

Pressure Ulcer Prevalence among Hospitalized Children in Jordan

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Abstract

Background: Pressure Ulcers (PUs) remain a significant and complex health problem in health care settings. It is related to human suffering, pain, disfigurement, and financial burden. Only few studies about PUs incidence and prevalence have focused on paediatric patients whereas PUs prevention and management are generally extrapolated from the adult population.

Aims: Determining PUs prevalence among children in Jordan and exploring the allocation of prevention measures to at risk populations.

Methods: A point prevalence survey was conducted on 784 inpatient children in university, private and governmental hospitals in Jordan. A modified European Pressure Ulcer Advisory Panel (EPUAP) PUs prevalence survey form was used. PUs were classified according to the 2009 EPUAP and the National Pressure Ulcer Advisory Panel (NPUAP) grading system. Risk of PUs development was assessed using the 2009 Glamorgan scale for risk assessment in paediatrics.

Results/ Findings: The overall PUs prevalence was 8.2% (n=58) and decreased to 1.8% when Grade 1 was excluded. The sacrum was the most often affected site (75.8%, n=44 of 58). For the various at risk sub groups, paediatric critical care and surgical units showed the highest PUs prevalence of 43.1% and 36.2%, respectively. Of the 400 children evaluated to be at risk of PUs development, only 10% received prevention in terms of equipment and/ or repositioning.

Conclusions: The PUs prevalence among children in Jordan is comparable to that reported for other countries utilizing the same methodology. Despite relatively low PUs prevalence, few patients at risk received adequate prevention. Since PUs risk assessment scales are not frequently used in Jordan, there is a need to emphasize knowledge of prevention and interventions as a key to reducing PUs prevalence.

Keywords: Pressure ulcer, Paediatric, Prevalence, Jordan; Nursing.

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Introduction

A Pressure ulcer (also called bedsore or

decubitus ulcer) is a common health problem that is characterized by localized lesion caused by unrelieved pressure, shear or friction forces

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and aggravated by humidity, temperature, age, continence, and medications that result in damage to underlying tissues due to a prolonged period of ischemia. It usually occurs over bony prominences such as the sacrum, pelvic, elbows, knees, and ankles(1). Pressure ulcers can lead to human suffering, pain, disfigurement, and financial burden. Despite PUs preventive measures, PUs rates are significantly increased in health care facilities (2).

While the prevalence and prevention of PUs in adult patients have been extensively explored, few studies have been conducted on paediatric populations. Due to the dearth of research about paediatric PUs risk assessment and age specific interventions, PUs prevention and treatment among children were generally extrapolated from and based on the results of an adult population(3).

In their systematic literature review of PUs incidence and prevalence studies, Kottner et al. (2010) concluded that studies in paediatric settings are limited(4).The true scale of incidence and prevalence of pressure ulcers in children is unknown(2). Few studies reported PUs prevalence in children (n=10) (4). Considering methodological differences and reliability of PUs prevalence reports, only eight studies indicated PUs prevalence ranging between 0.5% (5) and 43.3% (6) in the USA. Considering more consistent methodologies used to report PUs prevalence, estimates ranged between 1.6% (7) and 4% (8) in North American Children hospitals. Excluding grade one PUs makes studies more comparable, with reported prevalence of 1.2% (7), 2.2% (9) and 4.5% (10).The PUs prevalence also depends on age groups at risk. For example, the European figures ranged between 6.6% (9) and 27.7%

(10) among children aged 11-20 years old.

PUs locations were predominantly frequent in the head in about 31% of paediatric population(8, 11), and occurred most of tenat the occipital region and at locations such as the nose, chin, or necke specially in newborns and infants (7, 9, 12). The likelihood of developing sacral and heel pressure ulcers increases with increasing age and growth(4, 13). PUs incidence was 20% at the seat area, and 19% at the foot area(8). Most PUs developed in children were grade one and aggravated by medical devices, mechanical ventilation, low mean arterial pressure (< 50 mm Hg), and higher PUs risk scores (14).

The literature review revealed limited sound empirical evidence about pressure ulcerin children. Since study designs and reports of many investigations were different, it is difficult to make any evidence based statements about PUs frequency in paediatric populations. However, it is recommended to consider appropriate guidance in planning, conducting and reporting of PUs incidence inpaediatrics(4).

In Jordan, no baseline information about pressure ulcer prevalence in children exists. Only two published studies on PUs incidence and prevalence in an adult populationin the Arab world have been carried out. One study gave incidence figures from Saudi Arabia (15)and the second provided data about Jordanian hospitalized patients(16). Thus, the current study is one of the first of its kind in the Arab world and may serve as abaseline and platform to synthesize PU prevalence in the paediatric population.

The present study aims to quantify the prevalenceof PUs among children in Jordan, to

compare these figures with international ones, and to provide a benchmark for PUs prevalence studies.

METHODS

Research Design

A cross-sectional survey design was used to quantify PUS prevalence in Jordanian hospitalized children between October 2011 and January 2012.

Sample and Sampling Technique

Setting

Pressure ulcer care is performed at hospital settings in Jordan. Inclusion criteria were those hospitals having 200 and more beds and having paediatric population. From a total of 30 governmental, 65 private and 2 university hospitals, only 10 hospitals (6 governmental, 2 university, and 2 private) met the inclusion criteria. A list of all units in which there were likely to be children with PUs including general, medical and surgical paediatric units, and general and paediatric intensive care units at each selected hospital was obtained from the directors of nursing. Only three eligible units were selected by means of a random number table from each site.

Sample

The sample included all hospitalized children who were admitted before midnight on the pre-determined day of data collection, aged one day to eighteen years, having PU grades 1-4 according to the 2009 European Pressure Ulcer Advisory Panel (EPUAP) and the National Pressure Ulcer Advisory Panel (NPUAP) classification(2), and are at risk of PU development (cut off >10) using the Glamorgan scale for PU risk assessment in paediatrics were included (17).

Instruments

A modified survey form was used to collect the data about PU prevalence in Jordanian hospitalized children. The survey form was based on the EPUAP pressure ulcer prevalence survey form which has high inter-rater reliability(13). The initial form was subjected to validation process by researchers and expert nurses (n=10) that assessed the level of comprehensiveness, clarity, avoidance of ambiguity, and content validity. This involved circulating the draft items until there was consensus on content, order, and wording. As a result, the form used is one page long and contains data in four areas: general patient data, risk assessment, skin inspection and PU prevention.

The first category includes patients' age, gender, length of stay from the admission date till the survey time, and patients' diagnostic category. It also includes the type of hospital, hospitals' number of beds, hospital unit the children are admitted to, and units' number of beds.

The second category includes patients' risk of PUs development using the Glamorgan scale(17). The psychometric properties of this scale have been tested and showed that the reliability of the Glamorgan scale was found to be greater than those for the Braden Q scale, which is widely used to assess PUs risk in children in the USA(17). It consists of several risk factors (indicators) that are significantly associated with and had predictive performance of PUs development. The Glamorgan scale includes immobility which is rated from 0 (least impaired) to 20 (most impaired), difficult to position rated from 0 (least impaired) to 15 (most impaired), reduced mobility for age rated from 0 (least impaired)

to 10 (most impaired), and equipment pressing or rubbing skin rated from 0 (least impaired) to 15 (most impaired). Additional factors include pyrexia, poor peripheral perfusion, inadequate nutrition, low serum albumin, weight loss more than 10th percentile and incontinence (inappropriate for age); all of which are rated from 0 (least impaired) and 1 (most impaired). The total scores range from 0 to 67 where higher scores indicate higher risk that necessitates prevention and categorized as follows: 10+ at risk, 15+ at high risk, and 20+ at very high risk.

The third category is skin inspection and gives specific information about the conditions of the patients' skin. This part is the clinical part of the study. All participating children were examined. The grade and location of the most severe ulcers were recorded using EPUAP and NPUAP classification system(2). This grading system has been tested for inter-rater reliability and has a Cohen kappa of 0.80(18).

The last category is preventive measures. Two main interventions were recorded: 1) Equipment which was defined as standard hospital mattress (no special equipment), non-powered device (pressure redistributing mattresses) or powered device (any device with an electrical supply) as defined by EPUAP methodology. 2) Intervention, which referred to repositioning; it was documented as not planned/irregular or at frequencies of every 2 or 3 hours as this is also consistent with EPUAP and NPUAP (2009) guidelines.

The prevalence of PU in children was measured using the formula: Number of patients developed pressure ulcers grade 1 to 4 during the point prevalence survey event divided by the number of surveyed population

multiplied by 100(19). The operational definition of PU was the presence of grade one PU at least once during the survey event as mentioned by(20). If the patient had more than one PU lesion, the extensive destruction of the skin and underlying structure injury was taken into account.

Ethical Considerations

Ethical approvals were obtained from the Research and Ethics Committee of the Faculty of Nursing at The University of Jordan and from the Research and Ethics Committees of the hospitals involved in the study. Furthermore, written permission of using the Glam organ scale (17) was obtained from authors. Anonymity of the child's identity was ensured by assigning them identification numbers rather than using their names to access actual research information. Confidentiality of the child and/or parents information was safe guarded in a cabinet that is password protected and was restricted to the research team. Furthermore, a consent was obtained from the child's parents who attended data collection events and were involved in the study. The child's parents were free to withdraw their children from the study at any time and refuse participation and/ or skin inspection of their children.

Data Collection Procedures

A detailed explanation about the aims and procedures of the study was given to nurse administrators, head nurses, and charge nurses in the participating hospitals. Each child participant was assessed by one of the data collectors who received standardized training on PUs identification, grading and survey form administration which ensures higher reliability. Skin assessment was carefully performed and pressure ulcers grade one

(non-blanchable erythema) to grade four (extensive destruction of the skin and underlying structure) identified according to the EPUAP and NPUAP (2009) classification system. Risk assessment was performed and the use of preventive measures was recorded. After completion, data sheets were reviewed and any missing data were added. Procedure was performed according to a programmed plan by the researcher and the participating units were scheduled for un announced visits.

Data Analysis

Data were analyzed using the SPSS package 16.0 (21). Descriptive statistics were employed to describe the studied variables.

Results

The total number of children surveyed was 784 patients. Only 476 of participating children were at risk (60.7%); 76 declined or discharged before completion of the study period. The final sample was 400 children at risk (51%) while 308 (39.3%) were not at risk. Table 1 shows demographic characteristics of at risk children and the characteristics of the of participating hospitals.

PU's Prevalence

Of the sample (N=708), 58 children (8.2%) (1.8% when excluding grade one PUs) were having one or more pressure ulcers. Grade one PUs were seen in 45 out of the 58 cases (77.6%) with the remaining 13 cases (22.4%) showing deeper ulcers of grades two and three. Results in table 2 show higher PUs prevalence in Paediatric critical care units (43.1%, n=25 of 58 children) and surgical paediatric units (36.2%, n=21 of 58 children). Considering number of children included in each unit, general critical care units had also a high rate of PUs (42.8%, n=3 of 7 children).

The most common site at risk of PUs development was the sacrum (75.8%, n=44 of 58) as compared to other areas such as heels, ischium, thoracic cage, and the head as shown in table 2.

Risk assessment

Of the 784 surveyed children, 400 (51%) were classified at risk of PUs development using the Glamorgan scale(17). Of those, 50.2% (n=201) were classified at risk, 28% (n=112) at high risk, and 21.8% (n=87) at very high risk of PUs development. It should be stressed that the present results lend further support to the reliability of the Glamorgan risk assessment scale, where 62.1% of those children having PUs (n=36 of 58) were originally classified at very high risk, 25.8% (n=15 of 58) at high risk, and only 12.1% (n=7 of 58) at risk.

PU's Prevention

Table 3 shows allocation of PUs preventive measures in terms of using pressure reducing equipment and repositioning. Preventive measures were categorized according to risk of PUs development employing the Glamorgan scale. In general, it was evident that the majority of children at risk were not allocated to preventive measures. This fact denotes poor PUs prevention. Almost 90% of participants at risk neither repositioned regularly nor placed on pressure relief equipment. Considering PUs risk, no special devices was applied in 96.5% (n=194 of 201) of the at risk children, 92% (n=103 of 112) of the at high risk children, and in 77% (n=67 of 87) of the at very high risk children. Further, no planned or irregular repositioning schedule was implemented in 97.5% (n=196 of 201) of the at risk children, 91.1% (n=102 of 112) of the at high risk children, and in 70.1% (n=61 of 87) of the at very high risk children.

Although participating children were at risk of PU development (n=400), which necessitates the need for regular repositioning and pressure reducing devices, only 28.7% (n=25 of 87) of children at very high risk have been repositioned every 2 hours and only 11.5% (n=10 of 87) of the same group have been placed to a powered device.

DISCUSSION

PU Prevalence

The current study found that PUs prevalence among Jordanian hospitalized children is 8.2% (1.8% when excluding grade one PUs). The identified PUs were based on actual skin examination and clear PUs classification. Considering methodological differences, settings, eligibility criteria, and reported sample characteristics; several studies from the UK and the USA reported widely differing PUs prevalence that ranged between 2% and 8% (4). The prevalence differences were reduced when excluding grade one PUs, and ranged between 1% and 5%. Using comparable methods to the ones used in the present study, only the study by Willock et al. (2000) on PUs prevalence among children in eleven children hospitals in the UK reported a comparable rate to the present study which was 2.2% (9) whereas the rate in the Jordanian paediatric population is 1.8%.

In the present study, the most identified PUs were grade one and this is similar to the findings of studies of paediatric population (9, 10, 22). One explanation might be that the effects of pressure and shearing forces are weakened by the resilience and tolerance of children's tissues, which results in a reduction of severe ulcers occurrence.

Despite inadequate utilization of PUs prevention in at risk children population, the present study reports a relatively low overall prevalence. This may be attributed to the ease of turning children in bed and keeping them dry by frequent change of diapers, as well as to the tolerance of children's tissues. On the other hand, higher PUs prevalence is found among intensive care paediatric population. This higher prevalence may be related to factors such as the use of medical devices (tubes, casts, or cables) that may contribute to pressure related injuries in children (25). Furthermore, risk of PUs injuries may also be increased by mechanical ventilation, low mean arterial pressure, and associated critical illness in these subgroups (14).

Considering similar methods used in the UK and the USA, Jordanian populations were different in terms of age, PUs prevention and treatment guidelines, severity of PUs risk, history of medical illness, and length of stay at the hospital. Regarding age, only 4.5% of the sample was 13-18 years old; while the majority of participating children (38.5%) were one year old or less. The population mean age in the present study was 3.35 years compared with 4.6 years in the study of Groeneveld et al. (24) where the PUs prevalence was 13.4%. Half of the participating Jordanian children (n=400) were at risk of PUs development using the Glam organ scale (17) while risk assessment was not clearly described in other studies (9). PUs prevention and treatment guidelines including risk assessment scales were not used in clinical practice by Jordanian nurses. Therefore, there is a need to explore additional factors that may influence PUs care in Jordanian children such as medical illness, length of stay, risk assessment, and the effects

of medical devices on PUs development.

Regarding the sites of PUs development, our study showed that 75.8% of PUs occurred at the sacral region. This contradicts the study of Kottner et al. (2010) which was performed on children (4), but similar to that of adults (13). The similarity of PUs sites among children in Jordanian hospitals and that among adults is attributable to the lack of implementation of adequate PUs preventive measures such as patients' turning programs.

PUs Prevention

In regard to PUs prevention, poor utilization of PUs prevention equipment and repositioning was evident. In fact, there is lack of data available about PU prevention in children. However, the literature about adult populations show low prevention care provided to patients at risk of PUs development(13, 23). Despite the availability of PUs prevention equipment, nurses were unable to implement PUs prevention modalities according to patients' risk categories. This finding signifies the need for PUs guidelines to regulate PUs prevention and care in Jordanian hospitals.

Limitations

The current study shed light on PUs among Jordanian children population employing a point prevalence indicator. PUs incidence is particularly useful in providing a broad view of PUs among children in Jordan and in establishing baseline data for future improvements where national studies and documentation of PUs are lacking (15). It may also be used as one measure for the development of PUs prevention strategies within Jordanian health care facilities. Furthermore, as data about PUs prevention

were collected from nurses and their documentation; it is imperative to verify whether these interventions are employed in clinical practice or not.

Although this study is the first conducted in the Arab world and contributes to the national and global body of knowledge, results cannot be generalized from this one study because of the use of a convenience sample. Additionally, the Glamorgan scale (17) is used for the first time and has not been previously tested and/ or used in the Arab World. Beyond the results of this study, PU prevention and efficacy of PU prevention modalities have not been explored. Additional factors influence PU development such as nutritional status, skin care, devices related injuries and continence were not examined.

Conclusions

Baseline PUs prevalence among Jordanian hospitalized children was reported. Despite variations in study designs and reports, PUs prevalence among Jordanian children was comparable to that reported in studies from the UK when considering paediatric intensive care units population. PUs prevalence was higher, however, than those reported in studies from the USA. Although young children population was selected, most developed PUs were located at the sacrum. This change in PUs locations contrary to the evidence from paediatric population reported in the literature has to be adequately taken into account in clinical practice and in future research. Of concern, inadequate PUs prevention provided to those patients at risk was evident and further work is needed to explore this area. In addition, there is a need to explore additional factors that may influence PUs care in Jordanian children such as medical illness,

length of stay, risk assessment, and the effects of medical devices on PUs development.

Table (1) Demographic characteristics of surveyed at risk children (N=400) and participating hospitals

Patients' characteristics according to	Number of Patients (n)	(%)
Type of Hospital		
Governmental	346	86.5%
Private	34	8.5%
University	20	5.0%
Hospital Number of Beds		
More than 500	129	32.2%
200-500	271	67.8%
Hospital Unit		
General Paediatric	193	48.2%
Medical Paediatric	29	7.2%
Surgical Paediatric	80	20.0%
Paediatric ICU	91	22.8%
General ICU	7	1.8%
Number of Unit Beds (n=361)¹		
Less than 20 Beds	171	47.4%
21-40 Beds	120	33.2%
More than 40 Beds	70	19.4%
Length of stay (n=394)²		
Less than 6 days	65	16.5%
6 days-1month	299	75.9%
More than 1 month	30	7.6%
Age		
1day-28 days	54	13.5%
1month-12 months	154	38.5%
1 year-3 years	66	16.5%
4 years-6 years	41	10.2%
7 years-12 years	67	16.8%
13 years-18 years	18	4.5%
Gender		
Male	211	52.8%
Female	189	47.2%
Patients' Diagnoses (n=394)²		
Neuro- Disorders	67	17.0%
Medical Health problems	242	61.4%
Surgical Health problems	77	19.5%
Oncology Disorders	8	2.0%

<i>Patients' characteristics according to</i>	<i>Number of Patients (n)</i>	<i>(%)</i>
<i>Glamorgan Scores</i>		
<i>At Risk</i>	201	50.2%
<i>High Risk</i>	112	28.0%
<i>Very High Risk</i>	87	21.8%

¹ This information was missing for 39 of the 400 at risk patients.

² This information was missing for 6 of the 400 at risk patients.

Table (2) Characteristics of pressure ulcers

<i>Characteristics of pressure ulcers</i>	<i>Number of Patients (n)</i>	<i>%</i>
<i>PUs Prevalence (N=708)¹</i>		
<i>Including grade 1</i>	58	8.2%
<i>Excluding grade 1</i>	13	1.8%
<i>Grades of PUs (n=58)²</i>		
<i>Grade 1</i>	45	77.6%
<i>Grade 2</i>	11	19 %
<i>Grade 3</i>	2	3.4%
<i>Grade 4</i>	0	0.0%
<i>Locations of PUs (n=58)²</i>		
<i>Sacrum</i>	44	75.8%
<i>Heel</i>	7	12 %
<i>Ischium</i>	5	8.6%
<i>Thoracic cage</i>	1	1.7%
<i>Temporal</i>	1	1.7%
<i>PUs prevalence according to hospital unit (n=58)²</i>		
<i>General Paediatric</i>	9	15.5%
<i>Medical Paediatric</i>	0.0	0.0%
<i>Surgical Paediatric</i>	21	36.2%
<i>Paediatric ICU</i>	25	43.1%
<i>General ICU</i>	3	5.1%

¹Total number of children screened to be classified as being at risk or not.

²Number of children with one or more pressure ulcers.

Table (3) Allocation of pressure ulcers preventive measures (N=708)

Prevention Modality	Not at Risk(n=308)	At Risk Children(n=400)		
		At Risk n=201 (50%)	High Risk n=112(28%)	Very High Risk n=87(22%)
Equipment				
<i>No Special Equipment</i>	299 (97%)	194 (96.5%)	103 (92%)	67 (77%)
<i>Non-Powered Device</i>	9 (2.9%)	1 (0.5%)	2 (1.8%)	10 (11.5%)
<i>Powered Device</i>	0 (0.0%)	6 (3%)	7 (6.2%)	10 (11.5%)
Repositioning				
<i>Not Planned/ Irregular</i>	287 (93.2%)	196 (97.5%)	102 (91.1%)	61 (70.1%)
<i>Every 2 hours</i>	14 (4.5%)	5 (2.5%)	10 (8.9%)	25 (28.7%)
<i>Every 3 hours</i>	7 (2.3%)	0 (0%)	0 (0%)	1 (1.1%)

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مدى حدوث التقرحات السريرية عند المرضى الأطفال المدخلين في المستشفيات في الأردن

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الملخص

الهدف: تهدف هذه الدراسة الى معرفة مدى حدوث التقرحات السريرية عند المرضى الأطفال المدخلين في المستشفيات في الأردن لمحاولة استكشاف الإجراءات الوقائية المستخدمة للأطفال المعرضين إلى مخاطر حدوث التقرحات السريرية.

الطريقة: تم إجراء تقييم سريري لـ 784 طفلاً ممن أدخلوا الى عدد من المستشفيات الحكومية والخاصة والمستشفيات الجامعية في الأردن خلال الفترة من تشرين الأول 2011 وحتى كانون الثاني 2012. جمعت البيانات من خلال ملء استبانة (اللجنة الاستشارية الأوروبية للتقرحات السريرية) التي تتضمن معلومات عامة عن المرضى وتقييم الخطورة وتقييم الجلد والإجراءات الوقائية المتبعة. ولتحديد مدى الخطورة استخدمنا مقياس Glamorgan للأطفال.

النتائج: خلصت الدراسة إلى أن نسبة حدوث التقرحات السريرية عند الأطفال المرضى في الأردن هي 8.2%، وإذا تم استثناء الدرجة الأولى من التقرحات السريرية تكون النسبة 1.8%. كما أشارت الدراسة إلى أن أكثر الأماكن إصابة هي المنطقة العجزية، وأظهرت النتائج أيضاً أن 400 مريض من الأطفال من أصل 784 طفلاً كانوا أكثر عرضة لحدوث التقرحات السريرية، وأن 10% فقط من هؤلاء الأطفال الأكثر عرضة فقط تلقوا إجراءات وقائية.

الخاتمة: بالرغم من أن نسبة حدوث التقرحات السريرية عند المرضى الأطفال في الأردن قليلة إلا أن نسبة قليلة منهم تلقوا الإجراءات الوقائية اللازمة، ولأنه لم يتم استخدام مقياس تحديد خطورة تعرض الأطفال للتقرحات السريرية؛ لذا فإنه من الضروري زيادة المعرفة بأساليب منع حدوث ومعالجة التقرحات السريرية للتقليل منها.

الكلمات الدالة: مدى حدوث، تقرحات سريرية، الأطفال، مستشفيات الأردن، التمريض.