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From Perceptions to Prevention: Understanding Fall Risk Severity and Frailty in Saudi Arabian Hospital

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Abstract

Despite a plethora of research examining fall risk, including numerous fall prevention strategies, falls remain the most common adverse event among the elderly. Frail older adults are at higher risk for falls. With the increase in the geriatric population and their risk for frailty, it is imperative to address the limitations of both diagnosis and treatment of frailty, and the concurrent fall risk for older adults in Saudi Arabia by examining self-perception of fall risk. In older Saudi Arabian adults, falls are a serious health issue affecting up to 49.9% of elderly people, often resulting in fractures, traumatic brain, and limb injuries.

Utilizing the Health Belief Model (HBM) as the framework, this study seeks to understand the relationships among individual perceptions related to risk for falling by examining perceived severity, frailty, demographic variables, and fall risk level among older adult patients admitted in an acute care setting in King Salman Armed Forces Hospital (KSFAH) in Saudi Arabia. A descriptive correlational, cross-sectional research design was used to examine the relationships among the variables. Mean scores of individual perceptions (perceived severity and frailty) were reported significantly higher in the No Fall of risk participants over High fall risk patients ($p < 0.05$). Also in this study, age and frailty are positively associated with high fall risk.

The findings of the study inform the public and policymakers about the gaps in the current fall screening tools. This research adds to the scientific knowledge about falls and should be used in the foundation for fall prevention program development that improves individual awareness of fall risk.

Keywords: Individual Perception; Perceived Severity; Fall Risk; Elderly Adult; Frailty; Saudi Ar

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INTRODUCTION

Fall related injuries are a major public health problem among the older adult population.

It is estimated that one in three adults aged 60 years and older fall each year (Chopik et al., 2018). The individual perception of falls among older adults or 'elderly' varies between cultures and generations, so no exact definition exists. Other factors that contribute to the definition of 'elderly' are based on social, economic, and chronological aspects, including frailty which is found in elderly men and women at 80 % and 85% respectively (Chopik et al., 2018). Globally, 60 years of age is typically considered elderly, and approximately 810 million people were elderly in 2012, with two-thirds of them residing in developing countries. This number is projected to grow to two billion by 2050. For Saudi Arabia alone, there were 1.4 million Saudis over 60 in 2012.. Falls are the leading cause of injury-related deaths and are the most common cause of non-fatal injuries and hospital admissions for trauma (Sihag et al., 2021). Patient falls is defined as any unplanned descent to the floor with or without injury to the patient. These are the most commonly reported adverse hospital events and are the second leading cause of patient injury (Huynh et al., 2020). Falls occur outside and inside the hospital setting. Frailty among the elderly is linked to reduced function, increased fall risk, higher vulnerability to adverse events, resulting in admission into assisted care (Cawthon et al., 2007; Ensrud et al., 2007; Ferrucci et al., 2004). With Saudi Arabia's increasing elderly population, it is vital that the risks related to frailty be addressed (Sihag et al., 2021).Participants were recruited that were aged 60 years and older and admitted to medical or surgical units. The prevalence of falls that occurred within the last three months of the participants hospital admission were examined.

Background and Significance

Between 2007 and 2016, the rate of deaths from falling increased 31% among the elderly, on average 3% each year (Sihag et al., 2021). When comparing various age groups, Guillaume et al. (2016) found 65 to 90-year-olds were most likely to fall (44.8%), followed by the middle age group of 45 to 64-year-olds at 41.9%. This provides an indication that the likelihood of falling increases with age. The death rate due to falls was higher for those 85 and above than other age

groups in 2016. If the rate from falls stays the same, 43,000 elderly will have fall related deaths by 2030 (Burns & Kakara, 2018). Lack of awareness and knowledge about their

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disease, poor social support, and low self- control or motivation to engage in health promotion behaviors are major factors that influence patient's individual perceptions related to fall risk (Ahn & Oh, 2018).

Problem Statement

With a sharp increase in the aging population there are significant direct and indirect effects on healthcare systems resulting from the corresponding increase in falls. With tools and other measures to quantify fall risk, and numerous strategies to help prevent falls, we still do not understand what factors lead older adults to put themselves at risk of falling. The current literature has looked at patient perception in connection with concepts such as patient engagement and self-efficacy but fall risk has remained relatively unexplored (Garcia et al., 2012).

Purpose

Exploring how perceived severity and frailty shape fall risk in older adults in a cute care setting in a Saudi Arabian Hospital (KSFAH).

Concepts of the Theory Related to the Study

One concepts from the HBM will guide this study: perceived severity. Table 1 provides the definitions of the concepts. The HBM has a history of empirical testing in a variety of settings and provides a critical framework for this study, which addresses the gap in theory-based survey studies in the Saudi Arabian elderly population regarding falls.

Table 1

Theoretical and operational definition of HBM constructs

HBM Concepts	Theoretical definitions	Operational definitions
Perceived Severity	Also known as perceived seriousness, refers to the negative consequences an individual links with an event or outcome	Patient's perceptions and belief about how serious of fall risk condition and its sequelae are

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Measurement Tools

Measurements in the study demographic data included modifying variables that measured part B of Tilburg Frailty Indicator (TFI) and characteristics such as age, gender, and educational level. Other measures are the MFS and the Fall-Related HBM .

Research Questions

For patients admitted to an acute care setting in KSFAH, To what extent do individual perceptions of severity, demographic variables, and frailty predict fall risk (no risk or high risk) for elderly patients admitted to an acute care setting in KSFAH?

LITERATURE REVIEW

The world's population is ageing, with the number of people aged 65 or older expected to grow to nearly 1.5 billion in 2050 (Immonen et al., 2020). Rapidly increasing aging populations are a challenge to limited social and health care systems. A countries' aging population greatly influences its overall public health, along with its use of resources related to social services and health care. The estimated number of older adults over 65 was set to double to approximately 89 million by 2050, which means one out of every five Americans are expected to be over 65 by that time (Thenmozhi&Aruna 2016). The report showed beginning in 2011, many Americans would reach their 65th birthdays and a call to action was made for federal agencies to address the issue of healthy aging in the US so that the quality of life would improve for older people (Thenmozhi&Aruna 2016).In 2002, around 3.7 million single falls were reported in the community while 3.1 million were recurrent falls and 2.2 million were falls that resulted in injuries (Shumway-Cook et al., 2009). In Saudi Arabia, a serious issue affecting health is falls among the elderly population. Up to 49.9% of elderly people experience falls each year, resulting in fractures and traumatic brain and limb injuries (Razik et al., 2020). Alex et al. (2020) reported that one in four adults aged 65 years and over fall at least once in 12 months. This study addresses a gap in the Saudi literature through examining the relationships among individual perceptions related to risk for falling and frailty among older adults' patients admitted in an acute care setting in a Saudi Arabian Hospital (KSFAH). This study adds to the body of knowledge of falls by addressing fall risk using the HBM. By using this framework and conducting this study, the researcher will be well positioned to understand the issues of fall risk in the elderly population and initiation critical

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fall prevention programs in KSFAH.

METHODOLOGY

Study Design

A descriptive correlational, cross-sectional research design was used in this study .The study participants were recruited utilizing a convenience, nonprobability sample that included all adult patients who were admitted to the King Salman Armed Forces Hospital (KSAFH) in an acute care unit and meet the inclusion/exclusion criteria. There are 20 to 25 beds in each unit and the patients are native-Arabic speaking male and female residents of the northwestern region. Medical and surgical units were chosen because these units contain patientsThe inclusion criteria are 1) hospitalized patients admitted to acute care units aged 60 and older; 2) speak Arabic; and are 4) without cognitive impairment; that is, they are cognitively alert and oriented. Exclusion criteria are patients diagnosed with dementia or delirium, or other psychiatric disorders.

Determination of Sample Size

In this study there is no consensus on the approach to compute the power and sample size with logistic regression (Berezka et al., 2022), abellan Faul et al., (2009) suggests 10 cases for each independent variable is appropriate. For this study, only data with complete records for 130 participants will be used.

Institutional Review Board and Ethical Considerations

Institutional review board (IRB) approval to conduct research on human subjects was obtained from the IRB at King Salman Forces Armed Hospital, in Tabuk, Kingdom of Saudi Arabia as well as the IRB at Kent State University. To initiate the study, the director of the nursing departments and acute care setting administrator in KSFAH by sending an official letter via email to obtain permission to take part in this study.

Maintaining Confidentiality and Anonymity

Each participant's anonymity and confidentiality were strictly protected via the following methods: 1) the electronic tablet that was used to collect the study data was encrypted, and only the researcher had the password; 2) the tablet was stored inside a locked

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cabinet in a locked office at Tabuk University of Science and Technology; 3) the researcher was the only one with

access to the Qualtrics account; 4) all data were collected in patients' private rooms or at a private office in the acute care unit; 5) all surveys were completed as an anonymous response, so no identifying information such as patient's name or patient's room number were collected; and

6) the data from this study are presented in the aggregate without identification of personal attributes.

RESULTS

Sample Characteristics

Participants' mean age was 70.4 ± 7.1 years (range 60–89); 56.7 % were female and 94 % married. Education levels: 52 % high school, 33 % diploma, 15 % bachelor's, < 1 % master's. Most (58.7 %) had hospital stays < 1 week. Diuretics were used by 53.3 %, antihypertensives by 70 %, anticoagulants by 37.3 %. See Table 1

Reliability

Cronbach's α: HBM overall 0.999; TFI 0.809; MFS 0.776, demonstrating strong internal consistency.

Correlations Among HBM Perceptions

Perceived severity of HBM were strongly positively correlated ($p < 0.05$).

HBM Perceptions and Fall Risk

Mean HBM scores were significantly lower in participants at high fall risk versus those at no risk (all $p < 0.001$). For example, median perceived severity score was 4 in high-risk participants versus 20 in no-risk participants. See table 4

Demographic and Frailty Associations

Older age groups (70–79 and ≥ 80) had lower HBM scores and higher frailty ($p < 0.01$). Frailty scores were higher among users of cerebral neurovascular agents and diuretics ($p < 0.01$). High fall risk increased with age and lower education ($p < 0.05$). Use of ≥ 3 high-risk medications was associated with a 6- to 10-fold increase in high fall risk. See table 3

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Logistic Regression

Age, frailty score, and use of high-risk medications (diuretics, antihypertensives, anticoagulants) independently predicted high fall risk (Nagelkerke $R^2 = 0.53$; overall classification accuracy = 82.7 %). Each one-year increase in age increased odds of high fall risk 2.9-fold; each one-point rise in TFI increased odds 2.7-fold.

Table 2

Sample Characteristics

Demographic Variables		Frequency	Percentage
Gender	Male	65	43.3
	Female	85	56.7
Age	60-69	77	51.3
	70-79	66	44.0
	80-89	7	4.7
Marital Status	Married	141	94.0
	Divorced	9	6.0
Education	High School	78	52.0
	Diploma degree	49	32.7
	Bachelor's degree	22	14.7
	Master's degree	1	0.7
Length of Hospitalization	Less than 1 week	88	58.7
	1 week	40	53.3
	More than 1 week	22	46.7

Table 3

Independent Variable Characteristics (N=150)

		Participant Range			
		N	Minimum	Maximum	Mean ± SD
Frailty Indicator		150	1.00	13.00	6.2 ± 3.70
Health Benefit	Severity	150	4.00	20.00	8.8 ± 7.0
	Susceptibility	150	5.00	25.00	11 ± 8.8
	Benefits	150	3.00	15.00	6.5 ± 5.4

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Model (HBM)	Barriers	150	5.00	25.00	10.9 ± 8.9
	Overall HBM Score	150	17.00	85.00	37.2 ± 29.9

Dependent Variable

The dependent variable for this study was fall risk, which was measured as a dichotomous variable of No Fall Risk or High Fall Risk (see Table 4).

Table 4

Dependent Variable Characteristics (N=150)

Morse Fall Scale	Number	Percentage
No Risk	43	29
High Risk	107	71
Total	150	100

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Research Questions

For patients admitted to an acute care setting in KSFAH

1. To what extent do individual perceptions (susceptibility, severity, benefits, barriers), demographic variables, and frailty predict fall risk (no risk or high risk) for elderly patients admitted to an acute care setting in KSFAH?

Table 5

Binary Logistic Regression Model for Fall Risk

	Dependent Variable	Independent Variable	B	Wald	Exp(B)	Chi-Square	*p*-value	Nagel-kerke R^2	Predicted % (corrected)
Model 1	Fall Risk	Severity	-0.55	34.86	0.58	157.9	0.00	0.93	98.70

As showed in table 5 , A binary logistic regression model was constructed for fall risk by using a stepwise approach. First, we included all variables in the complete model with demographic and frailty. Due to high collinearity, they were excluded from the model. There was a significant model in all the cases with a negative association to fall risk

DISCUSSION

This study demonstrates that lower perception of fall risk and greater frailty strongly predict high fall risk among older Saudi inpatients. The negative association between HBM perception scores and fall risk suggests that patients who underestimate the severity and susceptibility of falls are less likely to adopt preventive behaviors. These findings echo international literature linking frailty and polypharmacy to falls. Medication findings reaffirm the need for regular review of high-risk prescriptions. Participants taking ≥ 3 high-risk medications faced dramatically increased odds of falling, consistent with global evidence of polypharmacy as a major fall determinant.The findings overall are comparable with the literature, with at least similar and sometimes stronger reliability compared to previous studies. This is an important finding of the study and warrants further investigation for future use of this scale in the Saudi culture.

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Implications for Practice

Integrate Frailty Screening: Incorporating TFI into admission assessments can identify high-risk patients beyond conventional MFS scoring. Enhance Patient Education: Fall-prevention programs should address misconceptions about severity and susceptibility, using culturally and linguistically appropriate materials for patients with low literacy. Medication Review: Routine multidisciplinary medication reconciliation focusing on diuretics, antihypertensives, and anticoagulants is essential. Policy Development: Hospital administrators and policymakers should mandate combined HBM perception and frailty assessments in fall-prevention protocols.

Limitations

Convenience sampling from a single hospital may limit generalizability. The cross-sectional design precludes causal inference. Self-reported perceptions may be influenced by social desirability or literacy barriers, as evidenced by participants' tendency to choose extreme Likert responses.

Conclusion

The Health Belief Model (Rosenstock et al., 1988), provided the framework for this study, its importance as the overall conceptual model is clear as it underpins the impact of individual perceptions of received severity influence on fall risk. If health care provides can instill the importance of abiding by fall prevention strategies, they also need to understand the thought process of patients and their perceptions regarding their risk of falling in the hospital. The next step is to conduct a cognitive interview study to examine the meanings and processes used by respondents in answering questions on the HBM scale, which will enhance an understanding of question validity and response error. Health care professionals should include perception and frailty as a factor for consideration in patient fall risk. Patients' lives continue to be jeopardized by falls even though there have been several decades of research, it is important to begin intervention research using fall prevention programs in this area of study.

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