Pressure ulcers are a common problem in the disabled and elderly population, reducing quality of life and increasing the risk of life-threatening complications.

Pressure ulcer occurrence is usually due to multiple factors. Local (extrinsic) factors such as long-sustained low local pressure or a short period of high pressure, shearing forces, friction, and moisture while sitting or lying are likely to lead to the development of pressure ulcers. Pressure ulcers typically occur over a bony prominence and the majority of ulcers are located in the low back area, including sacrum, coccyx (tailbone), ischium, gluteals (buttocks), and greater trochanters and the leg area including the heels and lateral malleoli. These locations account for 87% of all pressure ulcers; 13% of locations are listed as “other”.

Apart from the usual systemic (intrinsic) factors such as immobility and malnutrition and other relevant chronic medical conditions (peripheral vascular disease, neurological problem, diabetes mellitus), different extrinsic risk factors may predispose to pressure ulcer development in atypical locations.

Atypical pressure ulcers are generally not located over a bony prominence; they can be found in unusual places such as the nape of the neck and on the penis, nostrils, helix of the ears, or the upper back. The prevalence and incidence of atypical pressure ulcers is not known.
A prospective, descriptive pilot study was conducted to document the occurrence, cause, prevention, assessment, and treatment of pressure ulcers in atypical locations. The pilot study is an integral part of an ongoing study to evaluate the pathogenesis of pressure ulcers.

**Methods**

**Setting and participants.** The Skilled Geriatric Nursing Department of Herzog Hospital, Jerusalem, consists of a 32-bed unit contained within a major 340-bed psychogeriatric inpatient healthcare facility. Admission criteria to the skilled geriatric nursing ward include one or more of the following: Stage III and Stage IV pressure ulcers per the National Pressure Ulcer Advisory Panel scale, tracheostomy, terminal cancer requiring palliative care, renal failure requiring hemodialysis, and tube feeding. Patients are referred from medical facilities throughout the country and treatment is funded by the major health funds.

All patients in the unit participated in the study. The study proposal was reviewed and approved by the Ethical Committee of Herzog Hospital.

**Assessment.** Upon admission, all patients are evaluated by a multidisciplinary team that includes a physician, nurse, dietitian, physiotherapist, occupational therapist, and speech therapist. The nurse performs a skin examination and completes a Norton Pressure Ulcer Risk Assessment Scale assessment. The attending physician conducts a physical examination; orders a routine blood analysis including serum albumin, hemoglobin levels, and total lymphocyte count; and completes the Glasgow Coma Scale, which measures level of consciousness (score range 3–15, with a score below 10 indicating vegetative state). The dietitian assesses weight and body mass index and recommends appropriate calorie and protein intake. The physical therapist and occupational therapist evaluate muscle tonus and patient cognitive state and the speech therapist assesses swallowing capacity. A social worker evaluates family emotional and economic resources. The physician and nurse review this assessment and initiate a coordinated treatment.

**Protocol.** As a preventive measure, upon admission each patient receives pressure-relief devices consisting of an air-filled, alternating-pressure mattress overlay and a cushion for sitting. Standard recommended nutritional support consists of 30 to 50 kcal/kg/day including 1 to 1.5 kg protein/day, given either orally or by tube feeding (nasogastric or percutaneous endoscopic gastrostomy) (PEG).

The unit incorporates two weekly combined staff meetings — one concentrates on physician and nurse wound assessment and in the other a multidisciplinary team reviews all patients. Policy changes in treatments are generally instituted based on these weekly meetings, recognizing that alternative treatment may be decided during daily visits. The nurse coordinates ongoing treatment with each discipline and the auxiliary staff.

**Data collection.** Data were collected on all 32 admitted patients, who were followed for 6 months from July 2008 through the end of December 2008. Patients with pressure ulcers underwent a weekly wound assessment and the location, appearance, grade, and size, as well as the treatment decisions made by the physician and nurse team, were documented. Atypical pressure ulcer diagnosis and weekly assessment for patients without ulcers was initiated only upon detection. The assessment and data collection forms (see Figure 1) were maintained in two locations: in the physician-held wound assessment notebook kept expressly for this purpose and in the patient’s hospital chart, recorded by the nurse and shared with the multidisciplinary staff. The data collection sheet is a standardized information source developed by the parent hospital and validated by ongoing usage and recognized effectiveness.

The information provided was shared with and utilized by the multidisciplinary team contributing to the direction of care.

**Pressure ulcer development.** New pressure ulcers usually were discovered by the orderlies in the course of bathing or diaper changing, by the nurses during treatment, or by the treating physician during the course of a routine bedside examination. This information was formally documented into the patient’s records by the physician and nurse. Observations by the auxiliary staff were transmitted verbally to the designated responsible nurse who then entered the information into the patient’s records. Following the appearance of these new ulcers, the patients were added to the list of weekly wound assessment.

Treatment is guided by the wound assessment and all pertinent patient information, including underlying illnesses, nutritional status, functional and rehabilitation capacity, level of cognition and consciousness, and social status (ie, support, resources, and values available from family, economic, community, and religious sources.

**Key Points**

- Case studies have described the occurrence of pressure ulcers in atypical anatomical locations but little is known about their rate of development or common risk factors.
- Results of a 6-month pilot study in a 32-bed skilled geriatric nursing unit showed an occurrence rate of 40%.
- Three risk factor categories were identified: medical devices (most common), spasticity, and bone deformity.
- Larger studies are needed to increase awareness and understanding about the scope of this problem and to improve prevention and treatment strategies.
Results

All 32 patients in the unit were included in the study. Average patient age was 71.5 years (range 35–89). Seventeen (53%) were women and 47% were men. All 32 (100%) were immobile and the majority had feeding problems (29, 80%). Sixteen (42%) had a cardiovascular diagnosis and seven (22%) had diabetes mellitus. Eighteen (56%) were admitted with pressure ulcers.

During the course of the study, 26 new pressure ulcers developed in 20 patients. Half (13) of the new pressure ulcers occurred in an atypical location; four were located on the back of the neck underneath the strap holding a tracheostomy tube in place, one was located in the urethral meatus next to an indwelling urinary catheter, and another was found in the abdominal wall next to the insertion site of a percutaneous gastrostomy tube (PEG). These six pressure ulcers were grouped together as exhibiting complications of the use of a medical device (iatrogenic). Among the other new atypically located pressure ulcers, four occurred in two patients with spasticity — two on the medial surfaces of the elbows and two on the medial surface of the knees. Three of the new pressure ulcers appeared to result from pre-existing anatomical deformities, including the upper spine (kyphosis), wing scapula, and a heterotopic bone formation at the hip area (see Table 1). In all of the atypical cases, the location and presumed cause was recorded in staff notebooks and discussed with the multidisciplinary staff at the weekly visit and patient review; appropriate follow-up action in addition to the standard pressure ulcer prevention measures was taken. For ulcers occurring at the nape of the neck related to tapes that affix tracheostomy tape, nursing staff applied a hydrocolloid dressing over the ulcer and surrounding skin and substituted the cloth tape with a soft wide plastic tape to stabilize the tracheostomy tubes and heal the device-related ulcers, which all healed in approximately 1 month. For patients with contractures, the physical and/or occupational therapist developed and applied a splint to reduce the progression of the contracture and relieve pressure on the extensor surface; in many cases, the treating physician prescribed muscle relaxants and instructed the nurse and caregiver to rotate the position of the patient taking into account the bony malformations and various tubes. These interventions were...
intended to reduce pressure and to provide comfort (see Table 1). The ulcers were improved but not healed.

**Discussion**

Half of all pressure ulcers that developed during the study occurred in atypical sites. A review of the data showed that patient risk factors could be categorized as 1) related to the use of medical devices, 2) the presence of or increased spasticity, and 3) the presence of bone deformity. The three main risk factor categories observed in this pilot study share an uncommon pathogenesis and not all ulcers occurred at the interface between a hard surface and a bony prominence.

**Medical device-related pressure ulcers.** Medical devices used on the patient for a particular goal were the most commonly observed cause of atypical ulcers; these devices should be considered an extrinsic risk factor. In all instances, rigid material such as plastic, rubber, and silicone caused rubbing of or created pressure on the soft tissue (skin or mucous membranes). The literature contains case reports of the development of pressure ulcers associated with the use of nasogastric tubes, PEG, indwelling and external urinary catheters, epidural catheter, intravenous catheters, nasal oxygen cannulas, and oxygen masks. The site of insertion — ie, where the tube penetrates the skin or mucous membrane or the location of device placement — appears to be most susceptible to wound formation.

Adhesive therapeutic devices such as those affixed to intravenous catheters, nasogastric tubes, urinary catheters, tapes that affix tracheostomy tubes, and adhesive dressings also can irritate susceptible skin. Ill-fitting prosthetic devices, including artificial limbs, footwear, and even heel protectors, are potentially dangerous. The causative device is an extrinsic factor that damages the skin epidermis and will be the place of greatest friction.

The problems associated with the inappropriate use of medical devices can be referred to as iatrogenesis and are applicable to any form of medical treatment that causes side effects. Iatrogenesis has been shown to be a major recurring problem in medicine and of particular concern in the older patient; however, in many cases it is potentially preventable. The initial goal is to increase the level of awareness among the treating staff and to emphasize caution with the use and placement of medical devices. For example, tubing (oxygen, intravenous, feeding, urinary catheter) should be situated so as to be completely visible during each shift and not pass under the patient’s body. Minimal use of physical restriction is recommended, combined with an awareness of the potential for pressure ulcer development.

A review of literature indicates a scarcity of recommendations for preventing and healing iatrogenic-caused atypical pressure ulcers. Two case studies describe proper positioning (proper not defined) and intermittent catheterization for two women with spinal cord injury and a urethral pressure ulcer. A letter to the editor describes a man with an atypical ulcer secondary to an epidural catheter in the midline of the back. Position changes were proposed, preferring the mid-auxiliary line to a course along the midline of the back. Another case report of a patient with a suprapubic urinary catheter and an atypical pressure ulcer recommends wrapping the catheter with a nonirritant, soft material. Another letter to the editor regarding a woman with an atypical ulcer caused by a wrist splint recommends traditional treatment using padding, antibiotics, and elevation to treat the affected arm.

**Summary.** Treatment and healing in the current study involved the use of soft wide tape avoiding tightness, hydrocolloid dressing, thigh fixation (not pulling), and vertical abdominal fixation (not pulling). Case reports in the literature indicate pressure ulcer development due to use of tubes, catheters, adhesive dressings, tapes, and ill-fitting prosthetic devices, rarely recognizing the development of a specific category for atypical pressure ulcers resulting from the use of the associated medical devices.

**Spasticity.** Pressure ulcer risk assessment scales do not include spasticity (or contracture) as a major risk factor. However, spasticity has a direct impact on mobility, repositioning, and pressure redistribution and hinders the ability to inspect skin, thus presenting major risk assessment and treatment challenges.

Severe spasticity associated with atypical pressure ulcer development involves intrinsic factors including comorbidity and functional state. Many patients, particularly...
the elderly and the disabled, suffer severe flexion contractures of the lower and/or upper extremity, primarily due to progressive neurological disorders of the central nervous system, spinal cord disease, or injuries. Neurological disorders include vegetative state, cerebral vascular accident, Parkinson Disease, dementia, drugs with anticholinergic effect, and head trauma.22 Disease or injuries of the spinal cord specifically include spinal stenosis, multiple sclerosis, spinal fracture from osteoporosis, metastases of prostate carcinoma, falls, and trauma.

These neurological problems lead to knee, heel, or elbow spasticity in the lower or upper extremities, which can progress to increased muscle tone and pressure over bony prominence and subsequent pressure ulcer formation.24 Exposed extensor surfaces of knees or elbows may apply direct high pressure and compress the skin between the patient’s bony prominence and the bed or wheelchair. In the further progression of such contractures, “kissing lesions” are observed; the patient’s elbows press against the chest wall or the medial aspects of the knees press against each other, causing atypical pressure ulcers in both locations.3

Tendon-release procedures of the knee joint in multiple sclerosis patients are undertaken not only to prevent pressure ulcers, but also to facilitate wheelchair use.25,26 Limb spasticity studies27 using prescription muscle relaxants such as baclofen, dantrolene, diazepam, and tizanidine found limited evidence for their effectiveness in relieving spasticity. Evidence27,28 supports the use of botulinum toxin (BT) and intrathecal baclofen to reduce spasticity; however, the latter two treatments are invasive and substantially more expensive than oral muscle relaxant. Preventive approaches to consider before resorting to surgery or drugs may include physical therapy, exercise, passive range of motion, neurological techniques, splints, and standing programs.

The literature contains several case studies20,21,25 with recommendations for preventing and healing atypical ulcers caused by spasticity. A report of 10 cases20 included a description of the release of flexion contractures using skin flaps and grafts for the prevention/treatment of atypical ulcers, along with the postoperative use of casting and immobilization using a special lamb’s wool sling for the treatment of a patient with multiple sclerosis and a pressure ulcer. Another study25 of nine patients with severe cerebral spasticity and extremity ulcers indicated that serial casting is a valuable treatment tool. A case report21 of a young quadriplegic patient with severe spasticity and pressure ulcers described the failure of surgery and conventional treatment. Not identifying spasticity as a major risk factor was seen as a major impediment to care.

Summary. In the current study, use of a splint, exercise, and cushion pressure relief were effective in the patient population for treatment and healing atypical pressure ulcers; muscle relaxant medication was less effective. A limited number of case studies dealing with spasticity reviewed in the literature included the effectiveness of tendon-release procedures of the knee joint in multiple sclerosis patients, using prescription muscle relaxants (limited effectiveness), and invasive and expensive use of botulinum toxin and a baclofen pump. The release of flexion contractures using skin flaps and grafts, along with serial and postoperative casting and lambs wool slings, also was effective.

Bone deformities. Bone deformations are an intrinsic risk factor that may be barely evident and not pose a problem until a person becomes immobile and cannot be repositioned. Wing scapula bone projection is a latent source for developing scapular wounds. A 19% incidence of severe heterotopic bone formation exists after hip fracture repair, causing abnormal, protruding, bone formation that may increase pressure and lead to ulcer formation.29 The aging process accelerates dorsal spine vertebral collapse, causing hyperkyphosis of the dorsal spine and increasing pressure to the midback. Hyperkyphosis has a prevalence of 20% to 40% among older adults with osteoporosis.29

Summary. Atypical pressure ulcers emanating from bone deformities were treated in this study by repositioning, hydrocolloid dressing, and pressure-relieving devices. The literature does not contain information about ulcers associated with bone deformity other than noting the possibility associated with hip fracture repair and hyperkyphosis and more generally the impact of osteoporosis.

Limitations

The main limitation of this pilot study is its small sample size, limited duration, and selective population of this skilled nursing facility. This limits the ability to extrapolate findings. Moreover, these findings cannot be compared to other studies because the literature does not contain information about the occurrence of atypical pressure ulcers in other geriatric settings or home care. Identification, definition, recognition, and location of atypical pressure ulcers are lacking in practice and in the medical literature. The known methods of prevention are either insufficient or underutilized.

Conclusion

The results of a 6-month pilot study involving 32 patients in a skilled nursing facility in whom 13 atypical pressure ulcers developed suggest that the incidence of atypical ulcers in a population of patients that often have serious neurological pathologies, are malnourished, and require extensive use of medical devices, may be higher than generally recognized. The rate of atypical pressure ulcer development in this study population was 40%. The nature of long-term care is likely to increase the incidence of atypical pressure ulcers due to the complexities of the treatment involved.

Every atypical pressure ulcer requires an investigation as to probable causes. In this study, three categories of predisposing factors lead to the development of these ulcers: use of a medical device, spasticity, and the presence of bone...
deformities. Additional studies with a larger research population are necessary to define, characterize, and validate these categories. This information may help healthcare professionals recognize risk factors for development of atypical pressure ulcers and expedite development of prevention and assessment strategies. A multidisciplinary staff and team approach in which each discipline has its own task in the prevention and treatment of the pressure ulcers and as a team provides comprehensive assessment of the whole patient appears to be medically advantageous. Weekly multidisciplinary conferences with team participation is important for training, as well as for the detection, reporting, and treatment of related pressure ulcers.31

Of primary importance in the prevention and healing of atypical pressure ulcers in the three categories discussed is to increase the level of staff awareness and to emphasize caution with the use and placement of healing strategies. The recognition of the three categories opens the door for continuing and intensified research leading to specialized prevention, treatment, and healing.

This pilot study provided valuable details regarding atypical pressure ulcers that will influence multidisciplinary prevention and treatment strategies. Consideration of atypical pressure ulcer risk factors and denoting risk categories was deemed necessary in practice to avoid wound development and resulting medical complications.

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Reference