From Screening to Full Risk Assessment in Pressure Injury Prevention: Targeting the Right Care to the Right Patients

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INTRODUCTION

Imagine an 84-year-old woman newly admitted to a hospital unit for older persons. She has been admitted from a residential facility due to a serious case of community-acquired pneumonia and dehydration. At admission, she needs personal assistance to transfer from the bed to the chair and has to be transferred to the bathroom by means of a wheelchair. Existing comorbidities are left ventricular heart failure with reduced ejection fraction and reduced physical activity as of Class II of the New York Heart Association classification,[1] hypertension, urinary incontinence, and mild cognitive impairment. A nurse or physician may easily associate this scenario with a patient with an increased risk of pressure injury (PI) as there are clear-cut indications to existing risk factors, including impaired mobility, increased exposure to moisture, and perhaps limited abilities to recognize and properly respond to elevated risk exposure, just to name the most obvious ones. Thus, risk assessment appears to be crucial in this case, as clearly the patient is at risk.

However, think of another case, for example, a psychiatric setting where a patient (64 y old) is admitted to a psychiatric facility due to a serious psychotic crisis. She additionally suffers from chronic musculoskeletal pain and has oxygen-dependent chronic obstructive pulmonary disease (COPD) after a long-term history of smoking cigarettes (>30 pack years). Before admission, she lived in a sheltered housing facility because she needed personal assistance in activities of daily living. Although she ambulates independently, she spends most of the time lying in bed due to her psychosis. When the nursing aide assists her with personal hygiene on day 5 postadmission, she notes a 2 cm (length)×3 cm (width)×0.5 cm (depth) open wound with no necrotic tissue in the wound bed in the sacral area that is eventually diagnosed as a stage 2 PI. No PI risk or preventative measures have been considered for this patient up to this point in time. As the risk factors were less overt at admission, the patient's needs for PI prevention have been unfortunately missed. Detailed assessment after detection of the PI reveals that the patient also suffers from peripheral arterial disease, malnutrition, occasional urinary incontinence, and a lack of personal hygiene when toileting.

The purpose of a PI risk assessment is to accurately detect those patients who have risk factors and to support decision-making on the appropriate preventative measures. For decades, there have been debates about the best methods for the assessment of PI risk and the role of standardized risk assessment tools such as the Norton, Waterlow, or the Braden scales.[2] However, these debates often constrict risk assessment to a matter of choosing the right risk assessment tool, thereby ignoring the complexity of factors that influence the efficacy and efficiency of risk assessment. Therefore, in 2019, the 3rd edition of the International Guideline on pressure injury prevention and treatment took on a more comprehensive view of the conditions and methods of risk assessment and introduced

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a 2-step approach as a suggestion for good practice.[3] The 2 steps are an initial screening to be carried out in all individuals admitted to the care service, followed by a full risk assessment step to be conducted in those individuals considered at risk via screening. This article explains the rationale behind this approach, defines core concepts, and describes strategies for implementation, based on examples of national policies and alternative risk assessment tools.

BACKGROUND

Risk assessment is a clinical reasoning process that includes the collection and appraisal of information about an individual's current health state (presence of risk factors) to reach conclusions about whether the individual is at risk of developing a PI in the near future. Because identification of patients at risk is not an end in itself, but the foundation of the care plan, the outcome of the risk assessment must include the detection of individual risk factors, especially those amenable to change, informing subsequent interventions.

Clinical reasoning is defined as "a context-dependent way of thinking and decision-making in professional practice to guide practice actions"[4] and is assumed to be critical for doing "the right thing in the right way at the right time."[5] Although it is sometimes synonymously used with the concept of clinical judgment, in this article the latter is understood as the outcome of the professionals' reasoning process, regardless which methods were used to collect and analyze the observable data.[6] However, both health professionals' clinical reasoning and their clinical judgments are complex and determined by factors inherent to the individuals to be assessed, the assessing professionals, and the care environment (Figure 1).[7] A major aim of evidence-based strategies for PI assessment is to help health professionals negotiate this complexity safely so that each individual at risk has a high chance of being identified as at risk and receiving the preventative care they require. Equally, individuals currently not at risk should be easily and safely identified as such, obviating the need for specialist PI prevention interventions to prevent unnecessary and wasteful utilization of resources.

In many care settings, patients vary in terms of the presence or absence of PI risk factors. In statistical terms, this variability reflects differences in patients' pretest probability of PI development, that is, the probability of the patients to develop a PI, the authors assumed before taking any history or physical examination.[8] This pretest probability is based on epidemiological knowledge and clinical experiences, and it determines the likelihood that any assessment would yield important information that helps to rule in or rule out risk.[8] Basically, target populations in health care vary between 2 extremes of pretest probability: (1) populations where all or the majority of individuals show a very low pretest probability of PI risk, as, for example, in mental health care, and (2) populations in which all individuals, or the majority, show a high pretest probability of PI risk, such as individuals in geriatric care wards,[9] intensive care units[9,10] units, or long-term care homes.[11] It could be determined that almost all target populations contain individuals who are at risk of developing a PI and require preventative care. Thus, even if a PI risk can be ruled out quite readily for those who are active, mobile, cognitively aware, and in good health, there is a need for some form of systematic risk assessment should these conditions change. However, the risk assessment must be efficient to target resources to those actually at risk. Furthermore, the closer a population is located to the high-risk extreme, the less likely the risk assessment would add relevant information to confirm the at-risk status because the risk is obvious for the majority before any assessment inquiry is conducted. Nevertheless, systematic assessment of all modifiable risk factors is still required to target preventative measures to the individual risk profile.

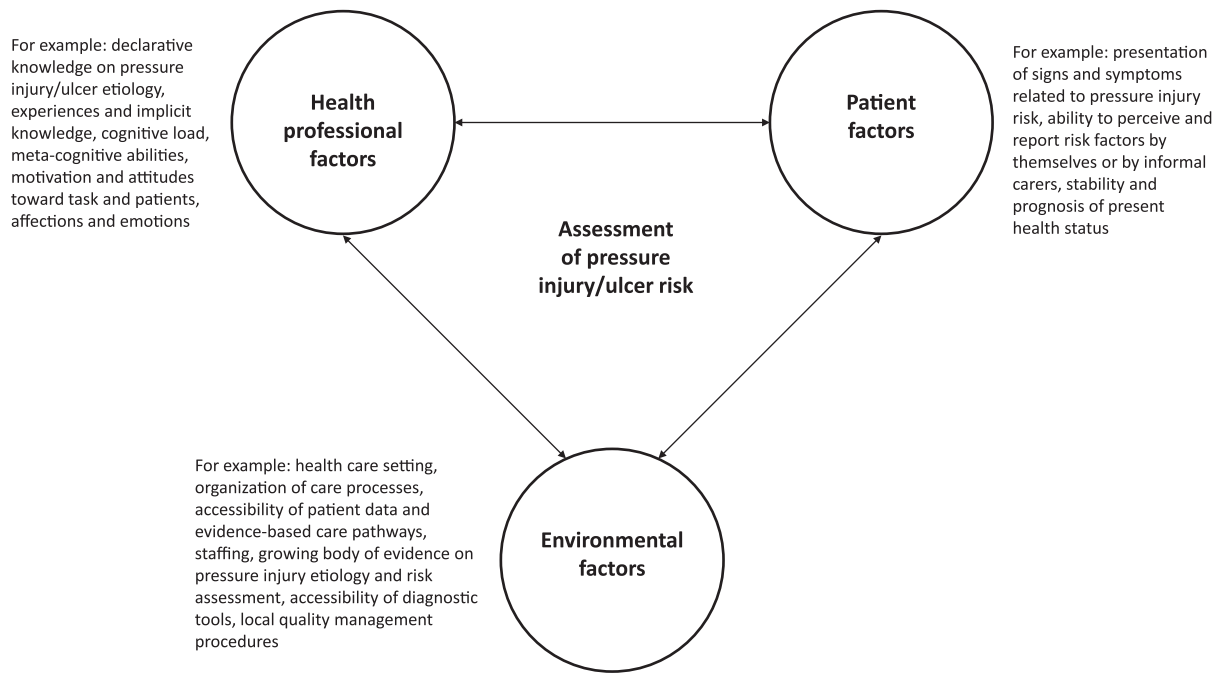

FIGURE 1. CONCEPTUAL FRAMEWORK OF THE INFLUENCING FACTORS ON PRESSURE INJURY RISK ASSESSMENT BASED ON CLINICAL REASONING THEORIES[6]

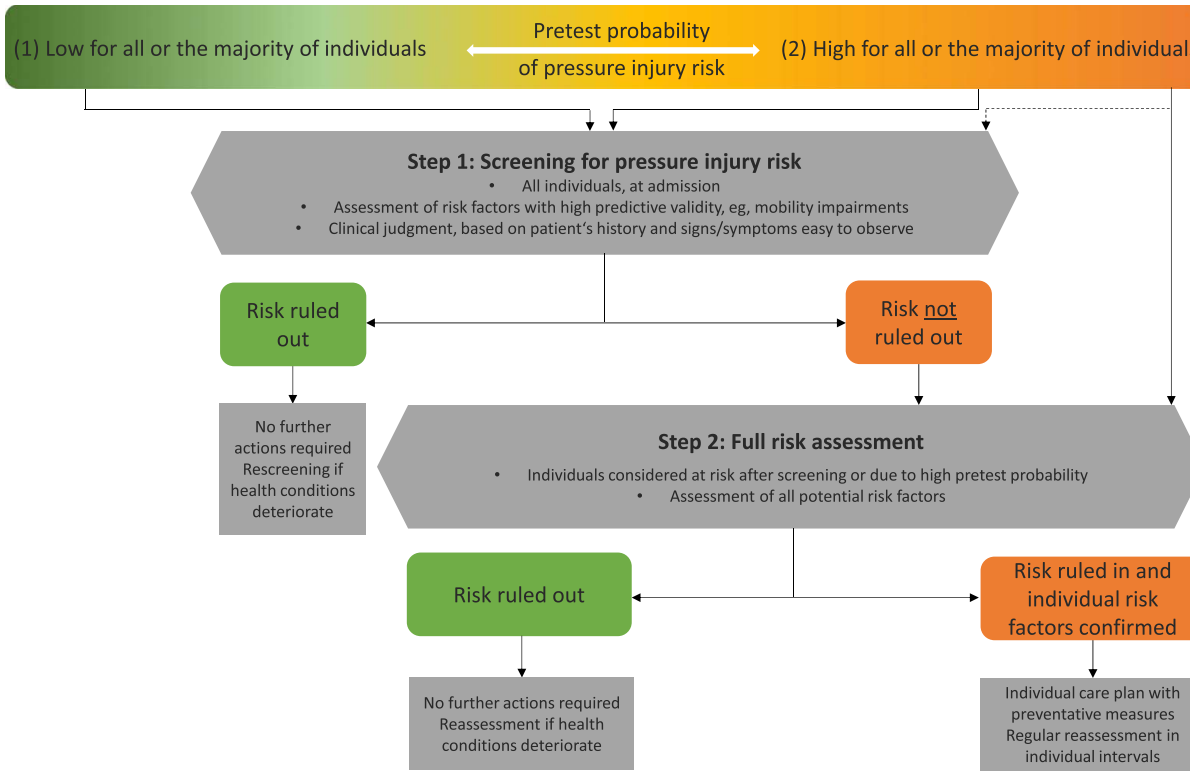

FIGURE 2. TWO-STEP APPROACH FOR PRESSURE INJURY RISK ASSESSMENT AS SUGGESTED IN THE INTERNATIONAL GUIDELINE OF PRESSURE INJURY/ULCER PREVENTION AND TREATMENT[3]

TWO-STEP APPROACH

To account for these population-specific requirements for PI risk assessment and to avoid waste of resources, the 2-step approach has been introduced as a "Good Practice Statement" in the 2019 3rd edition of the International Guideline on pressure injury prevention and treatment.[3] As described above, this

TABLE 1. CATEGORIES OF RISK FACTORS RECOMMENDED FOR RISK ASSESSMENT IN THE INTERNATIONAL GUIDELINE OF PRESSURE INJURY/ULCER PREVENTION AND TREATMENT[3]

Evidence-based Likelihood That Factor Influences Susceptibility to Pressure Injuries/Ulcers	Recommendation	Risk Factors[a]
High	Consider the affected individual to be at risk	•Limited mobility •Limited activity •High potential for friction and shear •Existing Stage 1 PI (risk of deterioration to Stage 2 or higher)
Moderate	Consider the impact of the presence of this risk factor on the individual's risk	•Diabetes mellitus •Perfusion and circulation deficits •Impaired nutrition status •Increased body temperature
Weak	Consider the potential impact of the presence of this risk factor on the individual's risk	•Oxygenation deficits •Moisture •Impaired sensory perception •Laboratory blood tests, eg, albumin or hemoglobin levels •Existing Stage 1 PI (risk of any additional PI) •Age

Abbreviation: PI, pressure injury.
[a]Only those recommended for general populations (ie, not for specific populations or care settings such as operation theater) with strong or weak strength of recommendation, excluding those based on good practice statement.

approach consists of 2 risk assessment steps: first, a screening step for all newly admitted patients, followed by a full risk assessment step only targeting those assumed to be at risk as an outcome of the first step (Figure 2). Both steps should be carried out using a structured approach, that is, they should follow evidence-based local protocols that describe the procedures and instruments to apply to predefined individuals at each step of the risk assessment. Also, at each step, the outcome of the risk assessment should be recorded in the individual's medical record.

Screening

Screening is a specific form of inquiry that aims to detect individuals at risk of a health condition of interest in groups among whom the majority do not show "known signs or symptoms of that disease or condition."[12] The outcome used is dichotomous, that is, the risk is ruled out or not. In terms of PI risk assessment, this screening step specifically targets populations that contain individuals with a low-test probability of PI risk. This step aims to detect those individuals for whom an elevated risk cannot be ruled out at the current moment and thus requires a more comprehensive risk assessment. The screening step should be conducted as early as possible after admission to a health care service and should be carried out on all newly admitted individuals, that is, at the first contact with the health professional after admission to the hospital, even in the emergency department, or at the first visit in the community setting.[3] Because certain individuals in the target groups will be free of any risk factor, it is important that the screening step is both efficient and accurate. Therefore, screening inquiries should draw on signs or symptoms that are easy to assess and highly predictive in the target population, such as inactivity, immobility, spinal cord deficits, and impaired cognition.[3,13,14]

The implementation considerations in the 2019 International Guideline suggest that "major risk factors for pressure injury development in the target population" should be considered for the structured screening.[3] Based on the risk factors recommended for risk assessment in the 2019 guideline, major risk factors are understood as those for which evidence shows a high likelihood that they influence individuals' susceptibility to PI (Table 1).[3,15] This category comprises impaired mobility and activity or any otherwise high potential for friction and shear. Also, existing Stage 1 PIs are classified as such a major risk factor because they put individuals at risk of additional as well as more severe PIs. By contrast, risk factors for which existing evidence indicates only a moderate or weak likelihood that they influence the susceptibility to PIs (Table 1)[3] are less suitable for screening. The risk of false positive or false negative classifications would otherwise be too high.

Assessment of risk factors at the screening stage should draw on readily accessible information such as patient history, admission documents, or direct patient observation. A head-to-toe skin assessment or other physical examinations should not be carried out at the screening step. However, in typical high-risk populations such as those in geriatric wards, palliative care units or intensive care units where (almost) all individuals show PI risk factors, the screening step may be omitted and a direct full risk assessment, including head-to-toe skin assessment, would be justified (Figure 2). Such population-specific pathways should be defined in local protocols, taking into account the prevalence of risk factors in the target populations of interest.

For individuals ruled out as being at risk during the screening step, no further actions are required unless any changes in the health conditions occur. For the others, a full risk assessment should follow (Figure 2).

Full Risk Assessment

The full risk assessment in the second step pursues 2 aims: verification of the assumed at-risk status and detection of individual risk factors, especially the modifiable ones. At this risk assessment step, all potentially relevant risk factors should be considered. In the International Guideline, the epidemiological evidence of the etiology of PI, including risk factors, is summarized,[2] and up-to-date systematic reviews of risk factors in the target populations of interest also provide useful information sources.[16] A full risk assessment may involve the application of standardized instruments, be it specific risk assessment scales, or tools for the assessment of specific risk factors such as the nutritional conditions or tissue perfusion. The choice of risk factors and instruments to employ may vary depending on the target population, because not all risk factors are similarly relevant in each population. For example, a detailed assessment of medical devices that potentially influence PI risk may be more relevant in trauma care wards or intensive care units, rather than in settings with less frequent invasive procedures. Similarly, in neurorehabilitation or geriatric care settings, individual movement patterns and physical activities are to be scrutinized closely to validly assess patients' risk exposure and to individually tailor interventions for long-term regain of physical activity. Furthermore, skin assessment tools and methods should be used that are suitable to detect clinically relevant skin changes in people with darkly pigmented skin.[17] To ensure that all relevant risk factors are considered appropriately, a full risk assessment should draw on the expertise and diagnostic information of all health professions currently involved in the treatment of the individual in question. Thus, although nurses usually have a leading role in PI risk assessment and prevention, it should be an interprofessional task.

Of importance to note is that the outcome of full risk assessment should not be simply dichotomous, that is, discriminate between at-risk and not at-risk status, but should also include a description of confirmed risk factors for those identified at risk. This information, as well as planned preventative measures, should be accessible to all team members who should be alerted to identified risk factors and required preventative measures. As part of the individualized prevention plan, intervals for a full reassessment of the PI risk should be scheduled, in addition to the ongoing evaluation of the effectiveness of initiated measures to relieve the exposure to pressure and shearing forces.

NATIONAL POLICIES AND PERSPECTIVES ON RISK ASSESSMENT: EXAMPLES

The 2-step approach has been proposed for pragmatic reasons, considering the variance of pretest probability across the various health care settings and thus population-specific requirements for the scrutiny of risk assessment.[3,15,18] It also reflects the 2-step structure of the Pressure Ulcer Risk Primary or Secondary Evaluation Tool (PURPOSE-T), a qualitative risk assessment instrument that has already been developed earlier by Coleman et al[19] based on a systematic synthesis of the evidence of risk factors for PI development.[19]

A 2-step approach of PI risk assessment has already been introduced by national policy recommendations in several countries. For example, in 2020, the Australian Commission on Safety and Quality in Health Care published a National Safety and Quality Health Service Standard on the prevention and management of PIs that discriminates between a screening and a risk and skin assessment step.[20] The screening step should be carried out in all adult individuals as soon as possible after

TABLE 2. COMPARISON OF THE NATIONAL POLICIES ON PI RISK ASSESSMENT IN AUSTRALIA AND GERMANY

	Australia	Germany
Source	National Safety and Quality Health Service (NSQHS) Standard (2020)[20]	National Expert Standard for PI prevention in nursing care (2017)[22]
Screening		
Target populations	•All populations except high-risk populations: •Acutely ill •Spinal cord injury or limited mobility, limited activity, and a high potential for friction and shear •Palliative care/hospice •Older aged individuals •Neonates and children •Individuals with a medical device in situ •Individuals with malnutrition •Individuals with perfusion, circulation, and oxygenation deficits •Individuals with diabetes mellitus	All populations except high-risk populations (eg, geriatric individuals) due to obvious mobility impairments or known preexisting PIs Stage ≥1
Time points	At admission	At admission
Risk factors to consider	Not specified	•Obvious risk factors related to current or imminent exposure to pressure or friction and shear: Mobility impairments Extrinsic or iatrogenic sources such as medical devices or positioning on surfaces with poor pressure-redistributing attributes, eg, stretchers, for longer periods of time •Skin status at pressure points, especially blanchable or nonblanchable erythema, PIs of Stage ≥2, or incontinence-associated dermatitis
Information sources	•Patient history •Clinical examinations	•Patient history •Patient records •Clinical examinations (no head-to-toe examination)
Methods or tools	•Not specified •Implementation in healthcare practice: screening items of the PURPOSE-T	•Clinical judgment •No specific tools recommended
Activities based on outcome	•Risk ruled out: no current actions, rescreening when health deteriorates •Risk not ruled out: full risk assessment	•Risk ruled out: no current actions, rescreening when health deteriorates •Risk not ruled out: full risk assessment
Full risk assessment		
Target populations	•High-risk populations excluded from screening step (see above) •Individuals with risk not ruled out after screening	•High-risk populations excluded from screening step (see above) •Individuals with risk not ruled out after screening
Risk factors to consider	•Mobility and activity •Existing PIs category ≥1 •Perfusion/circulation •Malnutrition/nutrition problems •Skin moisture •Sensory perception •Diabetes mellitus •Body temperature •Blood tests •Age •General health	Adults •Mobility impairments and immobility •Impaired skin status at pressure points and existing Stage ≥1 PIs •Disturbed perfusion/circulation •Malnutrition/nutrition problems •Skin moisture •Impaired sensory perception •Diabetes mellitus •General health/comorbidities •Pediatric populations •History of exposure to pressure, friction, and shear before admission •Skin maturity and status •Occipital conditions •Mobility •BMI and weight at birth •Nutrition and intake of fluids •Skin and tissue perfusion and oxygenation •Medical devices •Medication (eg, anti-hypotensive drugs) •Room temperature and humidity
Information sources	•See screening •Clinical examinations, especially Skin and tissue assessment: erythema and its cause, skin and tissue temperature, tissue consistency/edema, vascular/perfusion status, skin under devices, and prophylactic dressings Nutrition screening Comprehensive nutrition assessment in individuals with confirmed risk of malnutrition or with existing PI	•Patient history •Patient records •Bedside observation •Clinical examinations, especially Skin assessment (head-to-toe) Mobility assessment: individuals' abilities to independently reposition oneself in lying or sitting positions and to perform transfers between lying, sitting, and standing positions; physical, cognitive, behavioral, and iatrogenic influences; supporting resources Assessment of further existing risk factors (eg, nutrition problems, disturbed perfusion, medication) by nursing assessment and involvement of other professionals' diagnostic inquiries

TABLE 2. *(continued)*

	Australia	Germany
Methods or tools	•No specific tools recommended •For nutrition screening: use of a tool with sufficient reliability, validity, and applicability in the target population •For comprehensive nutritional assessment: involvement of a specifically qualified health professional •Implementation in health care practice: combination of risk assessment scales and condition-specific tools, eg, self-care evaluation tools	•Clinical judgment •No specific tools recommended •At the nurses' discretion, use of assessment tools, eg: Risk assessment scales Tools for the assessment of nursing care needs, eg, Barthel Index and self-care abilities Nutrition screening tools
Activities based on outcome	•Risk ruled out: no current actions, reassessment when health deteriorates •Risk and risk factors confirmed: development and implementation of an individualized, risk-based prevention plan by involving the individual, her/his family, or informal carers and the multiprofessional team	•Risk ruled out: no current actions, reassessment when health deteriorates •Risk and risk factors confirmed: development and implementation of an individualized, risk-based prevention plan by involving the individual, her/his family, or informal carers and the multiprofessional team

Abbreviations: BMI, body mass index; PI, pressure injury; PURPOSE-T, Pressure Ulcer Risk Primary or Secondary Evaluation Tool.

admission to the health care service, except in predefined populations with obviously high risk, who should directly undergo full risk assessment. For the screening step, a detailed list of risk factors is not considered. The clinician quickly screens for easily detectable red flags of risk, such as immobility or existing PIs. The screening should be carried out during initial history taking, clinical examinations, and by the use of validated tools.[21] If PI risk cannot be ruled out at the screening step, full risk assessment should be carried out, including a screening for nutrition problems and a comprehensive skin assessment. Table 2 summarizes the risk factors recommended to be taken into account during a full risk assessment. The recommendations do not include the use of specific tools for the full risk assessment, other than the advice to use an appropriate standardized nutrition screening instrument. However, in clinical practice, combinations of risk assessment scales (eg, Braden Scale) and further population-specific assessment instruments, such as instruments on care dependency, might be used.

In Germany, a 2-step approach for pressure injury risk was introduced via the National Expert Standard for PI prevention in nursing care in 2017.[22] Screening for PI risk is recommended for all newly admitted individuals and should be carried out directly when the individual nursing process starts. The screening should draw on obvious risk factors related to current or imminent exposure to pressure or friction and shear, and to current skin conditions. Assessment at the screening step is limited to easily accessible information, such as patient records or patient-reported data retrieved during the history taking. Head-to-toe skin assessment is only recommended for the full risk assessment. For the full risk assessment, an evidence-based long list of relevant risk factors is provided, one for adults and one for pediatric individuals (Table 2). No specific risk assessment tools are recommended. Instead, nurses are asked to use their best-informed, well-reflected clinical judgment both at the screening and the full risk assessment steps. This judgment may be supported by the use of risk assessment scales, especially focusing on their risk factor-specific subscales or items, and information collected by other nursing assessment instruments or diagnostic inquiries of other professions (eg, blood tests, physiotherapeutic assessments).

Since the publication of the 2017 version of the German National Expert Standard, the 2-step approach has been broadly adopted by acute care and long-term care institutions. The national policies and record forms for nursing assessment ("structured information collection," in German, "Strukturierte Informationssammlung") in residential care facilities and home care services now include a screening stage for various nursing-relevant health problems, such as risk of PI and falling.[23] In the acute care sector, providers of electronic patient records include a screening step as well. Although implementation of these new risk assessment policies has not been systematically evaluated in any of these health care sectors, routine data on quality indicators in acute and long-term care sectors do not indicate relevant changes in the incidence of PI in either direction.[24,25]

Altogether, the national policies in Australia and Germany are quite similar (Table 2), and anecdotal evidence suggests that the 2-step approach is feasible in various health care sectors. However, it has to be noted that these policies have not yet been subject to research-based evaluations of safety and effectiveness in terms of timely allocation of the right preventative measures offered to the right individuals and, eventually, prevention of PI. Also, the risk and consequences of false-negative (ie, missing patients at risk) or false-positive judgments (ie, wrongly

classifying patients at risk when they are actually not at risk) at the screening stage are unknown. Thus, systematic evaluation of the effects of the application of preventative measures to individuals at risk and the PI incidence is highly needed to secure the effectiveness and efficiency of the risk assessment in several populations.

STANDARDIZED RISK ASSESSMENT TOOLS, CLINICAL JUDGMENT, AND BEYOND

The research literature contains numerous studies on standardized risk assessment tools such as the Braden Scale, Norton Scale, or the Waterlow Scale. Despite this large and continuously growing body of evidence, the patient-relevant merits of these instruments, compared with risk assessment without using these instruments, are still unclear, as existing trials have failed to show a causal impact on the PI incidence.[26] These trials are limited in that they seek to associate the mere use of risk assessment tools with PI incidence. As an analogy, merely taking blood pressure and measuring blood lipids does not automatically lead to reductions in the incidence of hypertension and heart disease. It is what health care professionals do with the information that counts. In the United States, the type and level of risk identified in Braden subscales is used as an important source of information for risk-based prevention in adult individuals in many care settings.[27] Research data on the predictive validity and reliability of risk assessment tools are for several reasons not sufficient to draw evidence-based recommendations in favor of, or against, systematic use of risk assessment scales.[2,3] Predictive validity testing of risk assessment scales is an inherently flawed measure when health care professionals are simultaneously using the tool to guide prevention. In fact, if this strategy is successful, you should have fewer incident PIs than initially predicted. In this scenario, the risk assessment tool is being used for prevention, not prediction.

The International Guideline emphasizes that if a risk assessment scale is being used for full risk assessment, the tool with the best reliability and validity in the population of interest should be chosen, and the use of this tool should be supplemented by assessment of the risk factors not covered by the scale in question. In the guideline, a cross-tabulation of commonly used scales against epidemiologically relevant risk factors shows the gaps of each individual instrument. Also, the guideline calls for cautious use of the scales' total scores to derive decisions on required preventative measures. The validity of these total scores varies with the pretest probability of PI risk in the target population, and the total scores alone do not contain information about the individual risk factors to be addressed by preventative measures.[3] In the United States, most protocols recommend that a full risk-factor assessment include the Braden subscale scores and additional relevant risk factors as they pertain to the population (eg, impaired perfusion in critically ill patients). Although not a comprehensive risk assessment, the Braden Scale was designed for bedside assessment of the most common modifiable risk factors in adult at-risk populations.[28] In some settings, a Braden Scale score >18 is used to screen patients deemed not at risk as long as activity and mobility subscale scores are normal. More efficient yet safe care could be provided if mobility and activity could be used as a screening tool to rule out risk status in low-risk populations (eg, ambulatory patients in the emergency department or after-hours clinics).

The qualitative tool, PURPOSE-T, guides professionals through the collection and analysis of epidemiologically established risk factors, first at the screening stage, and then followed by a full risk assessment if required.[19] The outcome of this tool is not a score but a classification of individuals' risk into one of three categories ranging from "no current risk" over "at risk, requiring primary prevention" to "existence of pressure ulcer category 1 or above or scarring from previous pressure ulcer—requiring secondary prevention/treatment."[19] However, although the inter-rater and test-retest reliability, convergent validity, and feasibility of this tool have already been demonstrated, the tool's impact on the application of preventative measures and PI incidence has yet to be examined.[19,29] In parallel, more simplified methods of risk assessment and decision rules for PURPOSE-T have been developed. In a risk assessment project in 2 Belgian hospitals, only 2 screening items of the PURPOSE-T, that is, impaired mobility and activity and presence of PI of any category, were used for the decision regarding need of preventative measures.[30] Findings from the pre-post-evaluation of this simplified one-step risk assessment approach indicate that PI prevalence remained stable or slightly improved. However, data have to be interpreted with caution due to the high risk of confounding factors and other weaknesses of the evaluation design.

Detecting the risk factors prevalent in an individual at risk is not so much a matter of quantifying risk probabilities but a clinical assessment of the individual's signs and symptoms. Therefore, the International Guideline and likewise other policies, such as the German Expert Standard, attribute a central role to clinical judgment (and thus the clinical reasoning) of health professionals both for the screening and the full assessment steps.[3,22] To be able to make valid clinical judgments, professionals have to know the individual in need of care, the situation, and the evidence.[6] For PI risk assessment, it has yet to be shown which tools are most suitable and effective to support professionals' judgment on the individual risk exposure and the need for preventative measures.[2] Unless more conclusive research evidence is available on this question, continuous evaluation of the chosen approach's safety and effectiveness is an essential part of routine monitoring of quality of care in clinical practice, irrespective of which approach or tool has been implemented.

In the future, digital technologies will significantly increase the amount of clinical information available to professionals for the assessment of PI risk, as well as the possibilities to analyze collected data and derive individual prediction models.[2,31] Currently, no valid forecast is possible as to how these technologies will change the process and outcome of risk assessment. However, it will be critical for such technologies to explicitly identify the modifiable risk factors that are amenable to preventive measures. Given the complexity of risk assessment and successive clinical decision-making and care activities,[32] future tool development and evaluation should strive to ensure that the right preventative measures will be applied to the right individual at the right time in any care setting. It is the effects on patient-relevant outcomes (ie, PIs) that matter most, not the predictive validity or other surrogates. As long as patient-relevant evidence is lacking for most risk assessment strategies, pragmatic choices may be helpful. But they should be accompanied by robust evaluations to increase the body of evidence and pave the way to better evidence-based guideline recommendations.

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