Evidence to Decision Frameworks: Implementation of Best Practice

Clinical question What organisational level issues facilitate or are barriers to implementing best practice in pressure injury prevention and treatment?

Recommendation 20.1 **At an organizational level, assess and maximize workforce characteristics as part of a quality improvement plan to reduce pressure injury incidence.**

Option: Assessing skills mix
Comparison: Not assessing skills mix

Background: Workforce characteristics including skills mix and permanency of the work force are factors that may influence the successful implementation of pressure ulcer prevention and treatment strategies.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☒ | *Low* ☐ | *Moderate* ☐ | *High* ☐	**Evidence for skills mix and staffing permanency on pressure injury incidence** *Significant positive effect* • In US medical-surgical units (n=1,104 participants), hours of licensed practical nurse on day three of care was a predictor of developing a pressure injury incidence.[1] (*Level 3 prognostic, low quality*) • In a cohort of hospitalized individuals in Australia (n=36,529) being in an understaffed ward was associated with a statistically significant increase in odds of having a pressure injury (OR 1.07, 95% CI 1.05 to 1.09, p<0.001).[2] (*Level 3 prognostic, low quality*) • In nursing homes in the US (n=1,366 homes), there was a significant relationship between hours of registered nurses employed per resident day and pressure injury incidence (p<0.01).[3] (*Level 3 prognostic, low quality*) • In US hospitals (n=5 facilities), medical-surgical units showed a significant association between pressure injury incidence and total nursing care hours per patient day (r=-0.485; p<0.05), total registered nurse hours per patient day (r=-0.525; p<0.05), and total registered nurse hours staffed by agency staff (r=0.586; p=0.022).[4] (*Level 3, low quality*) • In US nursing homes (n = 35), there was a significant 21% increase in pressure injury rates in facilities that reduced their staffing levels or replaced licensed nurses with nursing assistants (p=0.004).[5] (*Level 4, moderate quality*) • In US acute care hospitals (n=2,397 units), an increase in 1 percentage point in register nurse mix was associated with a 1.2% reduction in odds of unit acquired pressure injuries.[6] (*Level 4, moderate quality*) • In US nursing homes (n=195), higher rates of staffing with registered nurses was associated with a 11.3% reduction in pressure injury incidence.[7] (*Level 4, moderate quality*) • In US nursing homes, there was a significant relationship between both the length of time the nursing home administrator had been in the role (p<0.05) and the length of time the director of nursing had been in the role (p<0.05) and pressure injury incidence.[8] (*Level 4, low quality*)
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☐ | *No known undesirable outcomes* ☒	
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
How substantial are the undesirable anticipated effects?	*Unclear* ☒ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	*Non-significant effect* • In US hospitals (n = 799 facilities), there was no statistically significant association between pressure injury incidence and register nurse hours per patient day.[9] (*Level 4, moderate quality*) • In US nursing homes (n = 35), there was no statistically significant association between pressure injury rates and having a high staff turnover (p=0.479).[5] (*Level 4, high quality*) • In US hospital (n=35 step down units), there was no significant associations between staffing mix/models and

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS	
			pressure injury incidence.[10] (*Level 4, moderate quality*) • In US critical care and step-down units (n=539 participants), there was no significant associations between staffing mix/models and pressure injury incidence.[1] (*Level 3 prognostic, low quality*) • In US hospitals (n=5 facilities), critical care units showed no significant association between pressure injury incidence and total nursing care hours per patient day, total registered nurse hours per patient day or total licensed practical nurses per patient day.[4] (*Level 3, low quality*) **Strength of Evidence: Strength of Evidence: C mixed evidence**	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ | *Not sub-stantial* ☐ | *Probably not sub-stantial* ☐ | *Probably sub-stantial* ☐ | *Sub-stanital* ☐ | *Varies* ☐	No evidence available	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☒ | *Yes* ☐ | *Varies* ☐	• In hospitals in Nigeria (n=193), nurses identified frustration with having inadequate staff as a barrier to providing best practice, suggesting a review of staffing would be acceptable to health professionals.[11] • In critical care (n=15 nurses), 20% reported inadequate staffing was a barrier to providing best practice, suggesting a review of staffing would be acceptable to health professionals.[12] (*Indirect evidence*).	
	Is the option a priority for key stakeholders?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	It is feasible to evaluate the characteristics of the staff work force in all clinical and geographic locations. Changing the characteristics of the workforce might be less feasible in some areas. (*Expert opinion*).	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings	Undesirable consequences *probably outweigh* desirable consequences in most settings	The balance between desirable and undesirable consequences *is closely balanced or uncertain*	Desirable consequences *probably outweigh* undesirable consequences in most settings	Desirable consequences *clearly outweigh* undesirable consequences in most settings
	☐	☐	☐	☒	☐
Strength of recommendation	Strong negative recommendation: Definitely don't it	Weak negative recommendation: Probably don't do it	No specific recommendation	Weak positive recommendation: Probably do it	Strong positive recommendation: Definitely do it
	☐	☐	☐	☒	☐

Justification

The recommendation to assess and maximize workforce characteristics is underpinned by several studies that provided evidence that the skills mix (i.e, ratio of registered nurses to licensed/enrolled nurse) and staffing levels contributes to the pressure injury incidence. Two low quality Level 3 studies[1-3] demonstrated that understaffing,[2] number of registered nurses per resident per day[3] and number of hours of care by a licensed practical nurse (LPN)[1] are prognostic factors for developing a pressure injury. A low quality Level 3 study,[4] and moderate[5-7] and low quality[8] Level 4 studies also demonstrated relationships between workforce characteristics and pressure injury incidence. Higher pressure injury rates were associated with the organization having with fewer qualified nurses, fewer nursing hours and lower rates of staff permanency. Two low quality Level 3 studies[1,4] and three Level 4 studies[5,9,10] showed that workforce characteristics (including skills mix, number of registered nurse working hours and staff permanency) were not statistically significantly associated with pressure injury incidence.

Clinical question	What organisation level issues facilitate or are barriers to implementing best practice in pressure injury prevention and treatment?

Recommendation 20.2	**At the organization level, assess the knowledge health professionals have about pressure injuries to facilitate implementation of education and quality improvement programs.**

Option: Assessing knowledge
Comparison: No knowledge assessment

Background:. Evaluation of health professional education before and after education delivery provides an indication as to whether the intervention is successful. The pre-evaluation identifies quality improvement needs.

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
BENEFITS & HARMS OF THE PRACTICE	**What is the overall certainty of the evidence?**	*No included studies* ☐ | *Very low* ☐ | *Low* ☒ | *Moderate* ☐ | *High* ☐	**Evidence for reduction in pressure injury incidence/prevalence** • In Belgian nursing home wards (n=11), a multi-faceted quality improvement program associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (7.1% versus 14.6%) included baseline and assessment of staff knowledge of pressure injuries.[13] (*Level 1, high quality*) • In Australian acute and aged care (n=648 beds), a multi-faceted quality improvement program associated with a reduction in pressure injury point prevalence compared to standard care (7.1% versus 14.6%) included a baseline knowledge assessment.[14] (Level 2, low quality) • In a US hospital, a multi-faceted quality improvement program associated with a reduction in pressure injury incidence and prevalence compared to standard care included baseline evaluation of staff understanding of pressure injury prevalence rates.[15] (*Level 2, low quality*) • In an aged care setting, a multi-faceted education program the content of which was based on a baseline evaluation of knowledge levels of health professionals was associated with a reduction in pressure injury incidence over 12 months (12·5% vs 6·8%, p=0·01).[16] (*Level 2, low quality*).
	Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☒ | *No known undesirable outcomes* ☐	
	How substantial are the desirable anticipated effects?	*Unclear* ☒ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substantial* ☐	
	How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	**Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, Most studies have consistent outcomes and inconsistencies can be explained**
	Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ | *Not sub-stantial* ☐ | *Probably not sub-stantial* ☐ | *Probably sub-stantial* ☐ | *Sub-stanital* ☐ | *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available.	
PRIORITY AND ACCEPTABILITY	**Is the option a priority for key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available.	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☒ | *Yes* ☐ | *Varies* ☐	Assessment of health professional knowledge is feasible in most clinical settings (*Expert opinion*).	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings ☐	Undesirable consequences *probably outweigh* desirable consequences in most settings ☐	The balance between desirable and undesirable consequences *is closely balanced or uncertain* ☐	Desirable consequences *probably outweigh* undesirable consequences in most settings ☒	Desirable consequences *clearly outweigh* undesirable consequences in most settings ☐
Strength of recommendation	Strong negative recommendation: Definitely don't it ☐	Weak negative recommendation: Probably don't do it ☐	No specific recommendation ☐	Weak positive recommendation: Probably do it ☒	Strong positive recommendation: Definitely do it ☐
Justification	The recommendation to assess staff knowledge to facilitate education and quality improvement programs is supported by three studies providing high quality Level 1 evidence[13] and low quality Level 2 evidence.[14,15] In all three studies,[13-15] knowledge survey results were used to develop organization-specific education interventions as a component of multi-faceted quality improvement programs that achieved reductions in pressure injury incidence. Additionally, one low quality Level 2 study[16] that demonstrated significant reduction in pressure injury incidence implemented a multi-faceted health professional education program that was based on the results of a knowledge assessment.				

Clinical question	What organisation level issues facilitate or are barriers to implementing best practice in pressure injury prevention and treatment?
Good Practice Statement 20.3	**At an organizational level, assess and maximize workforce attitudes and cohesion to facilitate implementation of a quality improvement program.**

Background: Before developing a quality improvement plan, identify strengths that can be capitalized on and weaknesses requiring address. Barriers and facilitators for guideline implementation are specific to the organization; therefore assessment at a local level is required. Attitude of health professionals is a factor that could influence the successful implementation of pressure ulcer prevention and treatment strategies.[17]

	SUPPORTING EVIDENCE, WHEN AVAILABLE
Evidence to support the opinion (when available)	***Relationship between pressure injuries and workforce attitudes*** • For medical-surgical nurses in India (n=100), teamwork and collaboration were identified by the nurses as the most important facilitator for providing pressure injury prevention.[18] (*Indirect evidence*) • In aged care in Finland (n=66 facilities), feeling time-pressured at work was significantly associated with an increase in pressure injury incidence (p=0.05).[19] (*Level 4, high quality*) • In nursing homes in Netherlands, group culture (including hierarchical structures) and team climate was not associated with pressure injury prevalence.[20] (*Level 4, moderate quality*) • In nursing homes in the US (n=40), group/development culture (scored on a 100-point scale) were significantly associated with quality improvement implementation (p<0.001)[21] (*Level 4, high quality*). ***Factors influencing attitudes*** • For registered nurses in Jordan (n=428), nurses held positive attitudes regarding pressure ulcers prevention (mean = 3.91), with positivity increasing with years of experience.[22] (*Indirect evidence*) • For nurses in critical care in Sweden (n=146), nurse attitudes in terms of interest in pressure injury prevention increased as education level increased (p=0.009).[23] (*Indirect evidence*)
Justification	Evidence provided by nursing staff members in surveys and interviews in four studies[18,19,22,23] identified team work and team cohesion as important in the implementation of quality improvement programs. Positive team climate and attitudes of individual health professions can be a facilitator for implementing best practice, while lack of time and negative attitudes to pressure injury prevention are barriers to quality improvement programs.

Clinical question What organisational level issues facilitate or are barriers to implementing best practice in pressure injury prevention and treatment?

Recommendation 20.4 **At an organizational level, assess and maximize the availability and quality of equipment and standards for its use as part of a quality improvement plan to reduce the incidence of pressure injuries.**

Option: Evaluating equipment/products in the facility
Comparison: Using existing equipment with no review

Background: Access to appropriate equipment, including support surfaces, medical devices and wound supplies is fundamental requirements in preventing and treating pressure injuries.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☐ | *Low* ☒ | *Moderate* ☐ | *High* ☐	**Evidence for reduction in pressure injury incidence/prevalence** • In Belgian nursing home wards (n=11), a multi-faceted quality improvement program associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (7.1% versus 14.6%) included a comprehensive review of the support surfaces in the facility.[13] (*Level 1, high quality*) • In a US nursing home (n=137 beds), a multi-faceted quality improvement program associated with a 86% reduction over six years in pressure injuries (p<0.001) compared to standard care included reviewing all the support surfaces.[24] (*Level 2, moderate quality*) • In US acute care hospitals (n=548 beds in 2 facilities), a multi-faceted quality improvement program associated with a reduction over three years in pressure injuries compared to standard care (2% versus 12.8%) included purchasing new pressure redistribution support surfaces.[25] (*Level 2, low quality)* • In a US community hospital, a multi-faceted quality improvement program associated with a reduction over four years in pressure injuries compared to standard care (0% versus 12%) included purchasing new pressure redistribution support surfaces.[26,27] (*Level 2, low quality*) • In Australian in-patient services (n=41), a multi-faceted quality improvement program associated with a reduction in pressure injury prevalence over two years (from 29.4% to 13%) included review of available support surfaces in the facility.[28] (*Level 4, moderate quality*) • In UK intensive care units (n=21,182 patients), a multi-faceted quality improvement program associated with a 63% risk reduction over four years in pressure injuries included changing the mattresses in the facility.[29] (*Level 4, low quality*) • In Australian acute and sub acute units (n=3,937 participants), a multi-faceted quality improvement program associated with a reduction over four years included providing new pressure-relieving equipment/devices.[30] (*Level 4, low quality*) **Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, Most studies have consistent outcomes and inconsistencies can be explained**
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☒ | *No known undesirable outcomes* ☐	
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ *Not sub-stantial* ☐ *Probably not sub-stantial* ☐ *Probably sub-stantial* ☐ *Sub-stanital* ☐ *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ *Probably No* ☐ *Uncertain* ☐ *Probably Yes* ☒ *Yes* ☐ *Varies* ☐	• In Australian in-patient services (n=41), there was 90.9% compliance with reviewing and selecting appropriate support surfaces within two years of introducing a quality improvement initiative.[28] (*Level 4, moderate quality*) • In intensive care units in Sweden (n = 146 staff), 57.8% of nurses identified the access to appropriate equipment as a factor influencing effectiveness of a quality improvement program[23] (*Indirect evidence*). • In hospitals in India (n=100 nurses), nurses identified inadequate supplies as one of the top five barriers to effectiveness of a quality improvement program[18] (*Indirect evidence*). • In hospitals in Nigeria (n=193), 40% of nurses identified lack of support surfaces as a barrier to providing best practice, suggesting a review of equipment would be acceptable to health professionals.[11] (*Indirect evidence*). • In critical care (n=15 nurses), 25% reported insufficient equipment was a barrier to providing best practice, suggesting a review of equipment would be acceptable to health professionals.[12] (*Indirect evidence*). • In critical care in Saudi Arabia (n=56 nurses), ease with which support surfaces and wound care supplies could be obtained were significantly related to health professionals implementing best practice.[31] (*Indirect evidence*).	
	Is the option a priority for key stakeholders?	*No* ☐ *Probably No* ☐ *Uncertain* ☒ *Probably Yes* ☐ *Yes* ☐ *Varies* ☐	• No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ *Probably No* ☐ *Uncertain* ☐ *Probably Yes* ☐ *Yes* ☐ *Varies* ☒	Individual health professionals may not have the technical knowledge and skills to review the support surface quality, function and applicability of use. (*Expert opinion*)	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings	Undesirable consequences *probably outweigh* desirable consequences in most settings	The balance between desirable and undesirable consequences *is closely balanced or uncertain*	Desirable consequences *probably outweigh* undesirable consequences in most settings	Desirable consequences *clearly outweigh* undesirable consequences in most settings
	☐	☐	☐	☐	☒
Strength of recommendation	Strong negative recommendation: Definitely don't it	Weak negative recommendation: Probably don't do it	No specific recommendation	Weak positive recommendation: Probably do it	Strong positive recommendation: Definitely do it
	☐	☐	☐	☐	☒
Justification	Evidence supporting the recommendation comes from one high quality Level 1 study,[13] one moderate[24] and two low[25-27] quality Level 2 studies, and additional Level 4 studies.[28-30] The studies were conducted in a range of clinical and geographic locations and all reported quality improvement programs that demonstrated reduction in pressure injury incidence and/or prevalence after commencement of the program. All the quality improvement programs incorporated an assessment of equipment and/or products in the facility as a component of the program, including reviewing, replacing and/or changing procurement arrangements for equipment and/or products. The resources required to conduct an equipment review were not clear, but in one moderate quality Level 4 study[28] that measured compliance, there was a very high level of delivery of the initiative by health professionals.				

Clinical question What organisational level interventions/quality improvement programs are effective in attaining sustained pressure injury prevention?

Recommendation 20.5 **At an organizational level, develop and implement a structured, tailored and multi-faceted quality improvement program to reduce the incidence of pressure injuries.**

Option: A multi-faceted quality improvement intervention aimed at reducing pressure injuries introduced at an organizational level
Comparison: Standard care in the facility

Background: A facility's ongoing involvement in quality improvement initiatives appears to be associated with significant reductions in pressure injury prevalence within the facility.

BENEFITS & HARMS OF THE RECOMMENDED PRACTICE

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
What is the overall certainty of the evidence of effectiveness?	*No included studies* ☐ | *Very low* ☐ | *Low* ☐ | *Moderate* ☐ | *High* ☒	*Due to the large volume of research, only studies providing Level 1 evidence are provided in detail.* **Pressure injury incidence** • In Australian hospitals (n=8), a multi-faceted quality improvement program was associated with a non-significant reduction in pressure injuries at the patient level compared to standard care (6.1% versus 10.5%, p>0.05), but a significant reduction in incident rate ratio (IRR 0.48, 95% CI 0.33 to 0.69, p<0.0001).[32] (*Level 1, high quality*) • In Belgian nursing home wards (n=11), a multi-faceted quality improvement program was associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (7.1% versus 14.6%).[13] (*Level 1, high quality*) • In Saudi Arabian intensive care units (n=2), a multi-faceted quality improvement program was associated with a significant 70% lower rate of pressure injuries compared to standard care (7.14% versus 32.86%, p<0.001).[33] (*Level 1, moderate quality*) • In US nursing homes (n=58), a multi-faceted quality improvement program was associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care(odds ratio [OR] 1.23, 95% CI 1.00 to 1.52, p=0.05).[34] (*Level 1, moderate quality*) In addition to the *Level 1* evidence above, 17 *Level 2* studies[14,15,24-27,35-45] conducted in critical care, acute care, aged care, community care and pediatric care provided evidence that a multi-faceted quality improvement program was associated with a significant reduction in pressure injury incidence. (*Level 2, high, moderate and low quality*). In addition to the *Level 1* evidence above, 5 *Level 3* studies[46-50] conducted in critical care, acute care, aged care, community care and pediatric care provided evidence that a multi-faceted quality improvement program was associated with a significant reduction in pressure injury incidence. (*Level 3, moderate and low quality*). In addition to the *Level 1* evidence above, 11 *Level 4* studies[28-30,51-58] conducted in critical care, acute care, aged care, community care and pediatric care provided evidence that a multi-faceted quality improvement program was associated with a significant reduction in pressure injury incidence. (*Level 4, high, moderate and low quality*). **Strength of Evidence: A - More than one high quality Level I study providing direct evidence, consistent body of evidence**
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☒ | *No known undesirable outcomes* ☐	
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☐ *Not sub-stantial* ☐ *Probably not sub-stantial* ☐ *Probably sub-stantial* ☐ *Sub-stanital* ☒ *Varies* ☐	• In Australian hospitals (n=8), a multifaceted intervention that was demonstrated as likely to have had an impact on pressure injury incidence showed an estimated net monetary benefit for care bundle of −$2320 (95%CI −$3900, −$1175) per individual (AUD in 2016).[59] (*High quality economic analysis*) • In a hospital in Demark that demonstrated a 9.3% reduction in pressure injuries through introduction of a pressure injury prevention bundle, there was an estimated net savings per patient of €38.62 (Euros in 2013).[60] (*Low quality economic analysis*) • In a study conducted in a US hospital (n=511 beds), a quality improvement bundle that demonstrated a 77% reduction in pressure injury incidence showed a cost savings of $95,120.[43] (*Low quality economic analysis*) • In a study conducted in 12 US nursing homes, introduction of a quality improvement bundle that was associated with a 59% reduction in monthly pressure injury incidence demonstrated a 2.6 reduction in care costs (approximate saving of $20,800 per 100 residents, US dollars in 2014).[48] (*Low quality economic analysis*) • In a study that demonstrated an association between a pressure injury bundle and reduction in pressure injury incidence, the intervention was associated with an approximate $12 million reduction in costs over four years (NZD in 2015).[52] (*Low quality economic analysis*)	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ *Probably No* ☐ *Uncertain* ☐ *Probably Yes* ☒ *Yes* ☐ *Varies* ☐	*Health professionals* • Australian nurses (n=18) reported that a pressure injury bundle improved communication between patients, nurses and other staff; encouraged more holistic care delivery and that the intervention was acceptable.[61] (*Indirect evidence*) • Australian nurses (n=20) reported that a pressure injury bundle improved communication between patients, nurses and other staff; increased awareness, encouraged collaboration and that the intervention was acceptable.[62] (*Indirect evidence*) • In two ICUs in Saudi Arabia, 78% of nurses (n=11 participants) were rated as having a high degree of compliance with delivering a pressure injury bundle.[31] (*Indirect evidence*) *Patients* • Australian patients (n=19) reported that a pressure injury bundle improved personal contact and patient participation in care.[63] (*Indirect evidence*)	
	Is the option a priority for key stakeholders?	*No* ☐ *Probably No* ☐ *Uncertain* ☒ *Probably Yes* ☐ *Yes* ☐ *Varies* ☐	No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ *Probably No* ☐ *Uncertain* ☐ *Probably Yes* ☐ *Yes* ☐ *Varies* ☒	• Quality improvement bundles require resources and leadership, which vary in different clinical and geographic locations. (*Expert opinion*)	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings ☐	Undesirable consequences *probably outweigh* desirable consequences in most settings ☐	The balance between desirable and undesirable consequences *is closely balanced or uncertain* ☐	Desirable consequences *probably outweigh* undesirable consequences in most settings ☐	Desirable consequences *clearly outweigh* undesirable consequences in most settings ☒
Strength of recommendation	Strong negative recommendation: Definitely don't it ☐	Weak negative recommendation: Probably don't do it ☐	No specific recommendation ☐	Weak positive recommendation: Probably do it ☐	Strong positive recommendation: Definitely do it ☒
Justification	Evidence from two high[13,32] and two moderate[33,34] quality Level 1 studies indicated that a multi-faceted quality improvement program is associated with reductions in facility-acquired pressure injuries. This was supported by 17 *Level 2* studies[14,15,24-27,35-45] of high, moderate and low quality; five *Level 3* studies[46-50] of moderate and low quality and 11 *Level 4* studies[28-30,51-58] of high, moderate and low quality. The studies were conducted in a range of facilities including acute medical-surgical hospitals, critical/intensive care facilities, nursing homes, community care and pediatric hospitals. The studies were also delivered in a range of geographic locations including the US, Europe, the Middle East and the Pan-Pacific. The interventions in all studies included a range of initiatives that were tailored to the facility and often increased as the quality improvement program continued. Reported effectiveness varies and is likely contributed to by the baseline pressure injury incidence and factors discussed throughout this chapter. One high quality economic analysis[59] and four lower quality economic analyses[43,48,52,60] indicated that the resources required to implement a quality improvement program are substantial, but lead to cost savings through prevention of pressure injuries. Qualitative studies indicated that health professionals[31,61,62] and individuals and their informal caregivers[63] find quality improvement programs to be acceptable.				

Clinical question	What are the professional, structural and organisational components of organisation level interventions/quality improvement programs that are effective in attaining sustained pressure injury prevention?

Recommendation 20.6 **At an organizational level, engage all key stakeholders in oversight and implementation of the quality improvement program to reduce the incidence of pressure injuries.**

Option: Engaging all stakeholders
Comparison: Program driven by one group of stakeholders

Background: Strong leadership should actively engage all stakeholders, including management, health professionals, patient individuals and informal caregivers.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☐ | *Low* ☐ | *Moderate* ☒ | *High* ☐	**Management engagement** • In a US regional hospital network (n=21 facilities), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over four years compared to standard care included a regional level steering committee with management and clinical staff.[37] (*Level 2, low quality*) • In acute and home care in a US region, a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over four years (from 53% to 12%) included a regional level steering committee meeting with management and clinical staff.[54](*Level 4, low quality*)
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☒ | *No known undesirable outcomes* ☐	**Staff engagement** • In US nursing homes (n=58), a multi-faceted quality improvement program that was associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (OR 1.23, 95% CI 1.00 to 1.52, p=0.05) included partnership between management and interdisciplinary care staff, and promotion of team decision-making.[34] (*Level 1, moderate quality*) • In a US nursing home (n=mean 137 beds per month), a multi-faceted quality improvement program associated with a significant 86% reduction in pressure injury prevalence over six years compared to standard care included formation of interdisciplinary leadership team.[24] (*Level 2, moderate quality)* • In a US regional hospital network (n=21 facilities), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over four years compared to standard care included a regional level steering committee with management and clinical staff.[37] (*Level 2, low quality*) • In acute care facilities in Sweden, there was no significant change in pressure injury incidence in at-risk individuals 14 months after introduction of a multi-faceted quality improvement program in which first line managers teamed with care delivery staff to evaluate the program (8.4% versus 9%, p>0.05).[45] (*Level 2, low quality*) • In Australian surgical units, a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 13 months included interdisciplinary team meetings.[46] *(Level 3, moderate quality*) • In acute and home care in a US region, a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over four years (from 53% to 12%) included a regional level steering committee meeting with management and clinical staff.[54](*Level 4, low quality*)
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	**Patient and family engagement**

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS	
			• In Australian hospitals (n=8), a multi-faceted quality improvement program that was associated with a significant reduction in incident rate ratio (IRR 0.48, 95% CI 0.33 to 0.69, p<0.0001) included patient engagement in pressure injury prevention and face-face patient education.[32] (*Level 1, high quality*) • In Australian acute and aged care (n=648 beds), a multi-faceted quality improvement program associated with a reduction in pressure injury point prevalence compared to standard care (7.1% versus 14.6%) included patient and family member engagement in pressure injury prevention.[14] (*Level 2, low quality)* • In a US pediatric hospital (n=490 beds), a multi-faceted quality improvement program associated with a reduction in tracheostomy-related pressure injury incidence over 22 months (mean 0.3% versus mean 8.1%) compared to standard care included patient and parent education and information leaflets.[36] (*Level 2, moderate quality*) • In New Zealand hospitals, a multi-faceted quality improvement program associated with a reduction in pressure injuries of all Categories/Stages included patient education and information leaflets.[52] (*Level 4, low quality)* **Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, Most studies have consistent outcomes and inconsistencies can be explained**	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ | *Not sub-stantial* ☐ | *Probably not sub-stantial* ☐ | *Probably sub-stantial* ☐ | *Sub-stanital* ☐ | *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☒ | *Yes* ☐ | *Varies* ☐	• In intensive care units in Sweden (n = 146 staff), 28.9% of nurses identified the patient's cognitive state as a factor influencing effectiveness of a quality improvement program[23] (*Indirect evidence*). • In hospitals in India (n=100 nurses), nurses identified lack of patient co-operation as one of the top five barriers to effectiveness of a quality improvement program[18] (*Indirect evidence*). • Australian nurses (n=18) reported that a pressure injury bundle focused on patient participation was an acceptable intervention.[61] (*Indirect evidence*) • Australian nurses (n=20) reported that a pressure injury bundle focused on patient participation was an acceptable intervention, and level of patient engagement influenced success or otherwise of the intervention.[62] (*Indirect evidence*)	
	Is the option a priority for key stakeholders?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☒ | *Yes* ☐ | *Varies* ☐	Engagement with all stakeholders is feasible in most clinical settings (*Expert opinion*).	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings ☐	Undesirable consequences *probably outweigh* desirable consequences in most settings ☐	The balance between desirable and undesirable consequences *is closely balanced or uncertain* ☐	Desirable consequences *probably outweigh* undesirable consequences in most settings ☒	Desirable consequences *clearly outweigh* undesirable consequences in most settings ☒
Strength of recommendation	Strong negative recommendation: Definitely don't it ☐	Weak negative recommendation: Probably don't do it ☐	No specific recommendation ☐	Weak positive recommendation: Probably do it ☐	Strong positive recommendation: Definitely do it ☒
Justification	Key stakeholders include management, health professionals and untrained staff, patients and families/informal caregivers. The recommendation is underpinned by a high quality Level 1 study that included a partnership between management and interdisciplinary care staff and promotion of team decision-making into a successful quality improvement program[34] as well as a low quality Level 2 study that incorporated a regional level steering committee with management and clinical staff.[37] A low quality Level 4 study also showed benefits of a regional oversight committee that included management and care staff.[54] A moderate quality Level 2 study[24] and a moderate quality Level 3 study[46] both included interdisciplinary team engagement in a quality improvement initiative. Patient engagement in quality care delivery was a primary focus of a quality initiative reported in a high quality Level 1 study[32] and was also a component of programs reported in Level 2[14,36] and Level 4 studies.[52] In surveys providing indirect evidence,[18,23] nursing staff identify barriers to implementing quality care when the patient individual is unable or unwilling to be involved in care, suggesting patient engagement is both important and acceptable to health professionals.				

Clinical question	What are the professional, structural and organisational components of organisation level interventions/quality improvement programs that are effective in attaining sustained pressure injury prevention?

Recommendation 20.7 **At an organizational level, include evidence-based policies, procedures and protocols and standardized documentation systems as part of a quality improvement plan to reduce the incidence of pressure injuries.**

Option: Implementing evidence based protocols
Comparison: Not implementing evidence-based protocols

Background: Using evidence to underpin the policies, procedures and protocols in the facility ensures that clinical practice is based on sound evidence, with limited unnecessary variation in care, leading to benefits to patients.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☐ | *Low* ☐ | *Moderate* ☒ | *High* ☐	**Evidence for evidence-based protocols for reduction in pressure injury incidence** • In Saudi Arabian intensive care units (n=2), a multi-faceted quality improvement program that was associated with a significant 70% lower rate of pressure injuries compared to standard care (p<0.001) included a bundle of policies based on evidence based international clinical guidelines.[33] (*Level 1, moderate quality*) • In US intensive care units (n=327), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence compared to standard care (2.1% versus 15.5%) includes use of a standardized guideline.[35] (*Level 2, moderate quality*) • In a US hospital, a multi-faceted quality improvement program that was associated with a lower incidence of pressure injuries (med-surg unit 12% versus 7%) compared to standard care was based on best practice clinical guidelines.[15] (*Level 2, low quality*) • In US acute care hospitals (n=2), a quality improvement program that was associated with a 67% reduction in hospital acquired pressure injuries over four years included a preventive care regimen based on international clinical guidelines.[64] (*Level 2, low quality*) • In a US long term acute care hospital (N=108 beds), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 12 months compared to standard care (41% versus 4.2%) included introduction of guideline-based policies and procedures.[40] (*Level 2, low quality*) • In a US regional hospital network (n=21 facilities), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over four years compared to standard care included an evidence based assessment and management protocol.[37] (*Level 2, low quality*) • In Australian acute and aged care (n=648 participants), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over three years compared to standard care (3.7% versus 11%) included an evidence based care program.[14] (*Level 2, low quality*) • In US acute care hospitals, a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over three years compared to standard care (2% versus 12.8%) included nurse-generated evidence based care planning.[25] (*Level 2, low quality*) • In a Lebanese medical center (n=19), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 16 months compared to standard care (n=2.47% versus n=6.63%, p<0.01) included use of standardized classification system derived from international guidelines.[39] (*Level 2, low quality*) In addition to the *Level 1 and 2* evidence above, one *Level 3* study[50] and two *Level 4* studies[29,30] conducted in critical care, acute care, aged care, community care and pediatric care provided evidence that a multi-faceted quality improvement program was associated with a significant reduction in pressure injury incidence. (*Level 3 and 4, high, moderate and low quality*)
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☒ | *No important uncertainty or variability* ☐ | *No known undesirable outcomes* ☐	
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS	
			Evidence for standardized documentation for reduction in pressure injury incidence • In a US long term acute care hospital (N=108 beds), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 12 months compared to standard care (41% versus 4.2%) included use of electronic medical records in conjunction with computerized internal reporting.[40](*Level 2, low quality*) • In US acute care hospitals, a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over three years compared to standard care (2% versus 12.8%) included use of electronic medical records in conjunction with automated WOCN referrals[25] (*Level 2, low quality*) • In US long term care facilities (n=11), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence (4.6% versus 12.1%) included a standardized documentation system linked to an automated alert system for high risk individuals[38] (*Level 2, moderate quality*) In addition to the *Level 2* evidence, and two *Level 4* studies[53,54] conducted in acute care and pediatric care provided evidence that a standardized documentation system was associated with a significant reduction in pressure injury incidence. (*Level 4, low quality*) **Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, Most studies have consistent outcomes and inconsistencies can be explained**	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND DDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ | *Not sub-stantial* ☐ | *Probably not sub-stantial* ☐ | *Probably sub-stantial* ☐ | *Sub-stanital* ☐ | *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available
	Is the option a priority for key stakeholders?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	Evidence based clinical resources can be used in all clinical settings (*Expert opinion*).

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings	Undesirable consequences *probably outweigh* desirable consequences in most settings	The balance between desirable and undesirable consequences *is closely balanced or uncertain*	Desirable consequences *probably outweigh* undesirable consequences in most settings	Desirable consequences *clearly outweigh* undesirable consequences in most settings
	☐	☐	☐	☐	☒
Strength of recommendation	Strong negative recommendation: Definitely don't it	Weak negative recommendation: Probably don't do it	No specific recommendation	Weak positive recommendation: Probably do it	Strong positive recommendation: Definitely do it
	☐	☐	☐	☐	☒

Justification

This recommendation is underpinned by one moderate quality Level 1 study,[33] one moderate quality Level 2 study,[35] seven low quality Level 2 studies,[14,15,25,37,39,40,64] one low quality Level 3 study[50] and two low quality Level 4 studies.[29,30] All these studies reported multi-faceted quality improvement programs that included policies, procedures and protocols that were underpinned by evidence-based guidelines. In one of these studies, nurse-generated care plans based on evidence were implemented,[25] and in another program evidence appraisals were undertaken.[29] In all the studies, the multi-faceted quality improvement program was associated with a reduction in pressure injuries.

Clinical question	What are the professional, structural and organisational components of organisation level interventions/quality improvement programs that are effective in attaining sustained pressure injury prevention?

Recommendation 20.8 **At an organizational level, provide clinical decision support tools as part of a quality improvement plan to reduce the incidence of pressure injuries.**

Option: Implementing a standardized clinical decision-making tool
Comparison: Not implementing decision-making tools

Background: Algorithms and decision support tools or protocols are used to assist health professionals in their selection of appropriate care strategies and equipment for preventing and treating pressure injuries. Such resources have been reported as a component of several successful quality improvement programs.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☐ | *Low* ☐ | *Moderate* ☒ | *High* ☐	**Evidence for reduction in pressure injury incidence** • In Belgian nursing home wards (n=11 wards), a multi-faceted quality improvement program associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (3.7% versus 11%) over three years, included use of computerized clinical decision tools (e.g. reports).[13] (*Level 1, high quality*) • In Saudi Arabian intensive care units (n=2), a multi-faceted quality improvement program that was associated with a significant 70% lower rate of pressure injuries compared to standard care (p<0.001) included a bundle of policies based on a risk assessment protocol.[33] (*Level 1, moderate quality*) • In a Lebanese medical center (n=19), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 16 months compared to standard care (n=2.47% versus n=6.63%, p<0.01) included use of standardized risk assessment protocol.[39] (*Level 2, low quality*) • In US acute care hospitals, a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over three years compared to standard care (2% versus 12.8%) included a support surface use selection protocol.[25] (*Level 2, low quality*) • In US long term care facilities (n=11), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence (4.6% versus 12.1%) included a computer-generated weekly report that altered staff to individuals with risk triggering outcomes (e.g. nutrition risk, abnormal skin observations).[38] (*Level 2, moderate quality*) • In a US community hospital, a multi-faceted quality improvement program associated with a reduction over four years in pressure injuries compared to standard care (0% versus 12%) included introduction of risk assessment protocols and computerized clinical decision tools (e.g. reports).[26,27] (*Level 2, low quality*) In addition to the *Level 1 and 2* evidence above, two *Level 3* studies[47,48] and three *Level 4* studies[29,51,52] conducted in critical care, acute care and aged care provided evidence that clinical decision tools included in a multi-faceted quality improvement program were associated with a significant reduction in pressure injury incidence. (*Level 3 and 4, high, moderate and low quality*) **Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, Most studies have consistent outcomes and inconsistencies can be explained**
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☒ | *No important uncertainty or variability* ☐ | *No known undesirable outcomes* ☐	
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND DDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ *Not sub-stantial* ☐ *Probably not sub-stantial* ☐ *Probably sub-stantial* ☐ *Sub-stanital* ☐ *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ *Probably No* ☐ *Uncertain* ☒ *Probably Yes* ☐ *Yes* ☐ *Varies* ☐	No evidence available
	Is the option a priority for key stakeholders?	*No* ☐ *Probably No* ☐ *Uncertain* ☒ *Probably Yes* ☐ *Yes* ☐ *Varies* ☐	No evidence available
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ *Probably No* ☐ *Uncertain* ☐ *Probably Yes* ☐ *Yes* ☒ *Varies* ☐	Evidence based clinical decision support tools can be used in all clinical settings (*Expert opinion*).

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings ☐	Undesirable consequences *probably outweigh* desirable consequences in most settings ☐	The balance between desirable and undesirable consequences *is closely balanced or uncertain* ☐	Desirable consequences *probably outweigh* undesirable consequences in most settings ☐	Desirable consequences *clearly outweigh* undesirable consequences in most settings ☒
Strength of recommendation	Strong negative recommendation: Definitely don't it ☐	Weak negative recommendation: Probably don't do it ☐	No specific recommendation ☐	Weak positive recommendation: Probably do it ☐	Strong positive recommendation: Definitely do it ☒
Justification	This recommendation is underpinned by high[13] and moderate[33] quality Level 1 studies, one moderate[38] and three low quality[25-27,39] Level 2 studies, two Level three studies[47,48] and three Level 4 studies[29,51,52]. The studies, which all reported reductions in pressure injuries associated with the introduction of a multi-faceted quality improvement program, reported the use of computer-generated reports,[13,26,27,38] risk assessment decision support protocols,[26,27,33,39] and support surface selection algorithms,[25] to promote clinical decision-making by individual health professionals and the multidisciplinary team.				

Clinical question	What are the professional, structural and organisational components of organisation level interventions/quality improvement programs that are effective in attaining sustained pressure injury prevention?

Recommendation 20.9 **Provide clinical leadership in pressure injury prevention and treatment as part of a quality improvement plan to reduce pressure injuries.**

Option: Incorporating clinical leadership into a multi-faceted care bundle
Comparison: No designated clinical leadership

Background: Clinical leadership, usually provided by a nurse, is a component of many successful quality improvement programs.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☐ | *Low* ☐ | *Moderate* ☒ | *High* ☐
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☑ | *No important uncertainty or variability* ☐ | *No known undesirable outcomes* ☐
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐

RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS

Due to the large volume of research, only studies providing Level 1 and 2 evidence are provided in detail.

Evidence on pressure injury incidence

- In Belgian nursing home wards (n=11 wards), a multi-faceted quality improvement program associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (3.7% versus 11%) over three years, included appointment of a wound champion.[13] (*Level 1, high quality*)
- In Saudi Arabian intensive care units (n=2), a multi-faceted quality improvement program that was associated with a significant 70% lower rate of pressure injuries compared to standard care (p<0.001) included appointment of a wound champion.[33] (*Level 1, moderate quality*)
- In US nursing homes (n=58), a multi-faceted quality improvement program that was associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (OR 1.23, 95% CI 1.00 to 1.52, p=0.05) included phone and email support from aged care trained nurse and onsite consultation with a research nurse.[34] (*Level 1, moderate quality*)
- In a Lebanese medical center (n=19), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 16 months compared to standard care (n=2.47% versus n=6.63%, p<0.01) included appointment of a wound champion.[39] (*Level 2, low quality*)
- In Australian acute and aged care (n=648 beds), a multi-faceted quality improvement program associated with a reduction in pressure injury point prevalence compared to standard care (7.1% versus 14.6%) included appointment of a clinical nurse educator.[14] (*Level 2, low quality)*
- In US acute care hospitals, a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over three years compared to standard care (2% versus 12.8%) included appointment of a wound champion and referrals to wound specialists.[25] (*Level 2, low quality*)
- In a US community hospital, a multi-faceted quality improvement program associated with a reduction over four years in pressure injuries compared to standard care (0% versus 12%) included appointment of a wound champion.[26,27] (*Level 2, low quality*)
- In a US hospital, a multi-faceted quality improvement program associated with a reduction in pressure injury incidence and prevalence compared to standard care included appointment of a clinical nurse educator.[15] (*Level 2, low quality*)
- In a US long term acute care hospital (N=108 beds), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 12 months compared to standard care (41% versus 4.2%) included appointment of a wound care team.[40] (*Level 2, low quality*)

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS	
			• In US nursing homes in one State, a multi-faceted quality improvement program that was associated with a 22% reduction in pressure injury prevalence over 12 months compared to standard care included phone support from an aged care nurse[41] (*Level 2, moderate quality*) In addition to the *Level 1 and 2* evidence above, three *Level 3* studies[46,47] and three *Level 4* studies[52,53,56] conducted in critical care, acute care, aged care, community care and pediatric care provided evidence that communicating clinical leadership (e.g., providing access to specialist health professionals,[53] wound care teams,[56] etc.) was associated with a reduction in pressure injury incidence. (*Level 3 and 4, moderate and low quality*) **Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, Most studies have consistent outcomes and inconsistencies can be explained**	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ | *Not sub-stantial* ☐ | *Probably not sub-stantial* ☐ | *Probably sub-stantial* ☐ | *Sub-stanital* ☐ | *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
PRIORITY AND ACCEPTABILITY	**Is the option a priority for key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☒	Providing clinical leadership, for example by appointment wound champions, a wound care team, a clinical educator etc., requires access to appropriately trained health professionals (*Expert opinion*).	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings	Undesirable consequences *probably outweigh* desirable consequences in most settings	The balance between desirable and undesirable consequences *is closely balanced or uncertain*	Desirable consequences *probably outweigh* undesirable consequences in most settings	Desirable consequences *clearly outweigh* undesirable consequences in most settings
	☐	☐	☐	☐	☒
Strength of recommendation	Strong negative recommendation: Definitely don't it	Weak negative recommendation: Probably don't do it	No specific recommendation	Weak positive recommendation: Probably do it	Strong positive recommendation: Definitely do it
	☐	☐	☐	☐	☒

Justification

A large volume of evidence supports the recommendation to provide clinical leadership as a part of a quality improvement program. A high quality[13] and a moderate quality[33] Level 1 study both included appointment of a wound champion as a part of a successful component of a multi-faceted improvement program. A second moderate quality Level 1 study[34] included clinical leadership delivered by an onsite research nurse. Seven low quality Level 2 studies,[14,15,25-27,39-41] three Level 3 studies[46,47] and three Level 4 studies[52,53,56] included clinical leadership from a wound champion, a clinical nurse educator, an aged care trained nurse, specialist allied health professionals or a wound care team. The studies were conducted in critical care, acute care, aged care, community care and pediatric care, providing evidence that including clinical leadership in a quality improvement program is associated with pressure injury incidence reduction in many clinical settings.

Clinical question	What are the professional, structural and organisational components of organisation level interventions/quality improvement programs that are effective in attaining sustained pressure injury prevention?
Recommendation 20.10	**At a professional level, provide education in pressure injury prevention and treatment as part of a quality improvement plan to reduce the incidence of pressure injuries.**

Option: Providing staff education
Comparison: No staff education

Background: Tailored health professional education was included in the majority of pressure injury reduction programs.

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
BENEFITS & HARMS OF THE PRACTICE	**What is the overall certainty of the evidence?**	*No included studies* ☐ | *Very low* ☐ | *Low* ☐ | *Moderate* ☐ | *High* ☒	**Evidence on pressure injury incidence** • In Australian hospitals (n=8), a multi-faceted quality improvement program associated with a significant reduction in incident rate ratio (IRR 0.48, 95% CI 0.33 to 0.69, p<0.0001) included an education program.[32] (*Level 1, high quality*) • In Belgian nursing home wards (n=11), a multi-faceted quality improvement program associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (7.1% versus 14.6%) included an interactive education program.[13] (*Level 1, high quality*) • In Saudi Arabian intensive care units (n=2), a multi-faceted quality improvement program that was associated with a significant 70% lower rate of pressure injuries compared to standard care (p<0.001) included an education program.[33] (*Level 1, moderate quality*) • In a Lebanese medical center (n=19), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 16 months compared to standard care (n=2.47% versus n=6.63%, p<0.01) included an education program.[39] (*Level 2, low quality*) • In Australian acute and aged care (n=648 beds), a multi-faceted quality improvement program associated with a reduction in pressure injury point prevalence compared to standard care (7.1% versus 14.6%) included a competency-based education program and bedside teaching.[14] (*Level 2, low quality)* • In a US hospital, a multi-faceted quality improvement program associated with a reduction in pressure injury incidence and prevalence compared to standard care included an education program and bedside/hands-on teaching.[15] (*Level 2, low quality*) • In a US pediatric hospital (n=490 beds), a multi-faceted quality improvement program associated with a reduction in tracheostomy-related pressure injury incidence over 22 months (mean 0.3% versus mean 8.1%) compared to standard care included web-based learning.[36] (*Level 2, moderate quality*) • In a US long term acute care hospital (N=108 beds), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 12 months compared to standard care (41% versus 4.2%) included an education program.[40] (*Level 2, low quality*) • In a US nursing home (n=mean 137 beds per month), a multi-faceted quality improvement program associated with a significant 86% reduction in pressure injury prevalence over six years compared to standard care included an education program.[24] (*Level 2, moderate quality)* • In US intensive care units (n=327), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence compared to standard care (2.1% versus 15.5%) included bedside/hands-on teaching.[35] (*Level 2, moderate quality*) • In US hospital (n=511 beds), a multi-faceted quality improvement program that demonstrated a 77% reduction in pressure
	Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☒ | *No known undesirable outcomes* ☐	
	How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
	How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
	Do the desirable effects outweigh the undesirable	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS	
	effects?		injury incidence included peer-to-peer teaching[43] (*Level 2, moderate quality*) • In acute care facilities in Sweden, there was no significant change in pressure injury incidence in at-risk individuals 14 months after introduction of a multi-faceted quality improvement program that included a staff training day (8.4% versus 9%, p>0.05).[45] (*Level 2, low quality*) In addition to the *Level 1 and 2* evidence above, and seven *Level 4* studies [28-30,52-54,56] conducted in critical care, acute care, aged care, community care and pediatric care provided evidence that an education program,[29,52-54] competency based education[56] and web-based learning[28,30,52,56] are associated with a reduction in pressure injury incidence (*Level 4, moderate and low quality*) **Strength of Evidence: A - More than one high quality Level I study providing direct evidence, consistent body of evidence**	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ | *Not sub-stantial* ☐ | *Probably not sub-stantial* ☐ | *Probably sub-stantial* ☐ | *Sub-stanital* ☐ | *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
PRIORITY AND ACCEPTABILITY	**Is the option a priority for key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☒ | *Yes* ☐ | *Varies* ☐	It is feasible to access pressure injury education in most clinical and geographic locations (*Expert opinion*).	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings	Undesirable consequences *probably outweigh* desirable consequences in most settings	The balance between desirable and undesirable consequences *is closely balanced or uncertain*	Desirable consequences *probably outweigh* undesirable consequences in most settings	Desirable consequences *clearly outweigh* undesirable consequences in most settings
	☐	☐	☐	☐	☒
Strength of recommendation	Strong negative recommendation: Definitely don't it	Weak negative recommendation: Probably don't do it	No specific recommendation	Weak positive recommendation: Probably do it	Strong positive recommendation: Definitely do it
	☐	☐	☐	☐	☒
Justification	The recommendation is supported by two high quality[13,32] and one moderate quality[33] Level 1 studies, four moderate quality[24,33,35,43] and five low quality[14,15,36,39,40] Level 2 studies and an additional seven Level 4 studies,[28-30,52-54,56] all of which included an education initiative in a quality improvement program that was successful in reducing pressure injury incidence. Education initiatives included didactic presentations, hands-on/bedside teaching, peer-to-peer teaching and web-based teaching.				

Clinical question	What are the professional, structural and organisational components of organisation level interventions/quality improvement programs that are effective in attaining sustained pressure injury prevention?
Recommendation 20.11	**At an organizational level, regularly monitor, analyze and evaluate performance against quality indicators for pressure injury prevention and treatment.**

Option: Evaluating the program (e.g. monitoring pressure injury incidence and other quality indicators)
Comparison: No program evaluation or prevalence reporting

Background: Evaluation of a quality improvement program includes evaluation of the implementation of the program as well as evaluation of measurable outcomes such as pressure injury incidence.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☐ | *Low* ☐ | *Moderate* ☒ | *High* ☐
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☒ | *No known undesirable outcomes* ☐
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☐ | *Yes* ☒ | *Varies* ☐

RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS

Evidence on pressure injury incidence

- In Belgian nursing home wards (n=11 wards), a multi-faceted quality improvement program associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (3.7% versus 11%) over three years, included regular auditing/surveillance and a computer-based pressure injury monitoring system.[13] (*Level 1, high quality*)
- In US nursing homes in one State, a multi-faceted quality improvement program that was associated with a 22% reduction in pressure injury prevalence over 12 months compared to standard care included quality indicator tracking system support.[41] (*Level 2, moderate quality*)
- In Australian acute and aged care (n=648 beds), a multi-faceted quality improvement program associated with a reduction in pressure injury point prevalence compared to standard care (7.1% versus 14.6%) included regular auditing/surveillance.[14] (*Level 2, low quality)*
- In a US regional hospital network (n=21 facilities), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over four years compared to standard care included evaluation of facilitators and barriers to best practice and engagement of a data analysis action team.[37] (*Level 2, low quality*)
- In a Spanish hospital (n= over 9,000 discharges), a multi-faceted quality improvement program that was associated with a relative risk reduction for pressure injury of 29.4% (number need to treat = 333) included use of a computer-based pressure injury monitoring system.[42] (*Level 2, low quality*)
- In a Lebanese medical center (n=19), a multi-faceted quality improvement program that was associated with a reduction in pressure injury incidence over 16 months compared to standard care (n=2.47% versus n=6.63%, p<0.01) included use of a computer-based pressure injury monitoring system.[39] (*Level 2, low quality*)
- In a US community hospital, a multi-faceted quality improvement program associated with a reduction over four years in pressure injuries compared to standard care (0% versus 12%) included ongoing daily evaluation of pressure injury rates and the quality program.[26,27] (*Level 2, low quality*)
- In a US hospital, a multi-faceted quality improvement program associated with a reduction in pressure injury incidence and prevalence compared to standard care included monitoring pressure injury rates.[15] (*Level 2, low quality*)
- In acute care facilities in Sweden, there was no significant change in pressure injury incidence in at-risk individuals 14 months after introduction of a multi-faceted quality improvement program in which first regular weekly evaluations of the program were undertaken (8.4% versus 9%, p>0.05).[45] (*Level 2, low quality*)

In addition to the *Level 1* and *Level 2* evidence above, one *Level 3* study[49] and two *Level 4* studies [30,57,58] reported multi-faceted quality improvement programs conducted in acute care and aged care that included a data linkage computerized care planning system and ongoing daily evaluation of program are effect. (*Levels 3 and 4, moderate and low quality*)

Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, Most studies have consistent outcomes and inconsistencies can be explained

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ *Not sub-stantial* ☐ *Probably not sub-stantial* ☐ *Probably sub-stantial* ☐ *Sub-stanital* ☐ *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ *Probably No* ☐ *Uncertain* ☒ *Probably Yes* ☐ *Yes* ☐ *Varies* ☐	No evidence available	
	Is the option a priority for key stakeholders?	*No* ☐ *Probably No* ☐ *Uncertain* ☒ *Probably Yes* ☐ *Yes* ☐ *Varies* ☐	No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ *Probably No* ☐ *Uncertain* ☐ *Probably Yes* ☒ *Yes* ☐ *Varies* ☐	Undertaking monitoring and evaluation requires appropriately trained professionals (*Expert opinion*).	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings	Undesirable consequences *probably outweigh* desirable consequences in most settings	The balance between desirable and undesirable consequences *is closely balanced or uncertain*	Desirable consequences *probably outweigh* undesirable consequences in most settings	Desirable consequences *clearly outweigh* undesirable consequences in most settings
	☐	☐	☒	☐	☒
Strength of recommendation	Strong negative recommendation: Definitely don't it	Weak negative recommendation: Probably don't do it	No specific recommendation	Weak positive recommendation: Probably do it	Strong positive recommendation: Definitely do it
	☐	☐	☐	☐	☒
Justification	This recommendation is supported by one high quality Level 1 study,[13] one moderate quality[41] and six low quality[14,15,26,27,37,39,42] Level 2 studies, a Level 3 study[49] and two Level 4 studies.[30,57,58] The studies reported multi-faceted quality improvement programs that were associated with reduction in pressure injury incidence and/or prevalence that included evaluation as one of the program components. Evaluation initiatives reported in the studies included auditing/surveillance, use of computer-based pressure injury monitoring systems, evaluation of facilitators and barriers to best practice, engagement of a data analysis team, and daily program evaluation.				

Clinical question	What are the professional, structural and organisational components of organisation level interventions/quality improvement programs that are effective in attaining sustained pressure injury prevention?

Recommendation 20.12 **At an organizational level, use feedback and reminder systems to promote the quality improvement program and its outcomes to stakeholders.**

Option: Promoting the quality improvement program
Comparison: No program promotion

Background: Promoting the quality improvement program could increase engagement of all stakeholders.

BENEFITS & HARMS OF THE PRACTICE

CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
What is the overall certainty of the evidence?	*No included studies* ☐ | *Very low* ☐ | *Low* ☒ | *Moderate* ☐ | *High* ☐	**Evidence on feedback initiatives pressure injury incidence or prevalence** • In a US pediatric hospital (n=490 beds), a multi-faceted quality improvement program associated with a reduction in tracheostomy-related pressure injury incidence over 22 months (mean 0.3% versus mean 8.1%) compared to standard care included real time reporting of pressure injury rates.[36] (*Level 2, moderate quality*) • In Australian acute and aged care (n=648 beds), a multi-faceted quality improvement program associated with a reduction in pressure injury point prevalence compared to standard care (7.1% versus 14.6%) included reporting the program outcomes.[14] (*Level 2, low quality)* • In a US hospital, a multi-faceted quality improvement program associated with a reduction in pressure injury incidence and prevalence compared to standard care included regular communication of pressure injury rates to staff.[15] (*Level 2, low quality*) • In a US community hospital, a multi-faceted quality improvement program associated with a reduction over four years in pressure injuries compared to standard care (0% versus 12%) included promotion of the quality improvement program to staff and patients with posters, and included a small reward recognizing staff.[26,27] (*Level 2, low quality*) **Evidence on reminder initiatives pressure injury incidence or prevalence** • In Belgian nursing home wards (n=11 wards), a multi-faceted quality improvement program associated with a reduction in Category/Stage I to IV pressure injuries compared to standard care (3.7% versus 11%) over three years, included a reminder system for health professionals to encourage implementation.[13] (*Level 1, high quality*) • In US acute care hospitals (n=2), a quality improvement program that was associated with a 67% reduction in hospital acquired pressure injuries over four years included a reminder system in which extremely high risk individuals received visual flagging.[64] (*Level 2, low quality*)
Is there important uncertainty about how much people value the main outcomes?	*Important uncertainty or variability* ☐ | *Possibly important uncertainty or variability* ☐ | *Probably no important uncertainty or variability* ☐ | *No important uncertainty or variability* ☒ | *No known undesirable outcomes* ☐	
How substantial are the desirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☐ | *Probably not substantial* ☐ | *Probably substantial* ☒ | *Substantial* ☐	
How substantial are the undesirable anticipated effects?	*Unclear* ☐ | *Not substantial* ☒ | *Probably not substantial* ☐ | *Probably substantial* ☐ | *Substanital* ☐	
Do the desirable effects outweigh the undesirable effects?	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☒ | *Yes* ☐ | *Varies* ☐	In addition to the *Level 1 and 2* evidence above, one *Level 3* study[46] and two *Level 4* studies[30,52] conducted in critical care, acute care, aged care, community care and pediatric care provided evidence that communicating and promoting a quality improvement program (e.g., rewards and recognition,[46] brochures,[52] etc.) was associated with a reduction in pressure injury incidence. (*Level 3 and 4, moderate and low quality*) **Strength of Evidence: Strength of Evidence: B2 - Level 3 or 4 studies (regardless of quality) providing direct evidence, most studies have consistent outcomes and inconsistencies can be explained**

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
RESOURCE USE	**How substantial are the resource requirements?**	*Not clear* ☒ | *Not sub-stantial* ☐ | *Probably not sub-stantial* ☐ | *Probably sub-stantial* ☐ | *Sub-stanital* ☐ | *Varies* ☐	There is no evidence available on the cost of this specific component of a quality improvement initiative. See previous recommendation for broad costs associated with quality improvement initiatives.	
PRIORITY AND ACCEPTABILITY	**Is the option acceptable to key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
PRIORITY AND ACCEPTABILITY	**Is the option a priority for key stakeholders?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☒ | *Probably Yes* ☐ | *Yes* ☐ | *Varies* ☐	No evidence available	
FEASIBILITY	**Is the option feasible to implement?**	*No* ☐ | *Probably No* ☐ | *Uncertain* ☐ | *Probably Yes* ☒ | *Yes* ☐ | *Varies* ☐	Using promotional material is feasible in most clinical settings but may reach fewer people in some locations (e.g. in community care settings). (*Expert opinion*)	

Balance of consequences	Undesirable consequences *clearly outweigh* desirable consequences in most settings	Undesirable consequences *probably outweigh* desirable consequences in most settings	The balance between desirable and undesirable consequences *is closely balanced or uncertain*	Desirable consequences *probably outweigh* undesirable consequences in most settings	Desirable consequences *clearly outweigh* undesirable consequences in most settings
	☐	☐	☒	☐	☒
Strength of recommendation	Strong negative recommendation: Definitely don't it	Weak negative recommendation: Probably don't do it	No specific recommendation	Weak positive recommendation: Probably do it	Strong positive recommendation: Definitely do it
	☐	☐	☐	☒	☐
Justification	One high quality Level 1 study,[13] one moderate quality and four low quality Level 2 studies,[14,15,36,64] and moderate and low quality Level 3[46] and Level 4[26,27,30,52] studies provided evidence supporting this recommendation. The studies reported on multi-faceted quality improvement programs associated with reduction in pressure injury incidence and/or prevalence that included initiatives that promoted the program to staff and/or patients and informal caregivers. Feedback initiatives included brochures and posters, reporting of outcomes, rewards and/or staff recognition for participation. Reminder systems included visual cues to care staff to implement preventive care.				

References

1. Patrician PA, McCarthy MS, Swiger P, Raju D, Breckenridge-Sproat S, Su X, Randall KH, Loan LA. Association of Temporal Variations in Staffing With Hospital-Acquired Pressure Injury in Military Hospitals. Research in Nursing & Health, 2017; 40(2): 111-119.
2. Twigg DE, Gelder L, Myers H. The impact of understaffed shifts on nurse-sensitive outcomes. J Adv Nurs, 2015; e-pub.
3. Konetzka RT, Stearns S, Park J. The staffing-outcomes relationship in nursing homes. Health Serv Res, 2009; 43(3): 1025.
4. Hart P, Davis N. Effects of nursing care and staff skill mix on patient outcomes within acute care nursing units. J Nurs Care Qual, 2011; 26(2): 161-168.
5. Hickey EC, Young GJ, Parker VA, Czarnowski EJ, Saliba D, Berlowitz DR. The effects of changes in nursing home staffing on pressure ulcer rates. J Am Med Dir Assoc, 2005; 6(1): 50-3.
6. Choi J, Staggs VS. Comparability of nurse staffing measures in examining the relationship between RN staffing and unit-acquired pressure ulcers: A unit-level descriptive, correlational study. International Journal of Nursing Studies, 2014.
7. Lee HY, Blegen MA, Harrington C. The effects of RN staffing hours on nursing home quality: A two-stage model. International Journal of Nursing Studies, 2014; 51(3): 409-417.
8. Decker FH, Castle NG. Relationship of the Job Tenure of Nursing Home Top Management to the Prevalence of Pressure Ulcers, Pain, and Physical Restraint Use. J Appl Gerontol, 2011; 30(5): 539-561.
9. Needleman J, Buerhaus P, Mattke S, Stewart M, Zelevinsky K. Nurse-staffing levels and the quality of care in hospitals. N Engl J Med, 2002; 346(22): 1715-1722.
10. Bae SH, Kelly M, Brewer CS, Spencer A. Analysis of nurse staffing and patient outcomes using comprehensive nurse staffing characteristics in acute care nursing units. Journal of Nursing Care Quality, 2014; 29(4): 318-326.
11. Ilesanmi RE, Olabisi P. Assessment of common interventions and perceived barriers to pressure ulcer prevention in Southwest Nigeria. Journal of Wound, Ostomy and Continence Nursing, 2014; 41(3): 242-246.
12. Choi KR, Ragnoni JA, Bickmann JD, Saarinen HA, Gosselin AK. Health Behavior Theory for Pressure Ulcer Prevention: Root-Cause Analysis Project in Critical Care Nursing. Journal of Nursing Care Quality, 2016; 31(1): 68-74.
13. Beeckman D, Clays E, Van Hecke A, Vanderwee K, Schoonhoven L, Verhaeghe S. A multi-faceted tailored strategy to implement an electronic clinical decision support system for pressure ulcer prevention in nursing homes: A two-armed randomized controlled trial. Int J Nurs Stud, 2013; 50(4): 475-486.
14. Antonio T, Conrad K. Clinical and economic improvements in pressure injury care at Ballarat Health Services. Wound Practice & Research, 2013; 21(1): 4-10.
15. Baldelli P, Paciella M. Creation and implementation of a pressure ulcer prevention bundle improves patient outcomes. Am J Med Qual, 2008; 23(2): 136-142.
16. Price K, Kennedy KJ, Rando TL, Dyer AR, Boylan J. Education and process change to improve skin health in a residential aged care facility. International Wound Journal, 2017.
17. Beeckman D, Vanderwee K, Demarre L, Paquay L, Van Hecke A, Defloor T. Pressure ulcer prevention: development and psychometric validation of a knowledge assessment instrument. Int J Nurs Stud, 2010; 47(4): 399-410.
18. Anand R, kumari V, Nair R. Nurses' Practice Related to Prevention of Pressure Ulcer among Patients and Factors Inhibiting and Promoting these Practices. International Journal of Nursing Education, 2014; 6(1): 229-233.
19. Pekkarinen L, Sinervo T, Elovainio M, Noro A, Finne-Soveri H. Drug use and pressure ulcers in long-term care units: do nurse time pressure and unfair management increase the prevalence? J Clin Nurs, 2008; 17(22): 3067-3073.
20. Bosch M, Halfens RJG, van der Weijden T, Wensing M, Akkermans R, Grol R. Organizational culture, team climate, and quality management in an important patient safety issue: nosocomial pressure ulcers. Worldviews On Evidence-Based Nursing / Sigma Theta Tau International, Honor Society Of Nursing, 2011; 8(1): 4-14.
21. Berlowitz DR, Young GJ, Hickey EC, Saliba D, Mittman BS, Czarnowski E, Simon B, Anderson JJ, Ash AS, Rubenstein LV, Moskowitz MA. Quality improvement implementation in the nursing home. Health Serv Res, 2003; 38(1 Pt 1): 65-83.
22. Tubaishat A, Aljezawi M. Exploring pressure ulcer care in Jordan: Nurses' knowledge and practice. Journal of the Dermatology Nurses' Association, 2014; 6(3): 115-123.
23. Strand T, Lindgren M. Knowledge, attitudes and barriers towards prevention of pressure ulcers in intensive care units: a descriptive cross-sectional study. Intensive & Critical Care Nursing: The Official Journal of the British Association of Critical Care Nurses, 2010; 26(6): 335-342.
24. Tippet AW. Reducing the incidence of pressure ulcers in nursing home residents: a prospective 6-year evaluation. Ostomy Wound Management, 2009; 55(11): 52-58.
25. McInerney JA. Reducing hospital-acquired pressure ulcer prevalence through a focused prevention program. Adv Skin Wound Care, 2008; 21(2): 75-78.
26. Bales I, Duvendack T. Reaching for the moon: achieving zero pressure ulcer prevalence, an update. J Wound Care, 2011; 20(8): 374-377.

27. Bales I, Padwojski A. Reaching for the moon: achieving zero pressure ulcer prevalence. J Wound Care, 2009; 18(4): 137-144.
28. Asimus M, Maclellan L, Li PI. Pressure ulcer prevention in Australia: the role of the nurse practitioner in changing practice and saving lives. Int Wound J, 2011; 8(5): 508-513.
29. Richardson A, Peart J, Wright SE, McCullagh IJ. Reducing the incidence of pressure ulcers in critical care units: A 4-year quality improvement. International Journal for Quality in Health Care, 2017; 29(3): 433-439.
30. Smith SK, Ashby SE, Thomas L, Williams F. Evaluation of a multifactorial approach to reduce the prevalence of pressure injuries in regional Australian acute inpatient care settings. International Wound Journal, 2017; 07: 07.
31. Tayyib N, Coyer F, Lewis P. Pressure injury prevention in a Saudi Arabian intensive care unit: Registered nurse attitudes toward prevention strategies and perceived facilitators and barriers to evidence implementation. Journal of Wound, Ostomy, & Continence Nursing, 2016; 43(4): 369-74.
32. Chaboyer W, Bucknall T, Webster J, McInnes E, Gillespie BM, Banks M, Whitty JA, Thalib L, Roberts S, Tallott M, Cullum N, Wallis M. The effect of a patient centred care bundle intervention on pressure ulcer incidence (INTACT): A cluster randomised trial. International Journal of Nursing Studies, 2016; 64: 63-71.
33. Tayyib N, Coyer F, Lewis PA. A two-arm cluster randomized control trial to determine the effectiveness of a pressure ulcer prevention bundle for critically ill patients. Journal of Nursing Scholarship, 2015; 47(3): 237-47.
34. Rantz MJ, Zwygart-Stauffacher M, Hicks L, Mehr D, Flesner M, Petroski GF, Madsen RW, Scott-Cawiezell J. Randomized multilevel intervention to improve outcomes of residents in nursing homes in need of improvement. J Am Med Dir Assoc, 2012; 13(1): 60-68.
35. Anderson M, Finch Guthrie P, Kraft W, Reicks P, Skay C, Beal AL. Universal Pressure Ulcer Prevention Bundle With WOC Nurse Support. Journal of Wound, Ostomy & Continence Nursing, 2015; 42(3): 217-225.
36. Boesch RP, Myers C, Garrett T, Nie A, Thomas N, Chima A, McPhail GL, Ednick M, Rutter MJ, Dressman K. Prevention of tracheostomy-related pressure ulcers in children. Pediatrics, 2012; 129(3): e792-e797.
37. Crawford B, Corbett N, Zuniga A. Reducing hospital-acquired pressure ulcers: A quality improvement project across 21 hospitals. Journal of Nursing Care Quality, 2014; 29(4): 303-310.
38. Horn SD, Sharkey SS, Hudak S, Gassaway J, James R, Spector W. Pressure ulcer prevention in long-term-care facilities: a pilot study implementing standardized nurse aide documentation and feedback reports. Adv Skin Wound Care, 2010; 23(3): 120-131.
39. Mallah Z, Nassar N, Kurdahi Badr L. The Effectiveness of a Pressure Ulcer Intervention Program on the Prevalence of Hospital Acquired Pressure Ulcers: Controlled Before and After Study. Applied Nursing Research, 2014.
40. Milne CT, Trigilia D, Houle TL, Delong S, Rosenblum D. Reducing pressure ulcer prevalence rates in the long-term acute care setting. Ostomy Wound Management, 2009; 55(4): 50-59.
41. Rantz MJ, Cheshire D, Flesner M, Petroski GF, Hicks L, Alexander G, Aud MA, Siem C, Nguyen K, Boland C, Thomas S. Helping nursing homes "at risk" for quality problems: a statewide evaluation. Geriatric Nursing, 2009; 30(4): 238-249.
42. Sebastian-Viana T, Losa-Iglesias M, Gonzalez-Ruiz JM, Lema-Lorenzo I, Nunez-Crespo FJ, Salvadores Fuentes P, team A. Reduction in the incidence of pressure ulcers upon implementation of a reminder system for health-care providers. Applied Nursing Research, 2016; 29: 107-12.
43. Beinlich N, Meehan A. Resource nurse program: A nurse-initiated, evidence-based program to eliminate hospital-acquired pressure ulcers. Journal of Wound, Ostomy and Continence Nursing, 2014; 41(2): 136-141.
44. Fisher K, Grosh A, Felty V. Using nurse-led rounds to improve quality measures related to HAPUs. Nursing, 2016; 46(11): 63-68.
45. Sving E, Högman M, Mamhidir AG, Gunningberg L. Getting evidence-based pressure ulcer prevention into practice: A multi-faceted unit-tailored intervention in a hospital setting. International Wound Journal, 2014.
46. Burston S, Chaboyer W, Gillespie B, Carroll R. The effect of a transforming care initiative on patient outcomes in acute surgical units: a time series study. J Adv Nurs, 2015; 71(2): 417-29.
47. Van Leen MWF, Schols JMGA, Hovius SER, Halfens RJG. The effect of a simple 3-step pressure relieving strategy for preventing pressure ulcers: An explorative longitudinal study from 2002-2011. Wounds, 2014; 26(10): 285-292.
48. Olsho LEW, Spector WD, Williams CS, Rhodes W, Fink RV, Limcangco R, Hurd D. Evaluation of AHRQ's on-time pressure ulcer prevention program: A facilitator-assisted clinical decision support intervention for nursing homes. Medical Care, 2014; 52(3): 258-266.

49. Stifter J, Yao Y, Lodhi MK, Lopez KD, Khokhar A, Wilkie DJ, Keenan GM. Nurse Continuity and Hospital-Acquired Pressure Ulcers: A Comparative Analysis Using an Electronic Health Record "Big Data" Set. Nursing research, 2015; 64(5): 361-371.
50. Padula WV, Gibbons RD, Valuck RJ, Makic MBF, Mishra MK, Pronovost PJ, Meltzer DO. Are evidence-based practices associated with effective prevention of hospital-acquired pressure ulcers in US Academic Medical Centers? Medical Care, 2016; 54(5): 512-518.
51. Hall S, Ryan E. How a mattress selection matrix helped to sustain pressure ulcer prevention and also cut costs. Wounds UK, 2015; 11(3): 16-21.
52. Lewis H, Hughes D, Madell D, Coomarasamy C, Villa L, Hayward B. Estimated reduction in expenditure on hospital-acquired pressure injuries after an intervention for early identification and treatment. New Zealand Medical Journal, 2017; 130(1461): 42-46.
53. Peterson J, Adlard K, Walti BI, Hayakawa J, McClean E, Feidner SC. Clinical Nurse Specialist Collaboration to Recognize, Prevent, and Treat Pediatric Pressure Ulcers. Clinical Nurse Specialist, 2015; 29(5): 276-82.
54. Thomas ME. The providers' coordination of care: a model for collaboration across the continuum of care. Professional Case Management, 2008; 13(4): 220-227.
55. Tzeng H-M, Grandy GA, Yin C-Y. Staff response time to call lights and unit-acquired pressure ulcer rates in adult in-patient acute care units. Contemporary Nurse, 2013; 45(2): 182-187.
56. Young DL, Borris-Hale C, Falconio-West M, Chakravarthy D. A Single Long-Term Acute Care Hospital Experience with a Pressure Ulcer Prevention Program. Rehabil Nurs, 2014.
57. Baier R, Butterfield K, Patry G, Harris Y, Gravenstein S. Identifying star performers: the relationship between ambitious targets and nursing home quality improvement. J Am Geriatr Soc, 2009; 57(8): 1498-1503.
58. Baier RR, Butterfield K, Harris Y, Gravenstein S. Aiming for star performance: the relationship between setting targets and improved nursing home quality of care. J Am Med Dir Assoc, 2008; 9(8): 594-598.
59. Whitty JA, McInnes E, Bucknall T, Webster J, Gillespie BM, Banks M, Thalib L, Wallis M, Cumsille J, Roberts S, Chaboyer W. The cost-effectiveness of a patient centred pressure ulcer prevention care bundle: Findings from the INTACT cluster randomised trial. Int J Nurs Stud, 2017; 75: 35-42.
60. Mathiesen ASM, Norgaard K, Andersen MFB, Moller KM, Ehlers LH. Are labour-intensive efforts to prevent pressure ulcers cost-effective? Journal of Medical Economics, 2013; 16(10): 1238-1245.
61. Roberts S, McInnes E, Wallis M, Bucknall T, Banks M, Chaboyer W. Nurses' perceptions of a pressure ulcer prevention care bundle: a qualitative descriptive study. BMC Nursing, 2016; 15: 64.
62. Chaboyer W, Gillespie BM. Understanding nurses' views on a pressure ulcer prevention care bundle: A first step towards successful implementation. Journal of Clinical Nursing, 2014; 23: 3415-3423.
63. Roberts S, Wallis M, McInnes E, Bucknall T, Banks M, Ball L, Chaboyer W. Patients' Perceptions of a Pressure Ulcer Prevention Care Bundle in Hospital: A Qualitative Descriptive Study to Guide Evidence-Based Practice. Worldviews Evid Based Nurs, 2017.
64. Shieh DC, Berringer CM, Pantoja R, Resureccion J, Rainbolt JM, Hokoki A. Dramatic Reduction in Hospital-Acquired Pressure Injuries Using a Pink Paper Reminder System. Advances in Skin & Wound Care, 2018; 31(3): 118-122.