent patients (27.0% vs 22.1%, $P = .00$). Significantly more incontinent patients regardless of HAPI status were using a bowel or bladder management system ($P = .00$).

CONCLUSION: Results of this study support the importance of incontinence as a risk factor in HAPI development. The prevalence of all types of incontinence was 31.7% for the entire sample. Almost three-fourths (72.6%) of patients with HAPI had UF, FI, or DI. A standardized definition of both UI and FI is needed, given that over 70% of all critical care unit patients with a urinary catheter for incontinence management were still classified as urinary incontinent.

KEY WORDS: Acute care, Incontinence management, Incontinence, Pressure injuries.

Kimberly Koloms, MS, *Hillrom Inc, now a Baxter company, Deerfield, Illinois.*

Jill Cox PhD, RN, APN-c, CWOCN, FAAN, *Clinical Professor, Rutgers University School of Nursing, Newark, New Jersey/WOC Advanced Practice Nurse Englewood Health, Englewood, New Jersey.*

Catherine A. VanGilder-Freese, MBA, BS, MT, CCRA, *Advanced Clinical Solutions, LLC, Bristol, Tennessee.*

Laura E Edsberg, PhD, *Professor Natural Sciences, Center for Wound Healing Research, Natural & Health Sciences Research Center, Daemen University, Amherst, New York.*

Kimberly Koloms is an employee of HillRom.

Correspondence: *Kimberly Koloms, MS, Hillrom Inc, now a Baxter company, Deerfield, IL 60015 (Kimberly.Koloms@hillrom.com).*

DOI: 10.1097/WON.0000000000000905

INTRODUCTION

Urinary (UI) and fecal incontinence (FI) are 2 conditions commonly encountered among the hospitalized population. Recent studies report the prevalence of UI in the hospital setting to be in a range of 13% to 26% and that for FI between 6% and 16.3%.[1-4] Dual incontinence (DI) rates are reported in the range of 3.6% to 9.0%.[3,4] Patients with incontinence are more likely to experience longer hospital admissions, be discharged to a nursing home, and suffer increased rates of mortality, with higher attributable hospital costs.[1]

Incontinence is strongly associated with an increased likelihood for pressure injury (PI) development.[5] The prevalence and severity of hospital-acquired pressure injuries (HAPIs) have been found to be higher in patients with incontinence as compared to those who are continent.[3,6] Findings from a recent study found that patients with incontinence were 5.8

times more likely to have progression of a sacral PI to a severe stage (stage 3, stage 4).[7]

The skin plays a major role as a barrier. The skin regulates temperature, protects from microorganisms, mitigates mechanical impact (forces and pressure), and manages moisture. However, wet skin loses much of its mechanical strength, making it more susceptible to deformation.[8] If moisture is not managed, it can lead to maceration, which impacts the barrier function of the skin and can also contribute to PI development or worsening of existing PIs.[9] When skin becomes moist, the friction between the skin and common bedding material approximately doubles and increases the forces transmitted to the skin, which increase tissue deformation.[10] Mechanical load and deformation are contributing factors to the development of PIs.[5]

In order to better understand the role of incontinence in PI development among patients hospitalized in the United States, an in-depth analysis of incontinence prevalence and interventions was undertaken. The purpose of this study was to identify and describe the prevalence of incontinence (urinary and/or fecal) and management practices among critical care, medical-surgical (MS), and step-down unit patients in 3 groups: (1) those with no HAPIs; (2) those with stage 1 and 2 HAPIs; and (3) patients with severe HAPIs (stage 3, stage 4, deep tissue pressure injury [DTPI], unstageable) cared for in US hospitals.

METHODS

This study was a secondary analysis drawn from the 2018/2019 International Pressure Ulcer Prevalence (IPUP) survey database. The IPUP survey is distributed and administrated by Hillrom, Inc (Batesville, Indiana). Participation is open to health care facilities globally. The current study employed an observational, cross-sectional cohort design for data collection. This study was approved by the institutional review board of Rutgers University through exempt status.

Data were drawn from 1801 US acute care facilities participating in the IPUP survey in 2018 (n = 914) and 2019 (n = 887), resulting in a sample of 296,014 patients. Patients were managed in MS inpatient care units (66%; n = 195,403), critical care units (14%; n = 41,866), and step-down units (8%; n = 23,979). All patients admitted to any of these unit types during the 2018 and 2019 surveys were considered for study inclusion.

Data Collection

Prior to the IPUP survey date, hospital-based clinical teams were trained on the data collection procedure and proper completion of the data abstraction record. All patient identifiers were removed by the data abstraction record. For this analysis, the following variables were included: demographic and pertinent clinical variables (age, gender, unit type, Braden Scale score on the day of the survey, body mass index); incontinence status (presence/absence of urine, fecal, or dual); and PI characteristics (PI prevalence [overall and hospital acquired], PI stage, and anatomic location). Stage 1 to 4, unstageable, or DTPI, and HAPIs were included in the analysis. The presence of incontinence was determined based on the response to the IPUP incontinence question, where the possible answers are "urine," "fecal," "urine and fecal," and "none." Respondents were asked to check one answer only. It was also possible not to answer the question.

The following definitions of bladder management, bowel management, incontinence management, and moisture management guided this study.

Bladder management strategies were defined as interventions used to enhance or ensure regular and adequate storage and evacuation of urine from the lower urinary tract. Bladder management strategies used in the acute care setting are independent or assisted toileting (voiding), intermittent catheterization, involuntary voiding into an external collection device, use of absorbent pads or body-worn absorbent products, and indwelling catheterization.[11,12] Indwelling urinary catheters are considered a bladder management strategy; nevertheless, they are not recommended as an incontinence management technique.[13] According to the Centers for Disease Control and Prevention, appropriate indwelling catheter use, except in extenuating circumstances, should be limited to end-of-life circumstances, healing of sacral or perineal wounds, or the need for accurate recording output in critically ill patient, management of acute urinary retention, or urologic/genitourinary surgery.

Bowel management strategies are defined as interventions used to ensure adequate storage and evacuation of fecal matter or stool. Common strategies used in the acute care setting are voluntary or assisted defecation, involuntary defecation onto absorbent pads or body-worn absorbent products, external collection devices, and internal fecal management devices.[14]

Incontinence management was defined as strategies used to absorb, contain, or collect urine or stool. Common strategies used in acute care for incontinence management are absorbent products and external collection devices. While the IPUP survey includes "indwelling urinary catheter" as an incontinence management strategy, we recognize this is *not* considered an appropriate strategy to manage UI.

The term "moisture management" is used in the NDNQI survey to identify PI prevention practices related to skin moisture and encompasses incontinence management strategies, along with strategies used to manage microclimate and moisture from other sources, such as draining wounds. This term encompasses all PI preventive strategies used to reduce exposure of skin to bodily fluids including urine and stool and to reduce the risk of HAPIs along with strategies to address microclimate, defined as the temperature, humidity, and airflow next to the skin surface.[5] It should be noted that "moisture management" is not a term that is frequently used by continence experts to address incontinence management.

Compliance to moisture management practices is determined based on documented and observed implementation of this intervention by the survey teams. Responses to this question are answered as "yes" (interventions are present), "no" (interventions not present), "unnecessary" (not needed for the patient), "documented contraindication" (eg, allergy to product), or "patient refused."[15]

In order to understand how WOC nurses classify patients using the IPUP incontinence management strategies, a polling session was conducted during the 2020 WOCN Society's national conference (WOCNext) during a session, titled "Risk Factors & Unavoidable Pressure Injuries: Results of the IPUP Study." Due to the COVID-19 pandemic, this symposium was presented virtually. Nine hundred six WOCNext conference attendees attended the session. All responses to the polling questions were voluntary and anonymous. Questions related to incontinence consisted of the following: (1) Would you consider your patient urinary incontinent if an indwelling or external catheter was in place (yes or no)? and (2) Would you consider your patient fecal incontinent if an internal or external fecal containment device was in place (yes or no)? Demographic information of the WOC nurses included years of experience as a WOC nurse, geographic region, and primary practice setting.

TABLE 1.
Incontinence Prevalence by Continence Category for All Acute Care

Incontinence Prevalence—All Acute Care		
	All Patients	HAPI Patients
Total patients by category	192,852	5715
Continent	68.3%	27.4%
Incontinent	31.7%	72.6%
Urine incontinence	10.5%	13.5%
Fecal incontinence	3.9%	12.9%
Dual incontinence	17.3%	46.2%

Abbreviation: HAPI, hospital-acquired pressure injury.

TABLE 3.
Incontinence Prevalence by Continence Category for Medical-Surgical

Incontinence Prevalence—Medical-Surgical		
	All Patients	HAPI Patients
Total patients by category	129,618	2805
Continent	72.2%	32.5%
Incontinent	27.8%	67.5%
Urine incontinence	9.6%	14.2%
Fecal incontinence	2.9%	9.0%
Dual incontinence	15.3%	44.3%

Abbreviation: HAPI, hospital-acquired pressure injury.

Data Analysis

Descriptive statistics including frequency distributions, means, and standard deviations for study variables were analyzed using R version 4.0.2 (Foundation for Statistical Computing, Vienna, Austria; https://www.R-project.org). Differences in incontinence interventions among patients with no HAPIs, stage 1 or 2 HAPIs, or severe HAPIs (stages 3, 4, DTPI, or unstageable) were analyzed using χ^2 analysis. Responses to the WOC polling questions were analyzed using descriptive statistics.

RESULTS

The total sample of US acute care patients comprised 296,014 patients; of these, 192,852 (65%) responded to the IPUP incontinence questions, and these data were used as our study sample. The incontinence prevalence was 32% (61,119/192,852 patients); 10.5% (n = 20,171) were identified as urinary incontinent, 3.9% (n = 7,531) fecal incontinent, and 17% (n = 33,417) dual incontinent (Table 1). In this sample, the prevalence of incontinence with HAPIs was particularly high (73%; n = 4,147/5,715). The incontinence distribution for the HAPI population included 14% (n = 769) with UI only, 13% (n = 739) with FI only, and 46% with DI only (n = 2,639). In addition, 27% of HAPI patients (n = 1,568) were categorized as not having any form of incontinence (Table 1).

The overall acute care population was further analyzed as 3 subgroups of hospitalized patients and included MS, critical care, and step-down unit patients (Tables 2-4). The prevalence of incontinence in critical care units was highest at 53% (14,621/27,638 patients) as compared to MS units at 28% (35,973/129,618 patients) and step-down units at 31% (n = 5,294/17,125 patients). When analyzed by type of incontinence, critical care units had the highest overall prevalence of UI at 15% (n = 4,082), followed by step-down units at 10.2% (n = 1,751) and MS units at 9.6% (n = 12,402). Patients in critical care units also had the highest prevalence of FI (9.7%; n = 2,682) and DI (28%; n = 7,857) compared to the other unit types. Incontinence prevalence was higher among patients with HAPIs across all unit types: critical care (82%; n = 1,485/1,816 patients), MS (67%; n = 1,893/2,805 patients), and step-down units (71%; n = 462/651 patients). Furthermore, among HAPI patients, the step-down unit had the highest UI prevalence of 15% (n = 95). Patients with HAPIs in critical care units had the highest prevalence of FI (21%; n = 376) and DI (50%; n = 904).

Participant Characteristics

Demographics of the population analyzed by continence category are presented in Table 5. Continent patients were younger (61.8 years, SD = 17.0) when compared to the average ages for the UI (72.1 years, SD =14.4), FI (67.6 years, SD = 15.3), and DI (71.0 years, SD =16.0) groups, respectively. Female patients had a higher percentage of UI overall in the acute care population at 58% versus 42% male, and the differences between female and males were greater in MS (61% vs 39%) and step-down (60% vs 40%) units but not in critical care units (50.0% vs 50.0%). Mean Braden Scale scores were consistently higher for continent patients than for incontinent patients for every unit type, indicating lower PI risk among the continent population.

TABLE 2.
Incontinence Prevalence by Continence Category for Critical Care

Incontinence Prevalence—Critical Care		
	All Patients	HAPI Patients
Total patients by category	27,638	1816
Continent	47.1%	18.2%
Incontinent	52.9%	81.8%
Urine incontinence	14.8%	11.3%
Fecal incontinence	9.7%	20.7%
Dual incontinence	28.4%	49.8%

Abbreviation: HAPI, hospital-acquired pressure injury.

TABLE 4.
Incontinence Prevalence by Continence Category for Step-down

Incontinence Prevalence—Step-down		
	All Patients	HAPI Patients
Total patients by category	17,125	651
Continent	69.1%	29.0%
Incontinent	30.9%	71.0%
Urine incontinence	10.2%	14.6%
Fecal incontinence	3.5%	9.5%
Dual incontinence	17.2%	46.9%

Abbreviation: HAPI, hospital-acquired pressure injury.

TABLE 5.
Demographic Data for All Acute Care

	All Acute Care			
	Continent	Urine Incontinence	Fecal Incontinence	Dual Incontinence
Total patients by continence category	128,212	18,345	6,104	26,923
Age, mean (SD), y	61.8 (17.0)	72.1 (14.4)	67.6 (15.3)	71.0 (16.0)
Height, mean (SD), cm	169.8 (10.7)	167.8 (11.1)	170.5 (10.9)	169.3 (11.1)
Weight, mean (SD), kg	81.5 (25.8)	81.4 (26.8)	82.6 (27.2)	79.8 (25.6)
BMI, mean (SD)	28.2 (8.6)	28.9 (9.2)	28.4 (9.0)	27.9 (8.7)
Sex				
Female	62,903 (49%)	10,611 (58%)	2,597 (43%)	13,936 (54%)
Male	64,758 (51%)	7,635 (42%)	3,474 (57%)	12,852 (48%)
Unknown	551 (0.4%)	99 (0.5%)	33 (0.5%)	135 (0.5%)
Braden Scale score, mean (SD)	19.4 (2.4)	16.7 (2.8)	15.0 (3.1)	14.7 (2.4)

Abbreviation: BMI, body mass index.

Incontinence by HAPI Stage

For purposes of this study, HAPIs were defined as the worst-stage HAPI for the individual patient, where stage 4 is the most severe stage, followed by unstageable, DTPI, stage 3, stage 2, and the least severe was stage 1. Among the acute care population for continent patients, a higher percentage of stage 1 and 2 HAPIs were found (62.1%; n = 974/1,568 patients) compared to 50.4% (n = 2,089/4,147 patients) for the incontinent population. However, there was a higher proportion of incontinent patients with unstageable HAPIs than continent patients (14.9% vs 9.6%, P = .00), as well as a higher proportion of incontinent patients with DTPIs as compared to continent patients (27.0% vs 22.1%, P = .00). The breakdown of the proportion of incontinent patients by continence category is summarized in Table 6. Analysis of the entire sample yielded similar results to analysis of unit-based subpopulations (MS, critical care, step-down units).

The proportion of patients by continence category was analyzed by worst-stage HAPI severity (no HAPIs; stage 1 or 2; severe; Figures 1-3). While 32% (n = 61,119) of patients were incontinent, these patients have 68% of all stage 1 or 2 HAPIs and 77% of all severe HAPIs. Among patients without any HAPIs, 73% (n = 126,644/173,869 patients) were continent compared to only 32% (n = 974/3,063 patients) of patients with stage 1 or 2 HAPIs being continent and 23% (n = 594/2,652 patients) of patients with severe HAPIs being continent. Half of the patients with severe HAPIs experienced DI (n = 1,333) as compared to 14% (n = 24,284) of patients without HAPIs.

Incontinence Management Strategies

Tables 7-10 examine the proportion of patients who used incontinence management strategies based on incontinence category and stratified by worst-stage HAPI severity (no HAPIs; stage 1 or 2; severe). A χ^2 test of independence (P value) analysis was used to compare the proportion of patients with each incontinence management method by whether they were incontinent or continent. Within all HAPI groups, significantly more patients that identified as incontinent used fecal management systems (6.4% vs 1.2%), indwelling urinary catheters (45% vs 20%), absorbent briefs (49% vs 10.5%), and external urine management systems (10.5% vs 0.8%) when compared to continent patients (P = .000). For incontinent patients without HAPIs, 52% used an absorbent brief (n = 24,727/47,225) as compared to 5.0% (n = 6,271/126,644) of continent patients. The result for the use of an indwelling catheter mirrors this comparison for each HAPI grouping (stage 1 or 2; severe; no HAPIs).

TABLE 6.
Proportion of Patients by Continence Category Broken Down by HAPI Stage

	All Acute Care				
	Continent	Incontinent	Urine Incontinence	Fecal Incontinence	Dual Incontinence
Total worst-stage HAPI patients by continence category	1568	4147	769	739	2639
Stage 1	27.9%	18.4%	25.2%	11.2%	11.6%
Stage 2	34.2%	32.0%	33.4%	18.8%	22.6%
Stage 3	5.1%	5.4%	4.0%	3.6%	4.1%
Stage 4	1.1%	2.3%	0.5%	1.6%	1.9%
Unstageable	9.6%	14.9%	9.8%	11.1%	11.0%
DTPI	22.1%	27.0%	27.0%	20.4%	18.0%

Abbreviations: DTPI, deep tissue pressure injury; HAPI, hospital-acquired pressure injury.

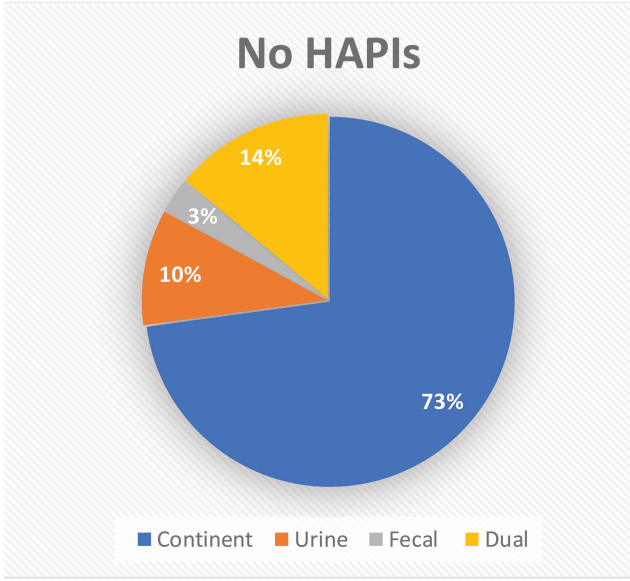

Figure 1. Distribution of patients with no HAPIs, by continence category. HAPI indicates hospital-acquired pressure injury.

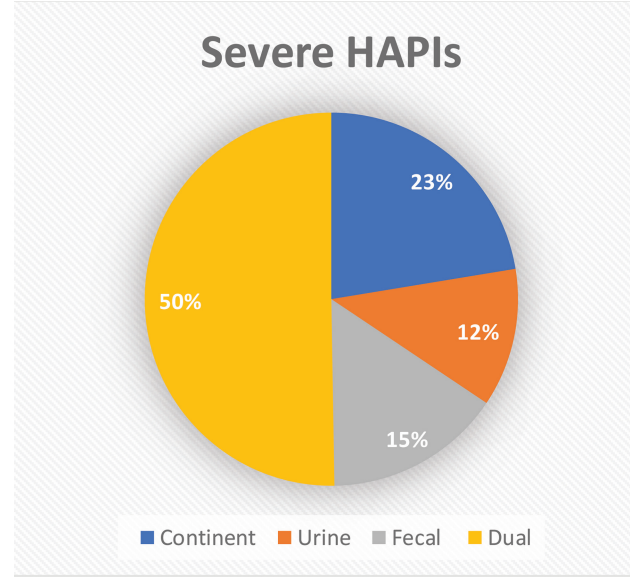

Figure 3. Distribution of patients with worst-stage HAPIs being severe, by continence category. HAPI indicates hospital-acquired pressure injury.

Conversely, significantly more continent patients had an ostomy than incontinent patients within the "severe HAPIs" group and the "no HAPIs" group (Table 7). When analyzed by unit type, critical care unit patients had the highest use of both indwelling fecal management systems among the incontinent population and indwelling catheters for all HAPI categories, while absorbent briefs use was the highest management strategy reported for both MS and step-down units.

Moisture Management Strategies for PI Prevention (NDNQI)

Moisture management strategies aimed at PI prevention are examined with the NDNQI portion of the IPUP survey. As anticipated, significantly more incontinent patients received moisture management strategies for PI prevention than continent patients across every HAPI group ($P = .000$). Moisture management was used as a prevention strategy in 91% to 92% of FI patients with HAPIs, 88% to 91% of DI patients with HAPIs, and 81% to 89% of UI patients with HAPIs. This strategy was also applied to incontinent patients without HAPIs ranging from 78% to 86% depending on incontinence grouping (Table 11).

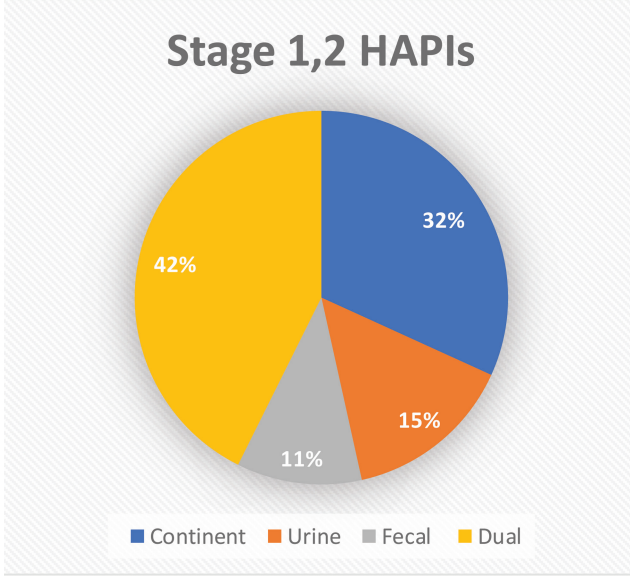

Figure 2. Distribution of patients with worst-stage HAPIs being stage 1 or 2, by continence category. HAPI indicates hospital-acquired pressure injury.

Polling Question Posed at WOCNext National Conference

Conference attendees (WOC nurses) were asked their opinion on the definition of incontinence when a patient is using a fecal or urinary management device. There were 906 attendees who responded to the questions. Respondents (57%; n = 516) commonly had between 11 and 20 years of WOC nursing experience. Fifty percent (n = 453) of respondents were from the geographic regions of the Northeast and Midwest, and 68% (n = 615) practiced in an acute care setting. When asked "Would you consider your patient fecal incontinent if an internal or external fecal containment device was in place?" 26% (n = 236) answered that they would not, while 74% (n = 669) indicated they would consider their patient fecal incontinent. When asked "Would you consider your patient urinary incontinent if an indwelling or external catheter was in place?" 42% (n = 381) said "no" as compared to the remaining 58% (n = 525), who indicated they would consider them to be incontinent of urine.

Lower Torso Wounds

A subanalysis was conducted on patients whose worst-stage PI was anatomically located in a region associated with incontinence. These PIs were identified as those that occurred in one of the following locations: sacrum/coccyx, buttocks, trochanter, ischium, or scrotum. This subgroup comprised 3,783 patients. Among these patients, 27% (n = 1,021) were continent and 73% (n = 2,762) were incontinent. This is a similar finding for the results among patients with HAPIs in all locations in Table 1. The prevalence of UI, FI, and DI for these patients with HAPIs was also similar to the prevalence reported for the overall population of HAPI patients regardless of wound location.

TABLE 7.
Proportion of Patients With Incontinence Management by Continence Category Broken Down by Worst-Stage HAPI Severity for All Acute Care

		All Acute Care					
		Incontinence Type					
					Incontinent vs Continent Testing		
	Incontinence Management	Urine Incontinence	Fecal Incontinence	Dual Incontinence	Incontinent	Continent	*P*
Stage 1, 2 HAPI	Total HAPI patients by continence category	451	332	1306	2089	974	
	Fecal management system	0.0%	6.9%	8.5%	6.4%	1.2%	**.000**
	Foley/catheter	44.8%	57.8%	42.1%	45.2%	19.8%	**.000**
	Absorbent Underpad/brief	39.2%	37.3%	54.8%	48.7%	10.5%	**.000**
	Ostomy	2.2%	3.3%	2.2%	2.4%	2.9%	.51
	External urine management	11.5%	0.7%	12.5%	10.5%	0.8%	**.000**
Severe HAPI	Total HAPI patients by continence category	318	407	1333	2058	594	
	Fecal management system	0.6%	14.3%	13.4%	11.6%	4.4%	**.000**
	Foley/catheter	60.1%	58.5%	53.4%	55.4%	28.8%	**.000**
	Absorbent Underpad/brief	29.2%	32.9%	41.5%	37.9%	11.4%	**.000**
	Ostomy	3.5%	3.4%	3.8%	3.7%	6.4%	**.006**
	External urine management	16.7%	3.7%	13.2%	11.9%	2.3%	**.000**
No HAPIs	Total HAPI patients by continence category	17,576	5365	24,284	47,225	126,644	
	Fecal management system	0.2%	4.2%	4.5%	2.9%	0.10%	**.000**
	Foley/catheter	35.6%	49.1%	30.2%	34.3%	5.9%	**.000**
	Absorbent Underpad/brief	45.6%	40.4%	59.9%	52.4%	5.0%	**.000**
	Ostomy	1.5%	7.2%	2.0%	2.4%	5.0%	**.000**
	External urine management	17.3%	2.9%	13.5%	13.7%	0.7%	**.000**

Abbreviation: HAPI, hospital-acquired pressure injury. Bold *P* values indicate statistical significance.

DISCUSSION

The purpose of this study was to identify and describe the prevalence of incontinence (urinary and/or fecal) and incontinence management practices among critical care, MS, and step-down unit patients with or without HAPIs cared for in 1801 acute care facilities drawn from the 2018 and 2019 IPUP data set. The overall prevalence of incontinence in this study was 31.7%. This is similar to previous works by Gray and Giuliano,[16] who reported an overall incontinence rate of 46.6% in a large multisite study published in 2018. Nevertheless, the prevalence was less than the 53% incontinence rate reported by Lachenbruch and colleagues,[3] based on an analysis of the 2013-2014 IPUP data set analyzing patients from long-term care, long-term acute care, rehabilitation, as well as acute care units. In 2 studies, the overall prevalence for incontinence was found to be much less than that reported in the current study at 1.5% and 5.2%, respectively.[2,7] Variations in these numbers may be attributed to differences in study design; however, it also highlights that the true prevalence of incontinence among hospitalized patients is largely unknown and may be attributed to lack of clarity regarding how UI and FI are defined.

When analyzed by type of incontinence, DI was highest at 17.3%, followed by UI at 10.5% and FI at 3.9%. This result differed from those of previous studies. Lachenbruch and colleagues[3] reported a prevalence of FI at 16.3% to be the highest, while Condon and colleagues[1] reported a higher prevalence of UI at 26% in a single-site cross-sectional study. Kayser and associates[7] also found UI to be the most prevalent type of incontinence affecting 86% of the incontinent sample. It should be noted in previous studies, the classification of patients with indwelling catheters as continent or incontinent is largely unknown and may have influenced the reported prevalence.

Among HAPI patients in this sample, the rates for overall incontinence were higher in every unit type when compared to continent patients. This is especially apparent among the patients with severe HAPIs. These results are consistent with those of Lachenbruch and colleagues,[3] who also reported a higher overall prevalence of incontinence in patients with HAPIs as compared to continent patients. When analyzed by care setting, HAPI patients in critical care units in our study demonstrated the highest rates of DI, approaching 50%, but the lowest rates of UI at 11.6% compared to 14.2% in MS unit patients and 14.6% in patients cared for in step-down units. Fecal incontinence rates were also higher for all HAPI patients, with critical care units again reporting the highest rates when analyzed by care setting.

With regard to stage of HAPI and incontinence, stage 2 and DTPI were found to be the most common among incontinent patients at 32% and 27%, respectively. Stage 2 remained the highest among MS and step-down unit patients, while in critical care unit patients, DTPI emerged as the most common stage for all 3 categories of incontinence (DI, FI, and UI). When location of HAPIs was explored, surprisingly, there were no differences in incontinence rates (all types) between those with any location HAPIs and those with only lower torso HAPIs.

TABLE 8.
Proportion of Patients With Incontinence Management by Continence Category Broken Down by Worst-Stage HAPI Severity for Critical Care

		Critical Care					
		Incontinence Type					
					Incontinent vs Continent Testing		
	Incontinence Management	Urine Incontinence	Fecal Incontinence	Dual Incontinence	Incontinent	Continent	*P*
Stage 1, 2 HAPI	Total HAPI patients by continence category	92	157	369	618	166	
	Fecal management system	0.0%	12.1%	20.1%	15.0%	4.8%	**.001**
	Foley/catheter	76.1%	60.5%	76.4%	72.3%	45.2%	**.000**
	Absorbent Underpad/brief	22.8%	26.8%	32.0%	29.3%	9.6%	**.000**
	Ostomy	2.2%	2.5%	3.5%	3.1%	1.8%	.60
	External urine management	15.2%	1.4%	11.0%	9.4%	0.0%	**.007**
Severe HAPI	Total HAPI patients by continence category	113	219	535	867	165	
	Fecal management system	0.0%	20.5%	23.6%	19.7%	12.7%	**.045**
	Foley/catheter	85.8%	58.0%	76.3%	72.9%	52.7%	**.000**
	Absorbent Underpad/brief	16.8%	26.9%	27.7%	26.1%	7.9%	**.000**
	Ostomy	7.1%	2.3%	4.9%	4.5%	7.3%	.19
	External urine management	6.8%	0.9%	6.8%	5.3%	3.6%	.78
No HAPIs	Total HAPI patients by continence category	3512	1860	5644	11,016	12,196	
	Fecal management system	0.34%	7.6%	12.6%	7.8%	0.7%	**.000**
	Foley/catheter	71.6%	66.3%	68.1%	68.9%	20.8%	**.000**
	Absorbent Underpad/brief	20.8%	29.5%	36.7%	30.4%	5.8%	**.000**
	Ostomy	1.2%	2.3%	1.7%	1.7%	1.0%	**.000**
	External urine management	14.5%	2.7%	11.7%	11.2%	1.2%	**.000**

Abbreviation: HAPI, hospital-acquired pressure injury. Bold *P* values indicate statistical significance.

Our results highlight some important findings that support previous literature. Lachenbruch and colleagues[3] also found stage 2 PIs to be the most prevalent stage of HAPIs associated with all types of incontinence; however, incontinence was also strongly associated with more severe HAPIs. Gray and Giuliano[16] reported a prevalence of 17.1% for sacral HAPIs among hospitalized incontinent patients, and patients with DI were 9 times more likely to develop a sacral HAPI as compared to those patients with UI, FI, or no incontinence. Similarly, Kayser and colleagues[6] reported that patients with DI were 2.2 times more likely to develop a severe HAPI. Among critical care unit patients, DTPI is emerging as the most common stage of HAPIs in recent investigations, as was the case in our study.[17-19] The association between UI, FI, and DI and DTPI has not been extensively examined. Kayser and colleagues[6] reported that admission to the intensive care unit (ICU), along with any type of incontinence, was a significant predictor of all PIs including DTPIs. Further studies examining DTPIs and incontinence in ICU patients are warranted to better understand this association.

Caregivers face challenges when distinguishing stage 2 PIs from other types of injuries such as the various forms of moisture-associated skin damage (MASD) and friction injuries.[20] These types of skin damage can mimic PIs, especially if they occur near or on bony prominences, making it difficult for clinicians to identify the true etiologic event.[20] Incontinence-associated dermatitis (IAD) is common in patients with incontinence and is part of the broader group of skin conditions termed "moisture-associated skin damage."[21] Both incontinence and IAD are risk factors for PI development.[21,22] This is likely due to the changes in tissue properties and the increase of friction at the skin surface due to the presence of moisture. The location and appearance of IAD in many cases can make differentiation between IAD and PI difficult. Therefore, it is plausible that some stage 2 HAPIs can be erroneously categorized as PIs when in fact the skin damage may have been attributed to another source.

The definition of incontinence is extremely important when conducting studies like this. As an example, whether a patient with an indwelling catheter is considered urinary continent or incontinent when assessed is crucial. Specific guidance is not given in the IPUP survey instructions for answering the questions pertaining to incontinence and management practices, which could cause disconnect between these concepts and influence caregiver interpretation. In order to understand how WOC nurses define incontinence, we polled WOC nurses to determine their perceptions of incontinence management practices. Of the 906 WOC nurses who attended a conference symposium and responded to polling questions, 58% responded affirmatively that a patient with an indwelling or external catheter would be considered urinary incontinent and 74% responded that a patient would be considered fecal incontinent when using an internal or external fecal management system. Kayser and colleagues[2] excluded patients with indwelling catheters when calculating the prevalence for UI, with the rationale that indwelling catheters divert

TABLE 9.
Proportion of Patients With Incontinence Management by Continence Category Broken Down by Worst-Stage HAPI Severity for Medical-Surgical

		Medical-Surgical					
		Incontinence Type					
					Incontinent vs Continent Testing		
	Incontinence Management	Urine Incontinence	Fecal Incontinence	Dual Incontinence	Incontinent	Continent	*P*
Stage 1, 2 HAPI	Total HAPI patients by continence category	263	122	713	1,098	598	
	Fecal management system	0.0%	0.8%	3.4%	2.3%	0.2%	**.002**
	Foley/catheter	31.9%	51.6%	25.7%	30.1%	13.0%	**.000**
	Absorbent Underpad/brief	44.9%	48.4%	65.5%	58.7%	11.7%	**.000**
	Ostomy	1.9%	4.9%	1.4%	1.9%	2.7%	.39
	External urine management	13.2%	0.0%	14.1%	12.2%	1.3%	**.000**
Severe HAPI	Total HAPI patients by continence category	135	131	529	795	314	
	Fecal management system	0.7%	4.6%	6.0%	4.9%	0.3%	**.0004**
	Foley/catheter	39.3%	58.0%	34.0%	38.9%	18.5%	**.000**
	Absorbent Underpad/brief	40.0%	43.5%	52.2%	48.7%	12.4%	**.000**
	Ostomy	1.5%	5.3%	2.6%	2.9%	6.7%	**.006**
	External urine management	22.6%	5.4%	17.6%	16.6%	1.2%	**.000**
No HAPIs	Total HAPI patients by continence category	10,871	2713	14,523	28,107	90,393	
	Fecal management system	0.13%	2.1%	1.8%	1.2%	0.1%	**.000**
	Foley/catheter	25.1%	39.0%	17.1%	22.3%	4.2%	**.000**
	Absorbent Underpad/brief	52.1%	45.8%	67.1%	59.3%	5.1%	**.000**
	Ostomy	1.7%	10.9%	2.0%	2.7%	0.8%	**.000**
	External urine management	18.1%	2.2%	13.8%	14.4%	0.6%	**.000**

Abbreviation: HAPI, hospital-acquired pressure injury. Bold *P* values indicate statistical significance.

moisture from the skin and decrease moisture as a risk factor. In their study, UI prevalence was lower (7.0%) than that in our study and may be attributed to the exclusion of indwelling catheters from analysis. In contrast, patients using indwelling bowel management systems were included in the FI prevalence analysis, with the rationale that leakage can occur with the use of these devices that could impair skin integrity. Fecal incontinence rates reported in this study were also lower than those in our study at 6.7%, with very low usage of fecal management systems reported at 1.0%. Surprisingly, in our results, more FI patients had an ostomy than continent patients within the "no HAPIs" group, which again points to the influences of variability in operational definitions of incontinence and its impact on study outcomes.

Among all patients in this sample with UI, regardless of HAPI status, the most common incontinence management practices reported included indwelling catheters, followed by absorbent briefs or absorbent underpads. However, we acknowledge that indwelling urinary catheterization is not an appropriate incontinence strategy. Absorbent briefs or underpads were also the most frequently reported management strategy for FI. Incontinence practices were also analyzed by unit type. Among these groups, critically ill patients, regardless of HAPI status, had the highest prevalence of indwelling catheters at 72.9% and fecal management systems at 19.7%, with the highest usage in the severe HAPI group. These results differed from MS unit patients, in whom absorbent briefs or underpads were the most common incontinence management strategy for either UI or FI across all 3 HAPI groups (stage 1, 2; severe, no HAPIs). In the step-down area, indwelling catheters and absorbent briefs or underpads were the most common incontinence management strategies across all HAPI groups (stage 1, 2; severe; no HAPIs)

According to Mikel Gray, PhD (oral communication, 2020), an expert in the field of incontinence, if an incontinence management device is in place to divert the flow of urine or stool, then the patient is not considered incontinent. While the patient might have been incontinent prior to initiation of the intervention, once the strategy has been implemented, incontinence becomes less of a factor as stool or urine is diverted away from the skin. The lack of consistency with the definition of incontinence may account for the prevalence differences reported between studies. Standardized definitions of both UI and FI in these cases based on consensus among multiple experts are clearly needed.

Bowel, Bladder, and Incontinence Management in the Acute Care Setting

A clinical decision support tool (algorithm) that can guide clinicians was developed to provide guidance concerning bladder and incontinence management after indwelling catheter removal.[11] Strategies included independent or assisted toileting, absorbent underpads, body-worn absorbent products, and external collection devices.[11,12] In an effort to protect the skin when UI is present, gentle cleansing, moisturizing the skin, and protecting the skin with moisture barriers are recommended to decrease the occurrence of IAD.[23,24]

TABLE 10.
Proportion of Patients With Incontinence Management by Continence Category Broken Down by Worst-Stage HAPI Severity for Step-Down

		Step-Down					
		Incontinence Type					
					Incontinent vs Continent Testing		
	Incontinence Management	Urine Incontinence	Fecal Incontinence	Dual Incontinence	Incontinent	Continent	*P*
Stage 1, 2 HAPI	Total HAPI patients by continence category	55	32	138	225	118	
	Fecal management system	0.0%	3.1%	5.1%	3.6%	0.8%	.17
	Foley/catheter	60.0%	62.5%	41.3%	48.9%	22.0%	**.000**
	Absorbent Underpad/brief	32.7%	50.0%	53.6%	48.0%	5.9%	**.000**
	Ostomy	0.0%	3.1%	2.2%	1.8%	5.1%	.1
	External urine management	5.9%	0.0%	9.5%	7.8%	0.0%	**.03**
Severe HAPI	Total HAPI patients by continence category	40	30	167	237	71	
	Fecal management system	2.5%	10.0%	7.2%	9.4%	2.8%	.26
	Foley/catheter	57.5%	63.3%	44.3%	48.9%	26.8%	**.002**
	Absorbent Underpad/brief	20.0%	30.0%	49.1%	41.8%	14.1%	**.000**
	Ostomy	0.0%	3.3%	2.4%	2.1%	5.6%	.22
	External urine management	31.6%	27.3%	20.9%	23.3%	0.0%	**.007**
No HAPIs	Total HAPI patients by continence category	1470	419	2051	3940	11,272	
	Fecal management system	0.48%	4.5%	3.6%	2.5%	0.1%	**.000**
	Foley/catheter	33.7%	46.3%	26.5%	31.3%	6.0%	**.000**
	Absorbent Underpad/brief	42.7%	41.5%	61.5%	52.4%	5.3%	**.000**
	Ostomy	1.8%	5.5%	2.0%	2.3%	0.6%	**.000**
	External urine management	25.7%	8.3%	17.3%	19.6%	1.2%	**.000**

Abbreviation: HAPI, hospital-acquired pressure injury. Bold *P* values indicate statistical significance.

TABLE 11.
Proportion of Patients With Moisture Management by Continence Category Broken Down by Worst-Stage HAPI Severity for All Acute Care[a]

		All Acute Care					
		Incontinence Type					
					Incontinent vs Continent Testing		
	Moisture Management Status	Urine Incontinent	Fecal Incontinent	Dual Incontinent	Incontinent	Continent	*P*
Stage 1, 2 HAPI	Total at-risk HAPI patients by continence category	273	248	931	1,452	509	
	Moisture management = Yes	81.0%	91.0%	88.0%	87.0%	71.0%	**.000**
	Moisture management = No	9.5%	6.0%	7.0%	7.3%	11.0%	**.0002**
	Moisture management = Other	2.6%	1.6%	1.1%	1.4%	11.2%	**.000**
Severe HAPI	Total at-risk HAPI patients by continence category	244	329	1,048	1,621	395	
	Moisture management = Yes	89.0%	92.0%	91.0%	91.0%	77.0%	**.000**
	Moisture management = No	7.8%	5.5%	5.7%	6.0%	6.6%	.74
	Moisture management = Other	0.4%	1.2%	1.1%	1.0%	11.6%	**.000**
No HAPIs	Total at-risk HAPI patients by continence category	10,098	3,741	17,726	31,565	27,429	
	Moisture management = Yes	78.1%	85.7%	85.3%	83.1%	54.9%	**.000**
	Moisture management = No	7.3%	5.9%	6.2%	6.5%	6.8%	.20
	Moisture management = Otherß	2.8%	2.7%	1.3%	2.0%	15.3%	**.000**

Abbreviation: HAPI, hospital-acquired pressure injury. Bold *P* values indicate statistical significance.
[a]Other = "not necessary for patient"; "documented contraindication"; and "patient refused."

For patients with FI, the use of internal bowel management systems and rectal trumpets are used to contain stool and minimizing IAD.[25] However, these devices are only successful if stool is of a liquid consistency. Similar to UI, other management strategies include a structured skin care program that incorporates regular cleansing and applications of skin protectant creams, often combined with the use of absorbent products and external collection devices.[11,12,23,24] While the use of absorbent was identified as a frequently used management strategy for FI in this study, critically ill patients reported the highest use of bowel management systems and the highest rates of FI. Acute FI is reported in previous studies to affect 40% of critically ill patients,[26] higher than reported in our study at 21.7%. Fecal incontinence in the critically ill is multifactorial and can be related to impaired cognition, sedation, or impaired functional ability. Fecal incontinence as a result of acute diarrhea is also a concern and can occur as a result of infectious organisms such as *Clostridum difficile* colitis, antibiotic treatment of underlying acute illness such as septic shock, and can also occur with enteral feeding intolerance.[26] As part of the NDNQI PI prevalence reporting data on PI prevention practices, the application of moisture management strategies was recorded by participants during IPUP data collection. While the question is nonspecific in terms of type of moisture, overall the compliance rates to moisture management practices in U.S. hospitals is high at 81% for UI, 91% for FI and for DI, compliance was 88%. The difference between continent and incontinent patients was statistically significant with more incontinent patients receiving these strategies as would be clinically expected. Findings also indicate that more patients with severe HAPIs across all unit types exhibited the highest compliance to moisture management strategies. This study did not determine the extent of consistency of the moisture management strategies designed to prevent HAPI were implemented. Nevertheless, finding clearly support a relationship between UI, FI, and DI as risk factors for PI and the need for consistent implementation of practices to diminish this risk.

Opportunities for Future Research

This study revealed opportunities for future research focusing on the contributions of UI, FI, or DI to PI development and strategies to ameliorate this risk. We evaluated incontinence within various unit types in acute care hospitals, revealing important differences between both the prevalence of incontinence and the use of various management strategies. These areas are worthy of further investigation in which to validate our findings. We also recommend additional studies to determine the prevalence of IAD among patients with UI, FI, and DI and evaluation of various bowel, bladder, and incontinence management strategies for the prevention of IAD. A definitive definition of UI and FI among patients using various bowel and bladder management strategies such as indwelling urinary catheters and fecal management systems is also needed to improve consistency and reproducibility or prevalence measurement.

Strengths and Limitations

This is the first study known that has examined incontinence within various unit types in acute care hospitals, revealing important differences between both the prevalence of incontinence and the use of various management strategies. We recognize several limitations in this study. While this study encompassed a large sample size, the cross-sectional design only allowed us to explore and report incontinence rates along with various moisture management practices at a single point. All data were self-reported by facilities; therefore, errors and response bias are possible. However, most facilities use their wound care experts to lead the IPUP survey team, improving the likelihood that the data collected accurately represented the clinical assessments. The definition of FI and/or UI may have been misinterpreted by some respondents, based on our polling questions, therefore the actual prevalence based on reports of intervention strategies may have differed. The survey has a 24-hour time frame for data collection and it is not known if HAPI development may have been the result of inconsistent prevention practices prior to that data collection period.

CONCLUSION

Results of this study support the importance of incontinence as a risk factor in HAPI development. The prevalence of all types of incontinence was 31.7% for the entire sample; however, among those with HAPIs, an alarmingly 72.6% had some form of incontinence. Among all unit types, critical care unit patients with any type of incontinence also possessed the highest percentage of severe HAPIs (DTPIs). While incontinence has been identified for decades as a PI risk factor, a larger body of empirical evidence is still needed to fully understand this relationship.

REFERENCES

1. Condon M, Mannion E, Molloy DW, O'Caoimh R. Urinary and fecal incontinence: point prevalence and predictors in a university hospital. *Int J Environ Res Public Health*. 2019;16(2):194.
2. Kayser SA, Phipps L, VanGilder CA, Lachenbruch C. Examining prevalence and risk factors of incontinence-associated dermatitis using the International Pressure Ulcer Prevalence survey. *J Wound Ostomy Continence Nurs*. 2019;46(4):285-290.
3. Lachenbruch C, Ribble D, Emmons K, VanGilder C. Pressure ulcer risk in the incontinent patient: analysis of incontinence and hospital-acquired pressure ulcers from the International Pressure Ulcer Prevalence™ survey. *J Wound Ostomy Continence Nurs*. 2016;43(3):235-241.
4. Shahin ES, Lohrmann C. Prevalence of fecal and double fecal and urinary incontinence in hospitalized patients. *J Wound Ostomy Continence Nurs*. 2015;42(1):89-93.
5. National Pressure Injury Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance; Haesler E, ed. *Prevention and Treatment of Pressure Injuries/Ulcers: Clinical Practice Guideline*. Osborne Park, Western Australia: Cambridge Media; 2019.
6. Kayser SA, VanGilder CA, Lachenbruch C. Predictors of superficial and severe hospital-acquired pressure injuries: a cross-sectional study using the International Pressure Ulcer Prevalence™ survey. *Int J Nurs Stud*. 2019;89:46-52. doi:10.1016/j.ijnurstu.2018.09.003.
7. Kayser SA, Koloms K, Murray A, Khawar W, Gray M. Incontinence and incontinence-associated dermatitis in acute care: a retrospective analysis of total cost of care and patient outcomes from the Premier Healthcare Database. *J Wound Ostomy Continence Nurs*. 2021;48(6):545-552.
8. Kalra A, Lowe A, Al Jumaily A. An overview of factors affecting the skin's Young's modulus. *J Aging Sci.* 2016;4:2.
9. Demarre L, Verhaeghe S, Van Hecke A, Clays E, Grypdonck M, Beeckman D. Factors predicting the development of pressure ulcers in an at-risk population who receive standardized preventive care: secondary analyses of a multicentre randomised controlled trial. *J Adv Nurs*. 2015;71(2):391-403.
10. Gerhardt L-C, Strässle V, Lenz A, Spencer ND, Derler S. Influence of epidermal hydration on the friction of human skin against textiles. *J R Soc Interface*. 2008;5(28):1317-1328.

11. Gray M, Beeson T, Kent D, et al. Interventions Post Catheter Removal (iPCaRe) in the acute care setting: an evidence- and consensus-based algorithm. *J Wound Ostomy Continence Nurs*. 2020;47(6):601-618.
12. Gray M, Kent D, Ermer-Seltun J, McNichol L. Assessment, selection, use, and evaluation of body-worn absorbent products for adults with incontinence: a WOCN Society Consensus Conference. *J Wound Ostomy Continence Nurs*. 2018;45(3):243-264.
13. Centers for Disease Control and Prevention. Guideline for the prevention of catheter associated urinary tract infection. https://www.cdc.gov/infectioncontrol/guidelines/cauti/recommendations.html. Accessed March 4, 2022.
14. Dorman BP, Hill C, McGrath M, Mansour A, et al. Bowel management in the intensive care unit. *Intensive Crit Care Nurs*. 2004;20(6):320-329.
15. Press Ganey. Guidelines for data collection and submission on pressure injury indicator. 2021 NDNQI guideline. https://members.nursingquality.org/NDNQIPortal/Documents/General/Guidelines%20-%20PressureInjury.pdf. Accessed March 24, 2022.
16. Gray M, Giuliano KK. Incontinence-associated dermatitis, characteristics and relationship to pressure injury: a multisite epidemiologic analysis. *J Wound Ostomy Continence Nurs*. 2018;45(1):63-67.
17. Cox J, Edsberg LE, Koloms K, VanGilder CA. Pressure injuries in critical care patients in US hospitals: results of the International Pressure Ulcer Prevalence survey. *J Wound Ostomy Continence Nurs*. 2022;49(1):21-28.
18. Sala JJ, Mayampurath A, Solmos S, et al. Predictors of pressure injury development in critically ill adults: a retrospective cohort study. *Intensive Crit Care Nurs*. 2021;62:102924. doi:10.1016/j.iccn.2020.102924.
19. Kirkland-Kyhn H, Teleten O, Wilson M. A retrospective, descriptive, comparative study to identify patient variables that contribute to the development of deep tissue injury among patients in intensive care units. *Ostomy Wound Manage*. 2017;63(2):42-47.
20. Beeckman D, Van Lancker A, Van Hecke A, Verhaeghe S. A systematic review and meta-analysis of incontinence-associated dermatitis, incontinence, and moisture as risk factors for pressure ulcer development. *Res Nurs Health*. 2014;37(3):204-218. doi:10.1002/nur.21593.
21. Gray M, Black JM, Baharestani MM, et al. Moisture-associated skin damage: overview and pathophysiology. *J Wound Ostomy Continence Nurs*. 2011;38(3):233-241. doi:10.1097/WON.0b013e318215f798.
22. Beeckman D. A decade of research on incontinence-associated dermatitis (IAD): evidence, knowledge gaps and next steps. *J Tissue Viability*. 2017;26(1):47-56. doi:10.1016/j.jtv.2016.02.004.
23. Gray M, Beeckman D, Bliss DZ, et al. Incontinence-associated dermatitis: a comprehensive review and update. *J Wound Ostomy Continence Nurs*. 2012;39(1):61-74.
24. Global IAD Expert Panel. Incontinence associated dermatitis: moving prevention forward. https://multimedia.3m.com/mws/media/1048834O/incontinence-associated-dermatitis-best-practice-principles.pdf. Accessed March 4, 2021.
25. Beeson T, Eifrid B, Pike CA, Pittman J. Do intra-anal bowel management devices reduce incontinence-associated dermatitis and/or pressure injuries? *J Wound Ostomy Continence Nurs*. 2017;44(6):583-588.
26. Bayon Garcia C, Binks R, DeLuca R, et al. Expert recommendations for managing acute faecal incontinence with diarrhea in the intensive care unit. *J Intensive Care Soc*. 2013;14(4)(suppl 2). https://journals.sagepub.com/doi/pdf/10.1177/17511437130144S201. Accessed March 4, 2013.