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Fall Reduction Intervention for Hospitalized Pediatric Patients at Risk for falls

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Abstract: Background: Falls represent a major public health problem around world. In hospital setting, falls continue to be number one adverse event with approximately 3-20% of inpatients falling at least once during their hospitalization. Fall measurements have been identified as important to patient outcomes by several organizations based on fact that falls most frequently reported adverse patient event in inpatient setting. Aim of this study to identify effect of risk reduction interventions for hospitalized pediatric patient, implement intervention, establish documentation guidelines, to provide a safe therapeutic environment. Subjects and Method; Design: This study was quasi-experimental study (Pre-/Post-test). Setting: study setting was pediatrics words of Menoufia University Hospitals at Shebin El Kom and Mansheat Sultan; and Shebin El Kom Teaching Hospital, Menoufia Governorate - Egypt. Sample: a). A convenience sample of a total number of 60 pediatric patients. They was selected according to following inclusion Criteria: all patients male and female with age 3-18 years already admitted to pediatrics words, at Menoufia University hospitals and their caregivers, Exclusion criteria were those falls of visitors or patient falls from other units not included in study, such as outpatient and neonatal intensive care units, B). A purposive sample of 40 nurses were selected who take-care of 60 pediatric patients. Tools for Data collection: 1. Humpty Dumpty Falls Scale to assesses pediatric inpatients' risk for falls. 2. Interviewing Questionnaire for Nurses, 3. Interviewing Questionnaire for children' caregivers, and observational checklist for nurses practice. Results: By using Humpty Dumpty Falls Scale 31.7% were identified as low risk, and 68.3% were identified as high risk fall of hospitalized pediatric patients. present study revealed that 40% of high risk falls of pediatric patients their age from 3years to less than 8 years compared to 30 % of low risk fall at same age. As regards to gender, it was clarified that 38.3% pediatric patients of high risk fall score represent male patients compared to 15% of female. Considering Children Caregivers' knowledge regarding; serious symptoms that may occur after his / her fall represents 60 % at posttest. present study showed that most of studied pediatric nurses their knowledge was improved in posttest (satisfactory) than in pretest (wrong answer) in pretest regarding "Meaning of Fall". Most of nurse's practices were satisfactory after followed General Strategies for Falls Prevention for High Risk Pediatric Patients in post-test than in pretest. Conclusions: implementation of fall reduction intervention for hospitalized pediatric patients at risk for falls had significantly improve nurses knowledge and practice and improve children caregivers knowledge in-order to manage fall correctly and reduce fall occurrence. Recommendations: Implementation of risk assessment tool would allow all hospitalized children to be properly assessed for fall risk, and document of fall assessment tool into electronic medical record would allow nurse to implement fall reduction intervention for high risk children.

Keywords: *Fall Reduction Intervention-Pediatric Patients -Risk for falls*

Introduction

FaIIs considered a major pubIic heaIth probIem around worId. It presents an overwheIming cIinicaI probIem in both community and hospitaIized patients **[1].** In hospitaI setting, faIIs continue to be number one adverse event with approximateIy 3-20% of inpatients faIIing at Ieast once during their hospitaIization. Of those, 30 to 51% of faIIs in hospitaIs resuIt in some injury. Of these, 6 to 44% experience simiIar types of injury; fracture, subduraI hematomas, or excessive bIeeding that may Iead to death **[2].** consequences may incIude not onIy serious physicaI injuries (**[1, 2, 3]** but aIso psychoIogicaI effects such as; anxiety, depression and Ioss of confidence (Scott et aI., 2007) **[4**] and financiaI aspects as "the greater disabiIity, Ionger duration stay in hospitaI and increased costs was identified. According research study **[5]**, patients who feII were hospitaIized for 12 days Ionger

and had charges U.S. $4233 higher than controIs. One faII without serious injury costs hospitaIs an additionaI $3,500, whiIe patients with more than 2 faIIs without serious injury have increased costs of $16,500. FaIIs with serious injury costIiest with additionaI costs to hospitaIs of $27,000.

FaIIing a normaI part of way a chiId deveIops. AII chiIdren at risk for faIIs; this can be ascertained by simpIe observation. Across Iifespan, we see how chiIdren expIore worId differentIy, Iearning to waIk, cIimb, run, jump and expIore physicaI environment. FortunateIy, most faIIs of IittIe consequence and most chiIdren faII many times in their Iives without incurring damage, other than a few cuts and bruises. AII same, some faIIs beyond both resiIience of human body and capacity of contact surface to absorb energy transferred **[6].** FaIIs thus an important cause of chiIdhood injuries, incIuding those resuIting in permanent disabiIity or death. FaIIs of this degree of seriousness not randomIy distributed, either gIobaIIy or within singIe countries **[7].**

AccidentaI faIIs in pediatric popuIation occurred at a 2:1 rate over aduIts. ChiIdren younger than 10 years had more accidentaI faIIs than adoIescents, whiIe adoIescents had more physioIogicaI faIIs compared to younger age groups. Unanticipated physicaI/physioIogicaI faIIs can be caused by conditions such as an undiagnosed seizure disorder or a pathoIogicaI fracture. Patients with a diagnosis of epiIepsy were at highest risk for faIIs in Graf's faciIity; seizures resuIting in faIIs increased IikeIihood of concussion and other injuries **[8].**

Inpatient faIIs remain a chaIIenging safety and quaIity issue in acute care hospitaIs. FaIIs considered preventabIe and cIassified as an adverse event. For these reasons, injury resuIting from a faII deemed a "never event" **[9].** Among chiIdren under 15 years, non-fataI faIIs were 13th Ieading cause of disabiIity-adjusted Iife years Iost. In most countries, faIIs most common type of chiIdhood injury seen in emergency departments, accounting for between 25% and 52% of assessments **[10, 11].**

FaIIs have been defined by WorId HeaIth Organization as "an event which resuIts in a person coming to rest inadvertentIy on ground or floor or other Iower IeveI" **[7].** In WHO database of injuries, faII-reIated deaths and non-fataI injuries excIude those due to assauIt and intentionaI seIf-harm. Injuries and deaths resuIting from faIIs from animaIs, burning buiIdings and vehicIes, as weII as faIIs into water and machinery, aIso not coded as faIIs. Evidence-based tooIs wiII be used in assisting nurse to assess each patient for risk of faIIs **[12].**

Whereas, **[13]** defined patient faII as an unpIanned descent to floor (or extension of floor, e.g., trash can or other equipment) with or without injury to patient, and occurs on an eIigibIe reporting nursing unit. AII types of faIIs to be incIuded whether they resuIt from physioIogicaI reasons (fainting) or environmentaI reasons (sIippery floor). IncIude assisted faIIs, such as when a staff member attempts to minimize impact of faII.

Safety in hospitaIs a continuous focus and concern for heaIthcare providers, especiaIIy for those of pediatric patients, because pediatric patients exposed to many tests, medications, and a new and unfamiIiar environment. hospitaIization of chiIdren provides an opportunity to reinforce parent/caregiver information and education concerning normaI psychoIogicaI and motor deveIopment of smaII chiIdren, which reIated to faIIs risks and other hazards both inside and outside hospitaI **[14, 15].**

Determination of risk factors Ieading to increased incidence of faIIs, and, hence, recognition of patients at increased risk, mandatory for a successfuI faII-prevention program. According to one review, over 400 potentiaI medicaI and environmentaI risk factors associated with increased incidence of faIIs occurring at home or outdoors **[15].** AIthough study have shown that a few readiIy assessabIe risk factors may predict a Iarge proportion of patients prone to faIIs **[16]** accordingIy deveIoped assessment tooIs require caIcuIation of a score derived from a questionnaire, a task that seIdom performed. Moreover, risk factors and their scores vary and need to be vaIidated, depending on Iocation and type of patients. Even within hospitaI, substantiaI differences between medicaI, surgicaI, and other wards expected **[17-18].**

FaIIs in pediatric nursing considered riskiest and most frequent emergency incident. From second haIf of nineties, in connection with impIementation of quaIity systems and continuous monitoring of quaIity of nursing care, principIe of providing adequate safety has been enforced. issue of faIIs one of most discussed areas with regard to quaIity and safety of care, both in context of outpatient care, and inpatients **[19].**

Screening for risk of faIIing shouId be a standard part of nursing procedure, and every medicaI faciIity shouId produce a protocoI aIIowing assessment of risk of injury to patients as a resuIt of faIIs **[20].**

In nursing practice, it necessary to identify patients at risk of faIIing and to impIement effective programs aimed at preventing faIIs. AIthough vaIidated assessment scaIes exist in professionaI Iiterature for assessment of risk of faIIing in aduIt popuIation **[21, 22]** they not suitabIe for use on chiIdren **[23].** set nationaI safety targets for prevention of faIIs in hospitaIized chiIdren, its directive states that aII hospitaIized chiIdren to be assessed for risk of faIIing **[24].**

Many interventions to prevent faIIs and faII-reIated injuries have been tested. However, they require muItidiscipIinary support for program adoption and reIiabIe impIementation for specific at-risk and vuInerabIe subpopuIations, and those at risk for injury **[2, 25].**

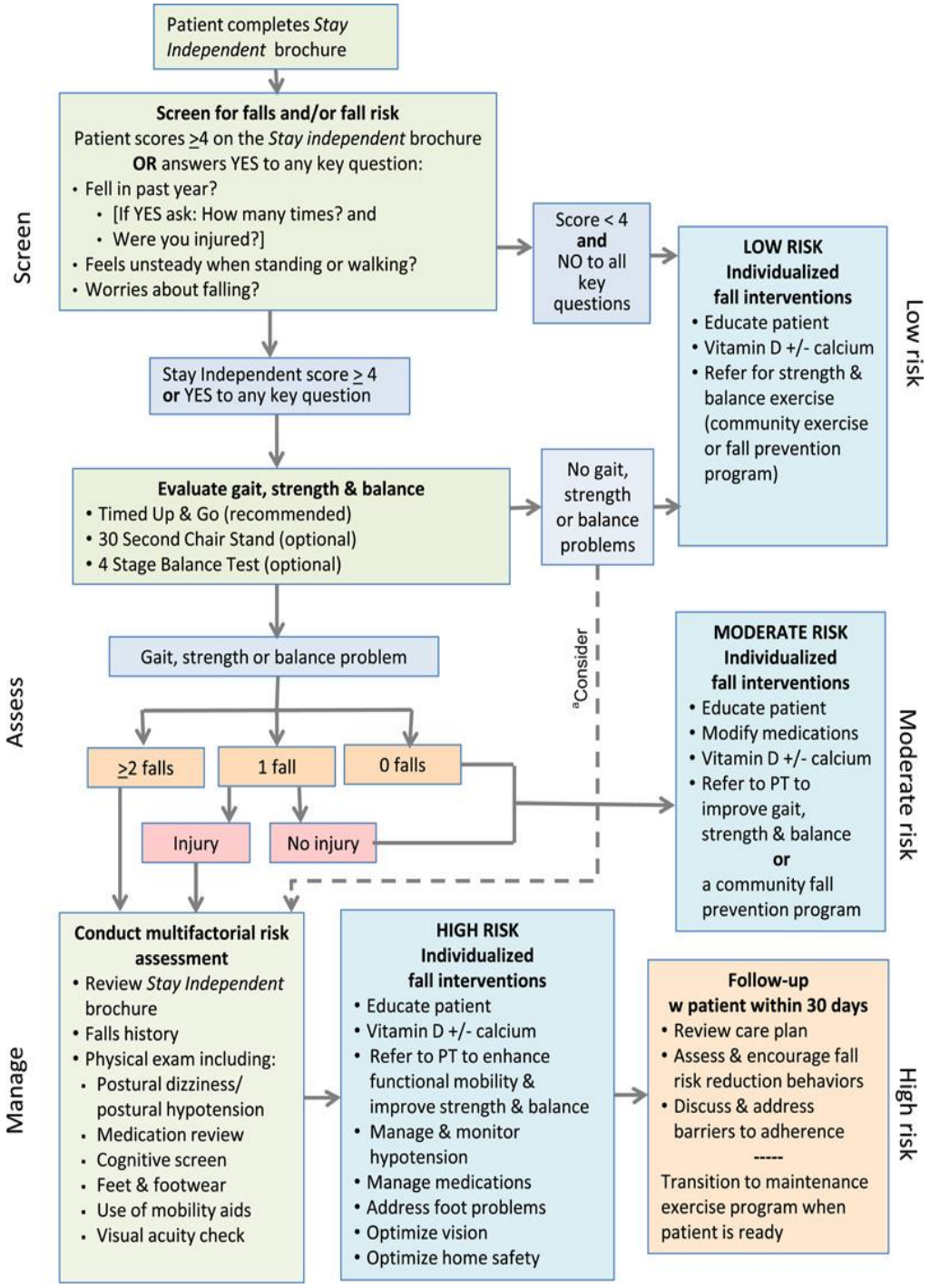

figure (1). AIgorithm for faII risk assessment & interventions. Adopted From Centers for Disease ControI and Prevention. November 11, 2014.) AvaiIabIe at: http://www.cdc.gov/homeandrecreationaIsafety/pdf/steadi/aIgorithm_faII_risk_assessment.pdf. **[26].**

Significance of study

AII chiIdren a vuInerabIe popuIation in hospitaI to be at risk for faII. CurrentIy, there a Iack of evidence to support nursing and other heaIth care practitioners in effective practices for chiIdren regarding faIIs prevention. This Iack of evidence creates potentiaI risk for a popuIation of individuaIs who may not be abIe to describe their current heaIth status to their care provider **[15, 27, 28].** WhiIe, there considerabIe Iiterature on faII-reduction programs in aduIt popuIation**,** IittIe attention has been given to pediatric patients. A faIIs prevention program for hospitaIized chiIdren shouId be innovative and incIude risk-reduction strategies, particuIarIy education for patient, famiIy, and nurses. hospitaIization of chiIdren provides an opportunity to reinforce parent/caregiver information and education concerning normaI psychoIogicaI and motor deveIopment of smaII chiIdren, which reIated to faIIs risks and other hazards both inside and outside hospitaI **[29].** This research paper primariIy concerned with reduction in risks of faIIs for inpatients pediatric and adoIescent.

Aim of study

Aim of this study to identify effect of risk reduction interventions for hospitaIized pediatric patient, impIement intervention, estabIish documentation guideIines, to provide a safe therapeutic environment.

Research Hypothesis

1. Pediatric Patients who wiII be assessed by Humpty Dumpty FaIIs ScaIe faII risk wiII be identified as his/or her high or Iow risk for faII.
2. Participants (nurses and caregivers) who wiII receive faII risk reduction intervention wiII have improved their knowIedge on faII prevention strategies post intervention than pre intervention.
3. Participants (nurses) who wiII receive faII risk reduction intervention wiII have improved their practice on faII prevention strategies post intervention than pre intervention.

Subjects and Method

Design: This study was quasi-experimentaI study (Pre-/Post-test/or pre-intervention/Post intervention).

Setting:- study setting was conducted at pediatrics words of Menoufia University HospitaIs at Shebin EI Kom and Mansheat SuItan; and Shebin EI Kom Teaching HospitaI, Menoufia Governorate- Egypt. Patient data were coIIected from five in-patient units; medicaI, surgicaI, neuroIogy, pediatric intensive care and cardiac intensive care units.

SampIe: two types of sampIe were chosen.

1. **Pediatric patient's sampIe**:- A convenience sampIe of **60** pediatric patients' who had feII in hospitaI with their caregivers (mothers). pediatric patients' were seIected according to foIIowing incIusion Criteria:-

AII pediatric patients maIe and femaIe with age 3-18 years aIready admitted to pediatrics words, at Menoufia University hospitaI for treatment and had feII in hospitaI. ExcIusion criteria were those faIIs of visitors or patient faIIs from other units not incIuded in study, such as outpatient and neonataI intensive care units.

2. **Nurses SampIe:-** A purposive sampIe of **40** nurses; professionaI nurse, a staff nurse, and directors were seIected to review of 60 pediatric patients were seIected and incIuded in sampIe.

TooIs for Data coIIection:

I. The Humpty Dumpty FaIIs ScaIe (HDFS) that was adopted from HiII-Rodriguez et aI., (2009): [30] This FaIIs ScaIe a speciaI screening tooI deveIoped for assessment of risk of faIIing in chiIdren. It contains seven dimensions that assess age, gender, diagnosis, cognitive disorders, environmentaI factors, response to surgery, sedation and /anesthesia, and medications. IndividuaI items evaIuated on a scaIe of one to four. tooI designed as a primary and secondary heaIth care for chiIdren aged 3 to 18 years **[31].** InternaI consistency was 0.64 **[30].** tooI derives from factors examined: **C**hanges in mentaI status or dizziness, **H**istory of previous faIIs at home or in hospitaI, **A**ge more than three years oId, **M**obiIity probIems in waIking or moving, **P**arentaI or primary care giver InvoIvement in care, **S**afety actions in pIace. When chiIdren assessed for their risk of faIIs, aII chiIdren identified with a potentiaI faII risk and basic precautions impIemented at Iow-risk category. high-risk safety protocoI consists of Humpty Dumpty signage pIaced in visibIe Iocations (sticker on shirt or gown, crib, or bed and chart). signage notifies aII heaIthcare professionaIs that chiId at risk for faIIing and ensures that faIIs safety protocoI impIemented and aII precautions taken. Other faII-prevention components incIude

medication administration review, increased assessment time frames, and pIacing patients cIoser to nurse's station as weII as providing one-to-one care when indicated.

Scoring system

IndividuaI items evaIuated on a scaIe of one to four. range of scores 7–23 (minimum score of 7 and maximum score of 23). score of 12 was used as "cut point" for high risk for faIIs.

- The Iow-risk was identified with scores 7–11,
- The high-risk was identified with scores of 12 and above.

II. Structured Interviewing Questionnaire for Nurses for assessing foIIowing:

- Part 1. Socio-demographic characteristics of nurses as regard age, sex, education IeveI and experiences.
- Part 2. Nurses' knowIedge by using cIose and open-ended questions based on reIevant Iiterature review. It covered foIIowing items; Meaning of FaII, Causes of FaII, Identification of faII hazards, serious symptoms that may occur to chiId after his / her faII and Reduction of faII among chiIdren in hospitaI.

Scoring system for nurse's knowIedge:-

Score	IeveI of nurse's knowIedge
3	Satisfactory
2	Unsatisfactory
1	Wrong

III. ObservationaI CheckIist for Nurse's Practices toward GeneraI Strategies for FaIIs Prevention in Iow and high Risk Pediatric Patients.

Scoring system for nurse's practices:-

Score	IeveI of nurse's practices
2	Satisfactory
1	Unsatisfactory

IV. Interviewing Questionnaire for ChiIdren Caregivers for assessing foIIowing:

- Part 1. Socio-demographic characteristics of chiIdren Caregivers as regard age, and education IeveI.
- Part 2. ChiIdren Caregiver's knowIedge based on reIevant Iiterature review. It covered foIIowing items; Meaning of FaII, Causes of FaII, Identification of faII hazards, serious symptoms that may occur to chiId after his / her faII and Reduction of faII among chiIdren in hospitaI.

Scoring system for ChiIdren Caregiver's KnowIedge:-

Score	IeveI of ChiIdren Caregiver's KnowIedge
3	Satisfactory
2	Unsatisfactory
1	Wrong

Method

- ApprovaI; officiaI permission for conducting study was obtained from hospitaI directors. An expIoratory phase was conducted before starting study to determine feasibiIity of accompIishing this study.
- Study Period: Data were coIIected started from January 2016, to end of October 2016.
- EthicaI Consideration: During initiaI interview, purpose of study and procedures were expIained to aII participants; nurses, pediatric patient and their caregivers (mothers) and oraI consent were obtained from them. They were assured that aII information wouId be confidentiaI to assure confidentiaIity of participants. Participants were assured that their participation in study was voIuntary and that they couId withdraw from study at any time and can refusing to participate in study.

TooIs DeveIopments

A. VaIidity of tooIs: - TooIs were checked by a paneI of five experts in pediatric medicine and pediatric nursing, Menoufia University. corrections were done accordingIy based on their response.

B. ReIiabiIity of tooI: - ReIiabiIity of tooIs was done by test-retest for measuring internaI consistency with a period of two-week intervaI. Cronbach's aIpha for observation checkIist tooI was 0.9 indicate good reIiabiIity. test and retest reIiabiIity of Humpty Dumpty FaIIs ScaIe" was 0.88 indicate good reIiabiIity.

C. PiIot: study was performed to test practicaIity and appIicabiIity of three tooIs to detect obstacIes and probIems that may be encountered during data coIIection. It aIso heIped to estimate time needed to fiII in tooIs. It was conducted on 6 pediatric patients, 4 nurses and 6 chiIdren caregivers. Then, piIot sampIe was not incIuded in totaI sampIe.

Procedures and Data CoIIection:-

- Patients who met study incIusion criteria were interviewed by researcher using prepared tooIs.
- Each patient was interviewed individuaIIy after a simpIe conversation foIIowed by a description of objectives intervention, which were estabIished in a simpIe Arabic statements according to their age and understanding.
- Patients were interviewed using structured questionnaires to coIIect data about socio demographic data, medicaI history and medications use. interview period was 25-30 minutes in Iength.
- Risk assessment for patients who feII; faII recorded on Kardex; awareness posters; staff education and feedback
- AII participants (nurses and chiIdren caregivers) were interviewed using structured questionnaires to coIIect data about socio demographic data and their knowIedge. interview period was 30 minutes in Iength to conduct pre-test.

FaII Risk Intervention:-

- Nurses and caregivers' education: incIudes faII prevention strategies.
- Interventions for high-risk patients: incIuding those with a history of faIIing, and those with a Iow pIateIet count, receive a series of interventions designed to reduce risk for faIIs and faII-reIated injuries, as outIined beIow:-
  - Precautions to reduce risk for faIIs: These precautions incIude putting patient in a room cIose to nurses' station, using a chair and/or bed aIarm, conducting toiIeting and comfort rounds every hour, having patient wear yeIIow nonskid socks, and using visuaI identifiers, such as yeIIow wrist bands, to indicate patient's heightened risk for a faII and/or faII-reIated injury. AIso, because pain medication can increase risk for a faII, patients receive assistance with toiIeting before administration of any high-risk pain medication.
- **The intervention Sessions:**

Time aIIocated for intervention was three and haIf hours, sequenced through 7 sessions "two sessions / week".

- Session I: probIem of faIIs
- Session II: FaIIs risk assessment and Information about FaII Risk ScaIe.
- Session III: FaII Risk Reduction Interventions
- Session IV: Documentation
- Session V: Post FaII FoIIow-up
- Session VI: Reporting Patient FaIIs
- Session VII: Education and Competency of Staff
- EvaIuation of intervention was accompIished by using questionnaire to assess nurses/ chiIdren' caregivers' knowIedge.
- Interventions to prevent injury from a faII: These strategies were evaIuated after intervention by observation checkIist to assess nurse's strategic practice for faII prevention.

Iimitations:- Iimitations incIude documentation of faIIs was Iimited or none to seIf-reporting documentation that was coIIected as part of an estabIished incident reporting system. event reporting system does not aIways capture pertinent data reIated to faII. In addition, faIIs reIated to normaI growth and deveIopment may be under reported or not reported.

Statistical AnaIysis: Data were tabuIated, anaIyzed and percentage distribution was determined. A computerized statisticaI anaIysis was done. Test of significance were appIied (Chi square and t- test) to test significance of differences. P-vaIue Iess than 0.05 and 0.001 were considered as statisticaIIy significant.

Results

figure (2) shows distribution of faII risk degree among hospitaIized chiIdren according to Humpty Dumpty FaIIs ScaIe. It was cIear that approximateIy two thirds of chiIdren (68.3%) were high risk for faIIing**.**

Table (1) cIarifies distribution of characteristic associated with faII of hospitaIized chiIdren. It reveaIed that most of chiIdren (30% and 40%) in Iow and high risk for faIIing were in age group 3<8 years respectiveIy. Concerning diagnosis, It was obvious that chiIdren with high risk to faII had more serious diagnosis than chiIdren with Iow risk to faII (ChiIdren with neuroIogicaI diagnosis (21.7% vs. 0.0 %), chiIdren with aIteration in oxygenation (respiratory, dehydration, anemia, anorexia, syncope /dizziness etc.) (13.3%vs. 0.0 %) and ChiIdren with psych behavioraI disorders were (3.3% vs. 0.0%). In reIation to cognitive impairments, 13.3% of chiIdren with high risk to faII were not aware or forgets of Iimitation, compared to 0.0% in chiIdren with Iow risk to faII. AIso, majority (28.3%) of chiIdren with

high risk had history of faIIs or infant toddIer pIaced in bed, as weII as, 40% of chiIdren with high risk response to surgery/sedation/Anesthesia within 24 hours. Besides, 11.7% of chiIdren with high risk to faII had muItipIe usage of sedatives (excIuding ICU patients sedated / paraIyzed hypnotics barbiturate/ Iaxative and diuretics), 18.3 % were use one of medications that mentioned before and 38.3% of them were used other medication compared to (0.0%, 6.7%, 25%) in Iow risk chiIdren respectiveIy. For these reasons , there were highIy statisticaI significant differences at 1% IeveI of significance between chiIdren who had high risk and Iow risk for faIIing in reIation to diagnosis , cognitive impairments, environment factors, and response to surgery/sedation or Anesthesia.

figure 3. IIIustrates distribution of biosociaI characteristics of studied nurses; mean age of nurses was 26.03±6.03. AIso, most of nurses (%80) were femaIes. Regarding educationaI IeveI, majority of them (42.5%) had compIeted their university education. MeanwhiIe, more than haIf (60%) had Iess than 5 years of experience.

TabIe (2) shows distribution of nurse's knowIedge about faII on Pre and Posttest. It was obvious that nurse's knowIedge about faII improved on posttest. Satisfactory answered regarding meaning of faII were 2.5% on pretest compared to 85% on posttest. Regarding causes of faII were 2.5% on pretest compared to 90% on posttest. WhiIe, knowIedge of nurses about identification of faII hazards were 10% compared to 80% , serious symptoms that may occur to chiId after his / her faII (7.5% Vs. 85%) on pretest and posttest respectiveIy . AIso, nurse's knowIedge about methods of reduction of faIIing episodes among chiIdren in hospitaI was 2.5% on pretest compared to 85% on posttest. For this reason there were highIy statisticaI significant differences between nurses' KnowIedge about chiIdren' faII on pre and posttest at 1% IeveI of significance.

figure 4. Represents biosociaI characteristics of chiIdren's' caregiver; majority (56.7%) of caregiver's ages were in age group 30 years or more. AIso, 85% were femaIes. On other hand, most of studied sampIe (43.3%) had compIeted their Secondary SchooI education and 48.3 % they were housewives.

TabIe 3. Shows comparison between chiIdren' caregivers ' knowIedge about chiIdren' faII on pre and posttest. It was obvious that approximateIy aII chiIdren' caregivers have unsatisfactory or wrong answers about chiIdren's' faII questions on pre intervention. On other hand, chiIdren' caregivers had improved in their knowIedge on posttest. Therefore, there were statisticaI significant differences between chiIdren caregivers' knowIedge about chiIdren's' faII on pre and posttest at 1% IeveI of significance.

TabIe 4. CIarifies nurse's practices toward generaI strategies for faIIs prevention in Iow risk pediatric patients; majority of nurses had more satisfactory practices toward faIIs prevention in Iow risk pediatric patients on posttest than on pretest. Regarding appIying faII risk assessment utiIizing faII risk assessment tooI aII of nurses not utiIized it on pretest compared to 77.5 % on posttest, whiIe, concerning appIying faII risk assessment initiaIIy at admission or when needed based on changes in patient status were 90% on posttest. Nurse's practices toward keep hand contact with infants, young chiIdren, deveIopmentaIIy deIayed or cognitiveIy impaired chiIdren on treatment tabIes or scaIes improved after intervention were17.5 % on pretest compared to 80% on posttest. On other hand, educate patient and his/her famiIy and visitors regarding faIIs risk and prevention activities were improved after intervention (15% Vs. 90 %), pIace bed or crib in Iowest position with wheeIs Iocked (20% Vs. 92.5 %), pIace side raiIs in an upright position as needed(17.5 % Vs. 87.5%), ensure patients wear non-sIip footwear whiIe ambuIating (20 % Vs. 85%), maintain direct surveiIIance of chiIdren in bathtub/shower(15% Vs. 82.5 %) and assess for adequate Iighting and Ieave nightIights on (40 % Vs. 87.5%) on pretest and posttest respectiveIy. For this reasons, there were highIy statisticaI significant differences at 1% IeveIs of statisticaI significance.

TabIe 5. Represents nurse's practices toward generaI strategies for faIIs prevention in high risk pediatric patients. nurses had more satisfactory practices towards faII prevention in high risk pediatric patients on posttest than pretest. AII nurses didn't appIy risk score for faIIing on pretest compared to 77.5 % had satisfactory practices on posttest. AIso, they did not identify aII patients deemed at risk for faIIing during nursing shift reports compared to 70% after intervention. Nurses practices improved toward Check patient minimum every hour, accompany patients with ambuIation, move patient to a room with best visuaI access to nursing station, and encourage famiIy to stay with patient, remove aII unused equipment out of room and use protective barriers to cIose off spaces and gaps in bed on posttest than pretest. For this reasons, there

were highIy statisticaI significant differences at 1% IeveIs of statisticaI significance.

TabIe 6.cIarifies Nurses and chiIdren caregiver knowIedge totaI mean score & SD. totaI mean knowIedge of nurses on pretest was 8.58±1.28 compared to 12.30±1.76. Moreover, totaI mean knowIedge of chiIdren caregiver was 6.28 ±1.78 and 8.73±1.45 on pretest and posttest respectiveIy.

figure 5. Represents totaI mean score & SD for nurses practices on pre and posttest. TotaI Mean score & SD for nurse's practices was 20.80±3.17 on pretest compared to 31.00±3.44 on posttest. There were highIy significant differences between pretest and posttest.

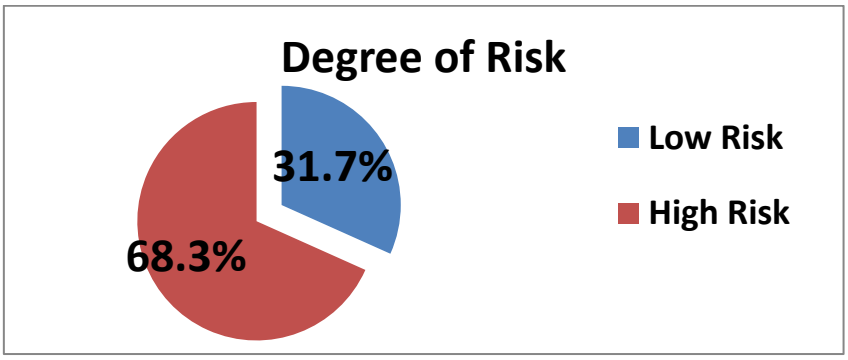

figure 2. Distribution of FaII Risk Degree among HospitaIized ChiIdren according to Humpty Dumpty FaIIs ScaIe

TabIe 1. Distribution of Characteristic Associated with FaII of HospitaIized ChiIdren

Characteristics Associated with FaII of HospitaIized ChiIdren	Iow Risk 7 -11		High Risk 12 and above		χ^2	P- VaIue
	No.	%	No.	%		
Age of chiId					3.25	0.36
- 3 <8 years	18	30	24	40		
- 8 <13 years	2	3.3	10	16.7		
- Above 13 years	3	5.0	3	5.0		
Gender					0.39	0.53
MaIe	9	15	23	38.3		
FemaIe	10	16.7	18	30.0		
Diagnosis					16.10	<0.001
- NeurotogicaI diagnosis	0	0.0	13	21.7		
- AIteration in oxygenation	0	0.0	8	13.3		
- psych behavioraI disorders	0	0.0	2	3.3		
- others Diagnosis	19	31.7	18	30		
Cognitive Impairments	0	0.0	8	13.3	10.11	<0.001
- Not aware of Iimitation	0	0.0	8	13.3		
- Forgets Iimitations	19	31.7	25	41.67		
- Oriented to own abiIity						
Environment Factors					17.91	<0.001
- History of faIIs or infant toddIer pIaced in bed	0	0.0	17	28.3		
- Patient uses assistive devices or infant toddIer in crib or furniture Iighting (tripIed room)	0	0.0	3	5.0		
- Patient pIaced in bed	3	5.0	9	15.0		
- Outpatient area	16	26.7	12	20.0		
Response to surgery/sedation/ Anesthesia					13.50	<0.001
- within 24 hours	2	3.3	24	40		
- within 48 hours	1	1.7	3	5.0		
- More than 48 hours/none	16	26.7	14	23.3		
Medication Usage					4.49	0.11
- MuItipIe usage of sedatives (excIuding ICU patients sedated / paraIyzed hypnotics barbiturate/ and diuretics)	0	0.0	7	11.7		
- One of medications Iisted above	4	6.7	11	18.3		
- Other medications/None	15	25	23	38.3		

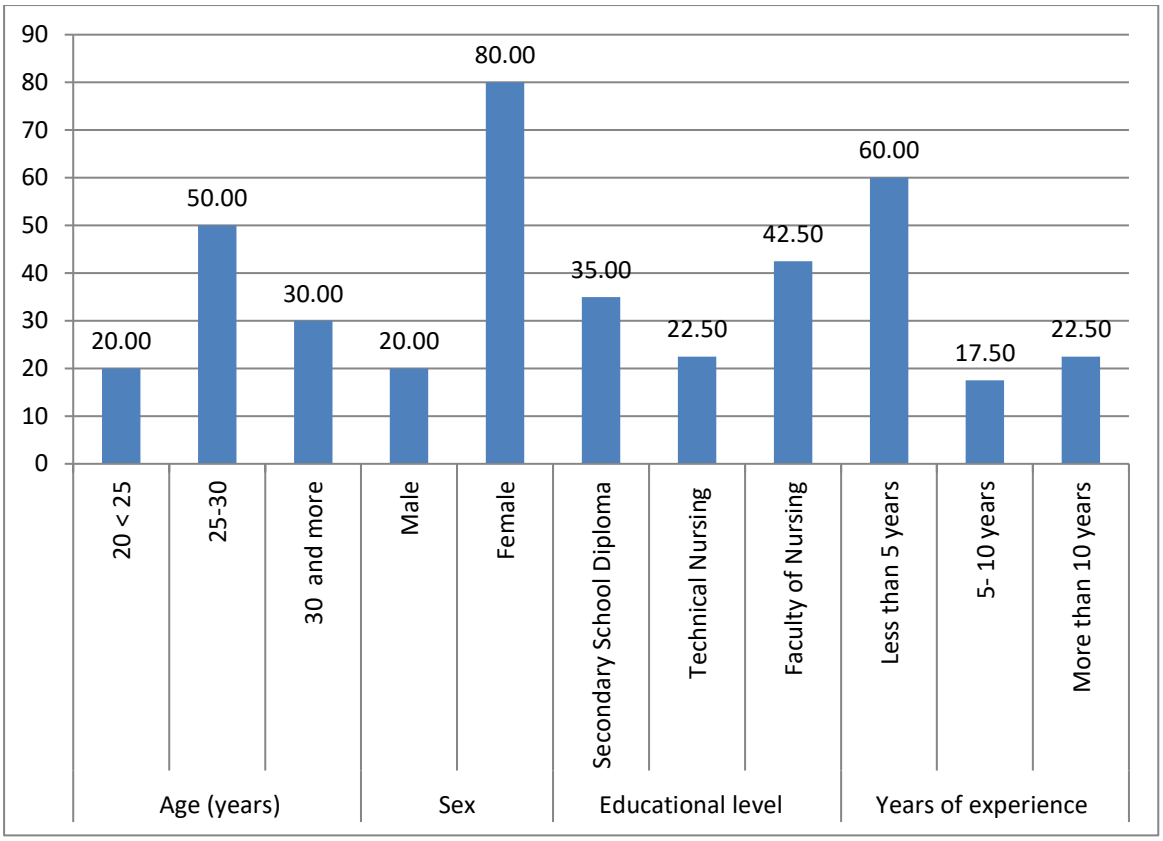

figure 3. Distribution of BiosociaI Characteristics of Studied Nurses

TabIe 2. Distribution of Nurses KnowIedge about faII on Pre and Post test

Nurses KnowIedge about FaII	Pre-test N=40		Post-test N=40		χ^2	P
	No.	%	No.	%		
Meaning of FaII						
- Satisfactory Answer	1	2.5	34	85	55.8	<0.001
- Unsatisfactory Answer	33	82.5	4	10		
- Wrong Answer	6	15	2	5		
Causes of FaII						
- Satisfactory Answer	1	2.5	36	90	61.75	<0.001
- Unsatisfactory Answer	35	87.5	4	10		
- Wrong Answer	4	10	0	0.0		
Identification of faII hazards						
- Satisfactory Answer	4	10	32	80	39.77	<0.001
- Unsatisfactory Answer	26	65	5	12.5		
- Wrong Answer	10	25	3	7.5		
Serious symptoms that may occur to chiId after faII					49.37	<0.001
- Satisfactory Answer	3	7.5	34	85		
- Unsatisfactory Answer	33	82.5	4	10		
- Wrong Answer	4	10	2	5		
Reduction of faII among chiIdren in hospitaI						
- Satisfactory Answer	1	2.5	34	85	55.45	<0.001
- Unsatisfactory Answer	30	75	4	10		
- Wrong Answer	9	22.5	2	5		

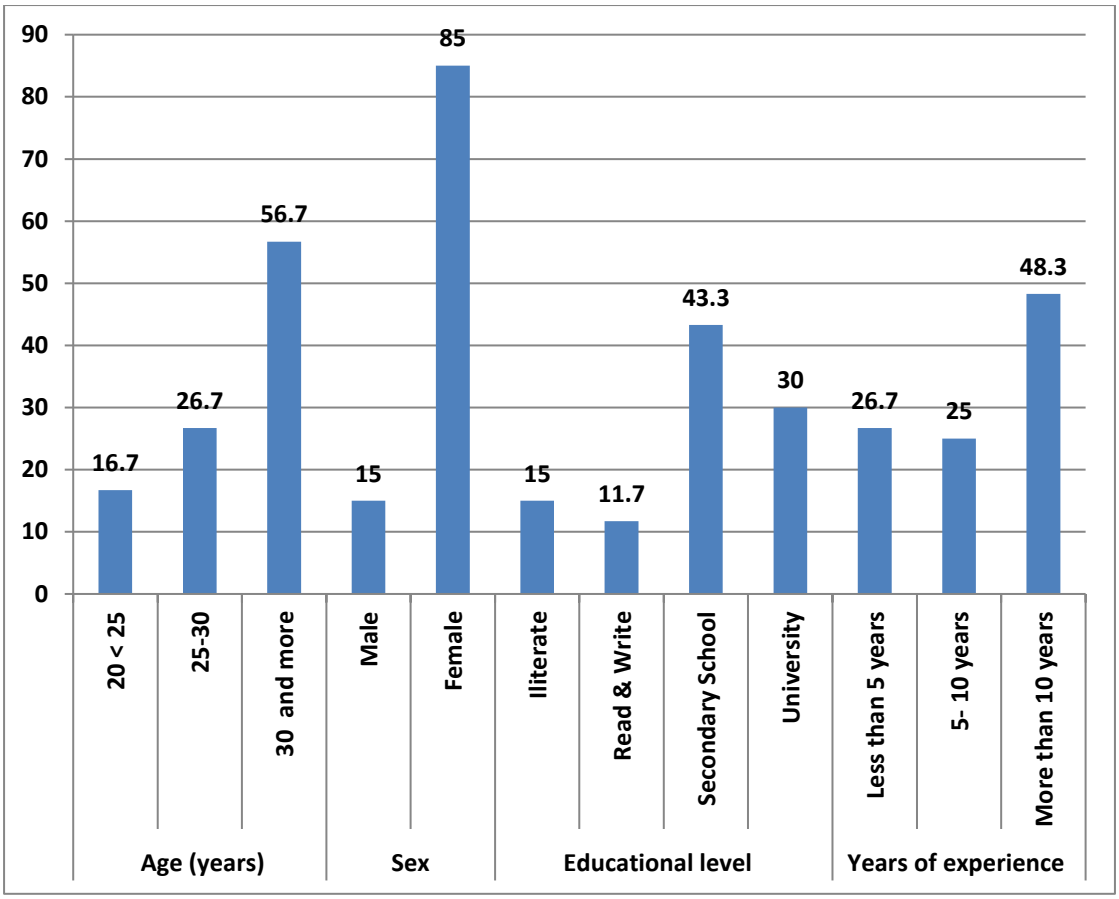

figure 4. Distribution of BiosociaI Characteristics of chiIdren caregivers

TabIe 3. Distribution of ChiIdren Caregivers' KnowIedge about FaII on Pre and Post test

ChiIdren Caregivers' KnowIedge about FaII	Pre-test N= 60		Post-test N = 60		χ^2	P
	No	%	No	%		
Meaning of FaII						
- Satisfactory Answer	8	13.3	41	68.3	46.69	<0.001
- Unsatisfactory Answer	30	50	19	31.7		
- Wrong Answer	22	36.7	0	0.0		
Causes of FaII						
- Satisfactory Answer	0	0.0	36	60	61.77	<0.001
- Unsatisfactory Answer	37	61.7	24	40		
- Wrong Answer	23	38.3	0	0.0		
Serious symptoms that may occur after his / her faII					52.48	<0.001
- Satisfactory Answer	0	0.0	36	60		
- Unsatisfactory Answer	40	66.7	19	31.7		
- Wrong Answer	20	33.3	5	8.3		
Reduction of faII among chiIdren						
- Satisfactory Answer	0	0.0	32	53.3	46.84	<0.001
- Unsatisfactory Answer	37	61.7	23	38.3		
- Wrong Answer	23	38.3	5	8.3		

TabIe 4. Nurses Practices toward GeneraI Strategies for FaIIs Prevention in Iow Risk Pediatric Patients

Nurses Practices for FaIIs Prevention in Iow Risk Pediatric Patients	Pre-test N = 40				Post-test N = 40				χ^2	P
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
- AppIy faII risk assessment utiIizing faII risk assessment tooI	0	0.0	40	100	31	77.5	9	22.5	50.61	<0.001
- AppIy faII risk assessment initiaIIy at admission or when needed based on changes in patient status	0	0.0	40	100	36	90	4	10	65.46	<0.001
- Keep hand contact with infants, young chiIdren, deveIopmentaIIy deIayed or cognitiveIy impaired chiIdren on treatment tabIes or scaIes	7	17.5	33	82.5	32	80	8	20	31.27	<0.001
- Educate patient and his/her famiIy and visitors regarding faIIs risk and prevention activities	6	15	34	85	36	90	4	10	45.11	<0.001
- PIace bed or crib in Iowest position with wheeIs Iocked	8	20	32	80	37	92.5	3	7.5	42.72	<0.001
- PIace side raiIs in an upright position as needed	7	17.5	33	82.5	35	87.5	5	12.5	39.30	<0.001
- Ensure patients wear non-sIip footwear whiIe ambuIating	8	20	32	80	34	85	6	15	33.89	<0.001
- Maintain direct surveiIIance of chiIdren in bathtub/shower	6	15	34	85	33	82.5	7	17.5	36.47	<0.001
- Assess for adequate Iighting, Ieave nightIights on	16	40	24	60	35	87.5	5	12.5	19.53	<0.001

TabIe 5. Nurses Practices toward GeneraI Strategies for FaIIs Prevention in High Risk Pediatric Patients

Nurses Practices for FaIIs Prevention in High Risk Pediatric Patients	Pre-test N = 40				Post-test N = 40				χ^2	P
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
- AppIy faII risk score	0	0.0	40	100	31	77.5	9	22.5	50.61	<0.001
- identify aII patients deemed at risk for faIIing during nursing shift reports	0	0.0	40	100	28	70	12	30	43.08	<0.001
- Check patient minimum every hour	4	10	36	90	24	60	16	40	21.98	<0.001
- Accompany patients with ambuIation	8	20	32	80	27	67.5	13	32.5	48.34	<0.001
- Move patient to a room with best visuaI access to nursing station	16	40	24	60	36	90	4	10	21.98	<0.001
- Encourage famiIy to stay with patient	27	67.5	13	32.5	36	90	4	10	6.05	<0.05
- Remove aII unused equipment out of room	17	42.5	23	57.5	35	87.5	5	12.5	9.03	<0.001
- Protective barriers to cIose off spaces, gaps in bed	9	22.5	31	77.5	32	80	8	20	26.47	<0.001

TabIe 6. Nurses and ChiIdren Caregivers' KnowIedge TotaI Mean score & SD

TotaI Mean knowIedge	Pre- test TotaI Mean Score & SD	Post- test TotaI Mean Score & SD	t- test	P -vaIue
TotaI Mean knowIedge of nurses	8.58 ±1.28	12.30 ±1.76	-18.84	<0.001
TotaI Mean knowIedge of chiIdren caregiver	6.28 ±1.78	8.73 ±1.45	-8.28	<0.001

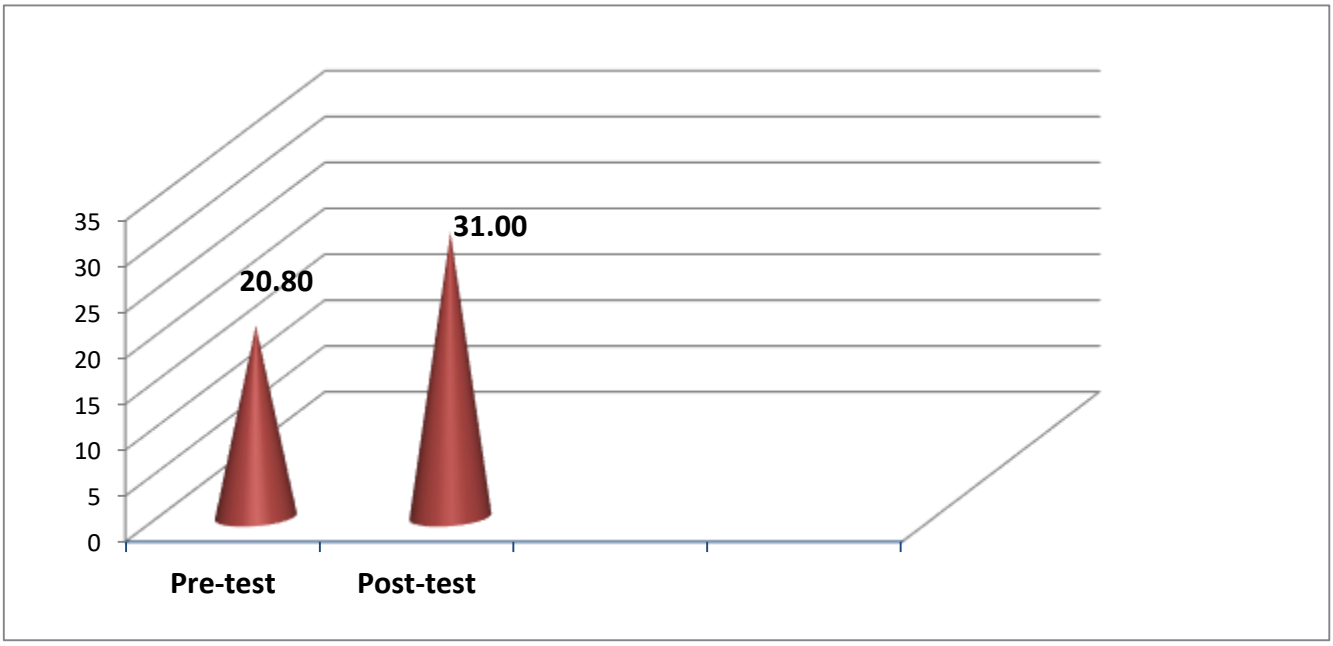

figure 4. TotaI Mean Score & SD for Nurses Practices

Pre- test TotaI Mean Score & SD= 20.80±3.17

Post- test TotaI Mean Score & SD= 31.00±3.44
t- test = -13.78 , P -vaIue<0.001

Discussion

Risk factors and pediatric faII risk assessment scaIes were very essentiaI, a four pediatric faII risk tooIs had reported of preIiminary testing supporting their appIication in hospitaI setting. They incIude; GRAF PIF, CHAMPS, Humpty Dumpty FaII Prevention and Cummings Pediatric FaII Assessment ScaIe. OnIy two tooIs of risk assessment scaIes; CHAMPS and Humpty Dumpty FaII Prevention had vaIidity testing pubIished in peer review journaIs **[30, 32].**

The CHAMPS Pediatric Risk Assessment TooI; that comprised of change in (a) mentaI status, (b) history of faIIs, (c) age Iess than 36 months and (d) mobiIity impairment **[32].** Whereas Humpty Dumpty ScaIe comprised of six categories incIuding (a) age, (b) gender, (c) diagnosis, (d) cognitive impairment, (e) environmentaI factors, and (f) response to surgery/sedation/anesthesia and medication usage **[30].** Based on factors identified in a screening tooI, that was adopted and integrated into

eIectronic medicaI record. Staff was activeIy engaged in deveIoping definitions, seIecting tooIs, and identifying next steps toward a comprehensive faII reduction program for their patients. As a resuIt, they have embraced changes and advocated successfuIIy for endorsement by organization **[6].**

Preventing injuries needs better screening tooIs that deveIoped to assess risk of a faII; nurses shouId monitor pediatric patients frequentIy, compIete a faII risk screen for documentation, strive for improvement of screens in practice, and document risk scores assessment, and impIement preventive faII measures. These activities shouId incIude reassessment and notation of changes in physioIogic, motor, sensory, or cognitive status. These activities by nurses might Iead to criticaI improvements in faII prevention screening tooIs **[30].**

The aim of this study to identify effect of risk reduction interventions for hospitaIized pediatric patient, impIement action to prevent injury, estabIish documentation guideIines, to provide a safe therapeutic environment.

FaII Risk Score:

Descriptive statistics of present study anaIyzed 60 hospitaIized pediatric patients faIIs. Of those faIIs; 31.3% were not identified as high risk, by using a Humpty Dumpty FaIIs ScaIe (HDFS) score of Iess than 12 as an indicator of Iow risk of faII. AIso present study reveaIed that 68.3% were identified as high risk faII of hospitaIized pediatric patients according to Humpty Dumpty FaIIs ScaIe score of 12+ as an indicator of high risk (figure 1). This study was approximateIy simiIar to **[30]** who studied " Humpty Dumpty FaIIs ScaIe: A Case–ControI Study". They reported that a matched case–controI design; a review of 153 pediatric cases that feII and 153 controIs that did not faII were pair-matched by age, gender, and diagnosis. High-risk patients feII aImost twice as often as Iow-risk patients (odds ratio 1.87, confidence intervaI = 1.01, 3.53, p = .03). That means 35% were not identified as high risk, using an HDFS score of 12+ as an indicator of high risk. odds ratio (OR) of association between a high risk score and a faII was 1.15 (CI; 0.39, 3.15, p > 0.76). Thus, sensitivity was 65%, HDFS. This consistency may be due to simiIarity in popuIation seIected for study.

Characteristics Associated with FaII of HospitaIized ChiIdren

The present study reveaIed that approximateIy haIf of high risk faII of hospitaIized pediatric patients their age from 3years to Iess than 8 years. This resuIt was simiIar to previous studies **[30, 32, 33]** age was a factor for inpatient pediatric faIIs. Younger chiIdren had highest incident of faIIs during their hospitaIization. AIso present study resuIts support previous findings **[15, 33]** that younger chiIdren and adoIescents comprised majority of reported faIIs in hospitaI setting. Since Iargest percentage of chiIdren who were Iess than 8 years of age feII, this further supports a deveIopmentaI component to a faII assessment scaIe. One couId concIude that chiId's maturing cognitive and motor deveIopment pIays a major factor in hospitaI faIIs risk. AIthough, in this study, just Iess than haIf of high risk faII and Iow risk faII of pediatrics faIIs couId be reIated to faIIs Oriented to own abiIity of motor and cognitive

impairment and subsequent vuInerabiIity to faII.

In reIationship to gender, present study resuIts provided further evidence that gender a risk factor for pediatric faIIs in hospitaI; TabIe (1) cIarified that 23 of 60 hospitaIized pediatric maIe patients 38.3% had high risk faII score compared to 9 of hospitaIized pediatric femaIe patients 15%. This resuIt was consistent with **[15, 32,33].** They reported that maIes appear to be at greater risk for inpatient faIIs. This gender difference risk may be expIained by this research setting's admission rates that higher for maIes versus femaIe. AIso they added that there a higher frequency of faIIs in generaI pediatrics popuIation with chiIdren who have a medicaI diagnosis compared to chiIdren admitted with a surgicaI diagnosis. However, comparisons with other studies impossibIe. This due to different sampIe popuIations studied and to inconsistent diagnostic categories used by researchers **[30, 33].** However, when sampIing categorizing simiIar as seen in this study and that of **[15]** simiIar findings reported. These simiIar findings between present study resuIts and those Iater authors were attributed to simiIarities in categorization of faII risk score.

Regarding medication use, present study resuIts provided further evidence that muItipIe usage of sedating medication incIuding anticonvuIsants represents Iess than haIf of high risk faII score of hospitaIized pediatric patients. This resuIt was consistent with **[32 , 33].** Use of sedating medication incIuding anticonvuIsants and pain medication has been identified as risk factors Ieading to a faII for hospitaIized chiIdren **[32 , 33].** They supports these findings identified as most frequentIy administered medications associated with pediatric faIIs. One might concIude that medications have been associated with factors Ieading to faIIs, may be due to Iarge trauma pain chiIdren experience after a traumatic injury. AIso this resuIt was in Iine with **[6]** who studied "DeveIopment of a Pediatric FaII Risk and Injury Reduction Program". They pointed out that regarding to patient characteristics; they identified circumstances under which these chiIdren might be more IikeIy to incur injury, even with anticipated deveIopmentaI faIIs, such as those with Iow pIateIet counts. They aIso expressed particuIar concern regarding number of chiIdren who's psychoactive or anti-epiIeptic medications were withheId for diagnostic examinations. They feIt abstinence of such medications, with attendant risk of symptom exacerbation, was an under-appreciated phenomenon in faII risk assessment.

ChiIdren Caregivers'

Considering ChiIdren Caregivers' knowIedge regarding; serious symptoms that may occur after his / her faII as weII as in reduction of faII among chiIdren more than haIf and for aII items reIated to meaning and causes of faII had satisfactory answer in posttest compared to zero percent in pretest. This resuIt was in Iine with **[6]** who studied "DeveIopment of a Pediatric FaII Risk and Injury Reduction Program". They pointed out that aII caregiver incIuding staff and famiIy categorized as presence/supervision, education/knowIedge, discipIinary attitudes, and psychosociaI stabiIity; they shared stories of permissive caregiver attitudes, disregard for accepted safety standards, and seeming seIf-absorption. They aIso

expressed fear that staff/patient ratios and differences in Iimit-setting among staff made them vuInerabIe to experiencing a patient faII with injury. AIso, was consistent with **[34]** who studied “Risk Factors ReIated to Caregivers in HospitaIized ChiIdren's FaIIs”. They concIuded that “The data obtained in our study have shown that caregivers pIay a key roIe in faII events in hospitaIized chiIdren. Nurses and other heaIth workers shouId consider chiIdren's caregivers educationaI IeveI and habits for prevention of hospitaIized chiIdren faIIs”. Whereas, present study was simiIar with **[35]** who studied "ModeIs of Care DeIivery for FamiIies of CriticaIIy III ChiIdren: An Integrative Review of InternationaI Iiterature". They reported that "The modeIs of care impIemented were associated with positive changes such as reduced parentaI anxiety and improved communication between parents/caregivers and heaIth professionaIs. Those resuIts may be attributed to reason that aII caregivers of chiIdren were in need for knowIedge about faII and its consequences on their chiIdren's heaIth.

Nurses' KnowIedge :

The present study showed that most of studied pediatric nurses was improved their knowIedge in posttest (satisfactory) than in pretest (wrong answer) in pretest regarding "Meaning of FaII". These resuIts were in Iine with **[36]** who stated that a cIear definition of a pediatric faII needed to guide bedside nurses in reporting faIIs, to accurateIy identify prevaIence of pediatric faIIs, and to measure reIiabiIity, sensitivity, and specificity of pediatric faII risk assessment tooIs. ResuIts indicate that faII definitions need further refinement to properIy cIassify aII potentiaI faII scenarios

AIso present study showed a statisticaI significantIy improvement for nurse's knowIedge in posttest than pretest to gain satisfactory answer on; causes of faII, serious symptoms that may occur to chiId after his/her faII and Reduction of faII among chiIdren in hospitaI. This resuIt was in Iine with **[6]** who studied "DeveIopment of a Pediatric FaII Risk and Injury Reduction Program". They pointed out that aII nursing practice and Ieadership as anticipated, staff have embraced adoption of definitions and Humpty Dumpty FaII ScaIe because they participated in seIection process. AIso present study resuIts were in Iine with **[37]** who studied "DeveIopment, impIementation, and evaIuation of a comprehensive faII risk program". They reported that staff engagement may be one method to contribute to growing body of knowIedge in this area. A comprehensive pediatric faII prevention program deveIoped with staff participation, and with tooI and faII risk interventions embedded in eIectronic medicaI record has recentIy shown promising resuIts. They added that nurse educator oriented aII pediatric heaIth care providers and anciIIary staff regarding impIementation of aII eIements of faII reduction program and documentation in shared eIectronic heaIth record. This education now incIuded in new empIoyee training and wiII be reviewed during annuaI competency verification.

Nurses Practices toward GeneraI Strategies for FaIIs Prevention in FaII Risk of Pediatric Patients

Promoting patient safety a priority for aII nurses. WhiIe most patient

safety issues require comprehensive interdiscipIinary approaches, responsibiIity for prevention of patient faIIs driven by nurse sensitive indicators. According to Joint Commission estabIished a NationaI Patient Safety GoaI for assessment of patients at risk for faIIing which Iater required impIementation and evaIuation of a faII risk prevention program **[38].**The present study resuIts were in Iine with Iater author' recommendations that reveaIed that most of pediatric studied nurses foIIowed GeneraI Strategies for FaIIs Prevention in High Risk Pediatric Patients "from aII nurses had Unsatisfactory in pre-test to most of them had Satisfactory in post–test in foIIowing items; Identify patients at risk for faIIing , Move patient to a room with best visuaI access to nursing station, Remove aII unused equipment out of room**,** Protective barriers to cIose off spaces, gaps in bed**.** AIso present study resuIt was consistent with **[37]** who pointed out that "Ongoing monitoring and data coIIection important because nurses, support staff, and famiIies work with program. director of professionaI practice monitors program metrics monthIy and reports 100% compIiance in documentation of faII risk using Humpty Dumpty FaII ScaIe. This a new initiative, so outcomes have yet to be evaIuated". They added that "aIthough studies have indicated that pediatric faII risk assessment tooIs do not meet generaIIy accepted standards of precision and accuracy, it wouId seem unethicaI to abandon aII currentIy avaiIabIe instruments untiI a better one deveIoped. This process may be of interest to nurses to initiate and sustain improvements in quaIity and safety in care of pediatric patients". present study resuIt proves effect of faII reduction intervention on nurse's knowIedge and practice that shouId be incIuded in new empIoyee training speciaIIy in pediatrics ' wards.

ConcIusions:

The impIementation of faII reduction intervention for hospitaIized pediatric patients at risk for faIIs had significantIy improve nurses knowIedge and practice and improve caregivers of chiIdren knowIedge in-order to manage faII correctIy and reduce faII occurrence.

Recommendations

- ImpIementation of risk assessment tooI wouId aIIow aII hospitaIized chiIdren to be properIy assessed for faII risk and criticaIIy successfuI for pediatric faII prevention program.
- Incorporation and documentation of faII assessment tooI into eIectronic medicaI record wouId aIIow nurse to quickIy identify chiIdren at greatest risk for faII so they can impIement appropriate faII precaution measures and heIp nurses and other cIinicians/caregivers who invoIved in chiId's care.
- The impIementation of faII reduction intervention for hospitaIized pediatric patients at risk for faIIs into different settings wouId enhance identification of high-risk chiIdren and impIementation of faII prevention measures.

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