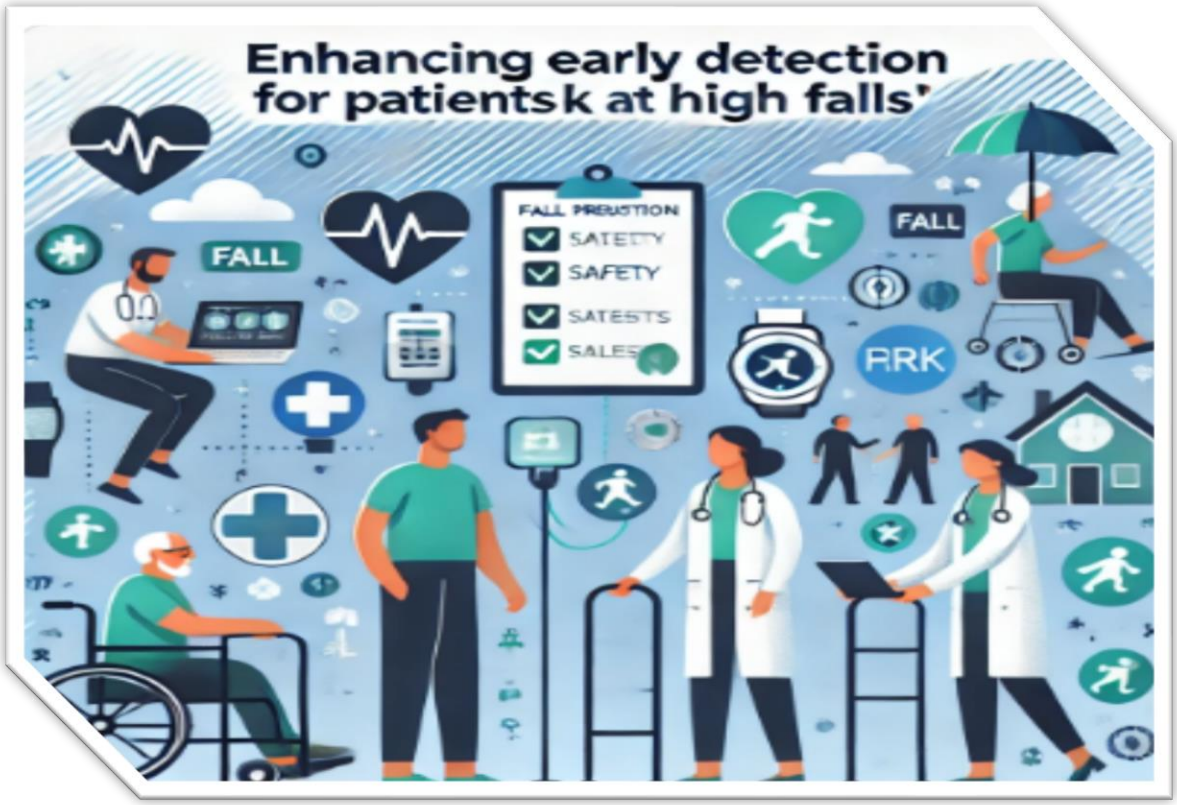
Chapter 11: Enhancing Early Detection



for Patients at High Risk for Falls

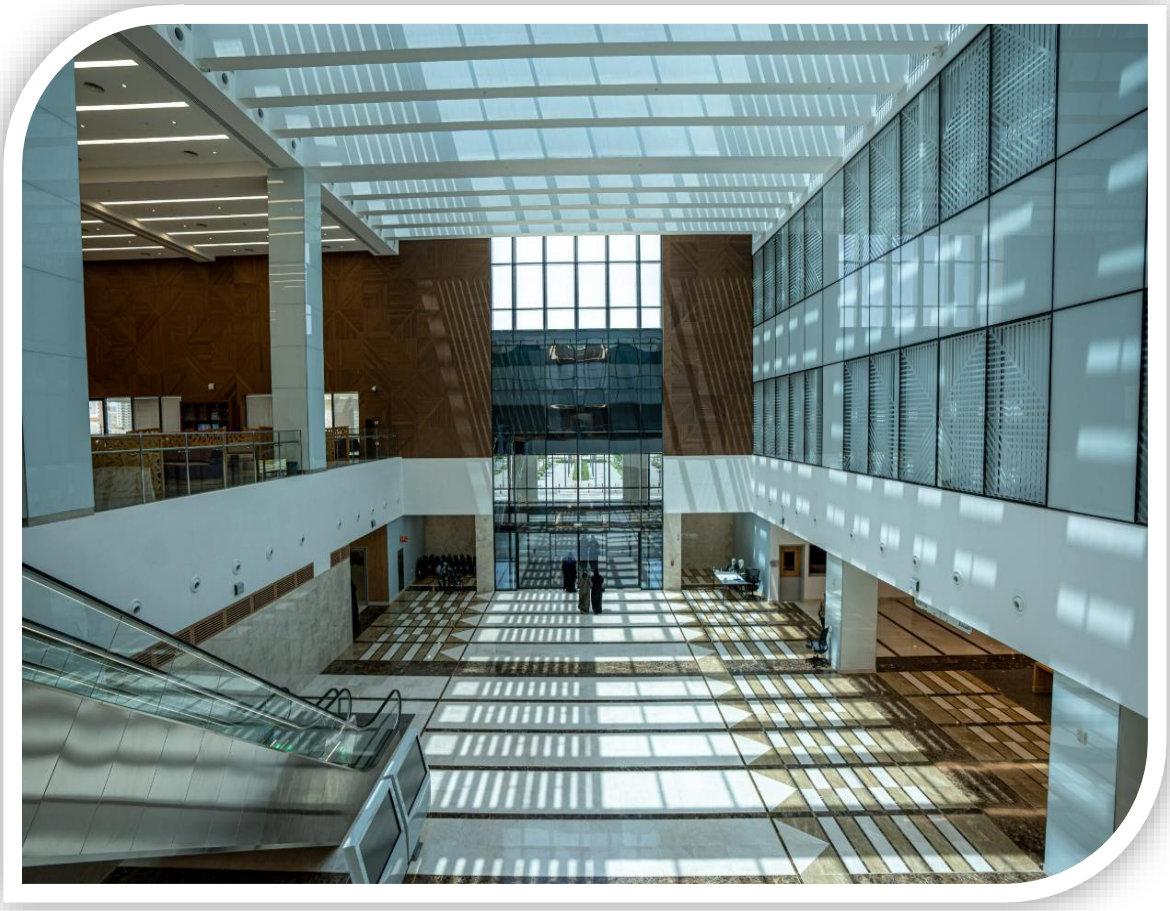
Authors:

Mohamad Majed, Omar Ayaad, Nabiha AlHasni, Rawan Ibrahim, Shinnona AlHarthy, Razzan Al Zadjali, Sara AlSheedi, Al Ameer Al Mashari, Huda Al Awaisi, Abdulhamid A Turkomani, Kefah Hassan, Khalid AlBaimani

Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC) - University Medical City

Summary

This project aimed to enhance patient safety by optimizing fall risk management for oncology patients using Failure Modes and Effects Analysis (FMEA) within outpatient settings at the Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC), University Medical City. Interventions targeted at improving fall risk assessment and preventive measures were applied, resulting in significant reductions in Risk Priority Numbers (RPNs) across various failure modes, demonstrating the effectiveness of FMEA in minimizing fall risks and enhancing patient safety.



Key Points

- The project applied Failure Modes and Effects Analysis (FMEA) to identify and mitigate potential failures in the fall risk assessment process at SQCCCRC, focusing on outpatient settings.
- Targeted interventions, including the use of the Modified Morse Fall Scale, electronic tracking, staff training, and policy updates, resulted in a 62% reduction in Risk Priority Numbers (RPNs) across identified failure modes.
- The findings underscore the effectiveness of FMEA in proactively enhancing fall risk management by improving the accuracy of assessments, clarifying responsibilities, and ensuring timely preventive actions.
- While the study achieved significant improvements, continuous monitoring, technological integration, and iterative policy updates are essential for sustaining gains and further reducing fall risks in outpatient oncology care.

Project Charter

Project Charter	Details
Project Title	Enhancing Fall Risk Management in Outpatient Oncology Settings at Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC)
Project Sponsor	Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC), University Medical City, Muscat, Oman
Project Start Date	Third Quarter 2022
Project End Date	Third Quarter 2023
Project Purpose	To improve patient safety by reducing the incidence of falls in outpatient oncology settings at SQCCCRC through the identification and mitigation of risks associated with patient falls, using the Failure Modes and Effects Analysis (FMEA) methodology to standardize fall risk assessments, enhance staff training, and implement technological solutions.
Problem Statement	Current fall prevention practices in outpatient oncology settings at SQCCCRC are inadequate due to a lack of standardized protocols, insufficient staff training, and limited technological tools, leading to preventable falls that adversely impact patient safety and care quality. A systematic approach is needed to improve the early detection of fall risks and implement effective interventions.
Project Goals and Objectives	1. Reduce the incidence of falls by 50% within the outpatient oncology settings. 2. Implement the Morse Fall Scale to standardize fall risk assessments across all relevant areas. 3. Enhance staff knowledge and skills through targeted training programs. 4. Develop and integrate an electronic tracking system for real-time monitoring of fall risk assessments. 5. Update fall prevention policies to ensure clarity and consistency in responsibilities and procedures.
Scope	Includes all outpatient settings at SQCCCRC, such as clinics, daycare, radiology, radiotherapy, and rehabilitation facilities. The project focuses on standardizing fall risk assessments, enhancing staff training, updating policies, and implementing technological tools for real-time monitoring. Excludes inpatient settings and non-oncology departments.
Key Stakeholders	Outpatient Clinic Staff, Nursing Staff, Quality and Accreditation Department, Rehabilitation Team, Radiology Department, Informatics Team, Patients, Hospital Management
Resources Required	Budget for technology development, staff training, and policy updates; personnel from relevant departments; IT infrastructure for electronic tracking systems; data analytics tools.
Risks and Assumptions	**Risks:** Resistance to new protocols, limited availability of resources for technology and training, challenges in maintaining consistent application of new procedures.

	Assumptions: Full support from hospital management, adequate funding and resources, active participation and cooperation of all stakeholders, and effective communication across departments.
Success Criteria	Achieving a 50% reduction in fall incidence in outpatient settings; successful implementation and use of the Morse Fall Scale and electronic tracking system; improved staff compliance with new protocols and positive feedback from stakeholders; demonstrated improvement in patient safety metrics.

Introduction

Patient falls are a significant safety concern in healthcare settings, often leading to severe consequences ranging from minor injuries to major trauma and even death (Ha et al., 2021). The risk of falls is particularly high in oncology settings due to factors like physical weakness, fatigue, cognitive impairments, and sensory deficits resulting from cancer treatments such as chemotherapy (Oliver et al., 2004; Christiansen et al., 2020). These impairments can substantially affect a patient's balance, coordination, and cognitive function, further increasing the likelihood of falls (Yamamoto et al., 2020).

Cancer patients face not only the physical and medical challenges associated with their condition but also the emotional and psychological impacts of falls. Injuries from falls can delay recovery, interrupt treatment schedules, and significantly reduce the quality of life due to increased fear and anxiety (Fulton et al., 2019; Sattar et al., 2021). Falls are a growing concern in outpatient oncology settings, where continuous follow-up care is necessary, and patients frequently navigate environments that may not always be optimized for safety (Mehta et al., 2021; Abdelbasset et al., 2021).

The outpatient nature of oncology services, combined with frequent appointments and the complex needs of cancer patients, creates unique challenges in fall prevention. Many outpatient

facilities lack the resources or comprehensive systems necessary to conduct thorough fall risk assessments, leading to missed opportunities for intervention (Smebye et al., 2014; Yulistiani et al., 2023).

This project employed the Failure Modes and Effects Analysis (FMEA), a proactive, systematic approach to identify and mitigate risks associated with patient falls, by analyzing potential failures in the fall risk assessment process and implementing targeted interventions (Haroun et al., 2021; Filz et al., 2021). Conducted at the Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC), the project aimed to optimize fall risk management in outpatient oncology settings, reducing fall incidents and improving patient safety outcomes.

Problem Statement

Falls pose a substantial risk to oncology patients in outpatient settings due to their inherent vulnerabilities and the outpatient context's unique challenges. Despite efforts to manage these risks, significant gaps in fall prevention remain, leading to preventable incidents that adversely affect patient safety and quality of care. This project addresses the need for a more robust and systematic approach to fall risk management to enhance early detection and intervention.

The lack of standardized protocols, insufficient staff training, and limited use of technological tools for monitoring and documentation contribute to the inadequacies in current fall risk management practices (Dehnavieh et al., 2014; Jain, 2017). To mitigate these risks, the project aimed to apply the FMEA methodology to identify critical failure modes and implement corrective actions, thereby improving the consistency and effectiveness of fall risk management practices in outpatient oncology settings.

Methods

Setting and Design

The project was conducted at the Sultan Qaboos Comprehensive Cancer Care and Research Centre (SQCCCRC) in Oman, focusing on outpatient clinics, daycare, radiology, radiotherapy, and rehabilitation facilities. An observational analytical design was used to assess the fall risk assessment process pre and post-interventions, commonly employed in health sciences to explore causal relationships (Social Research Methodology, 2020).

FMEA Methodology

A 7-step Failure Modes and Effects Analysis (FMEA) was implemented, involving:

1. **Defining the System or Process:** Created process maps to define the fall risk assessment system, identifying gaps at reception and other key areas.

2. **Identifying Potential Failure Modes:** Identified failure modes such as process failures, human errors, patient-specific factors, and equipment failures.

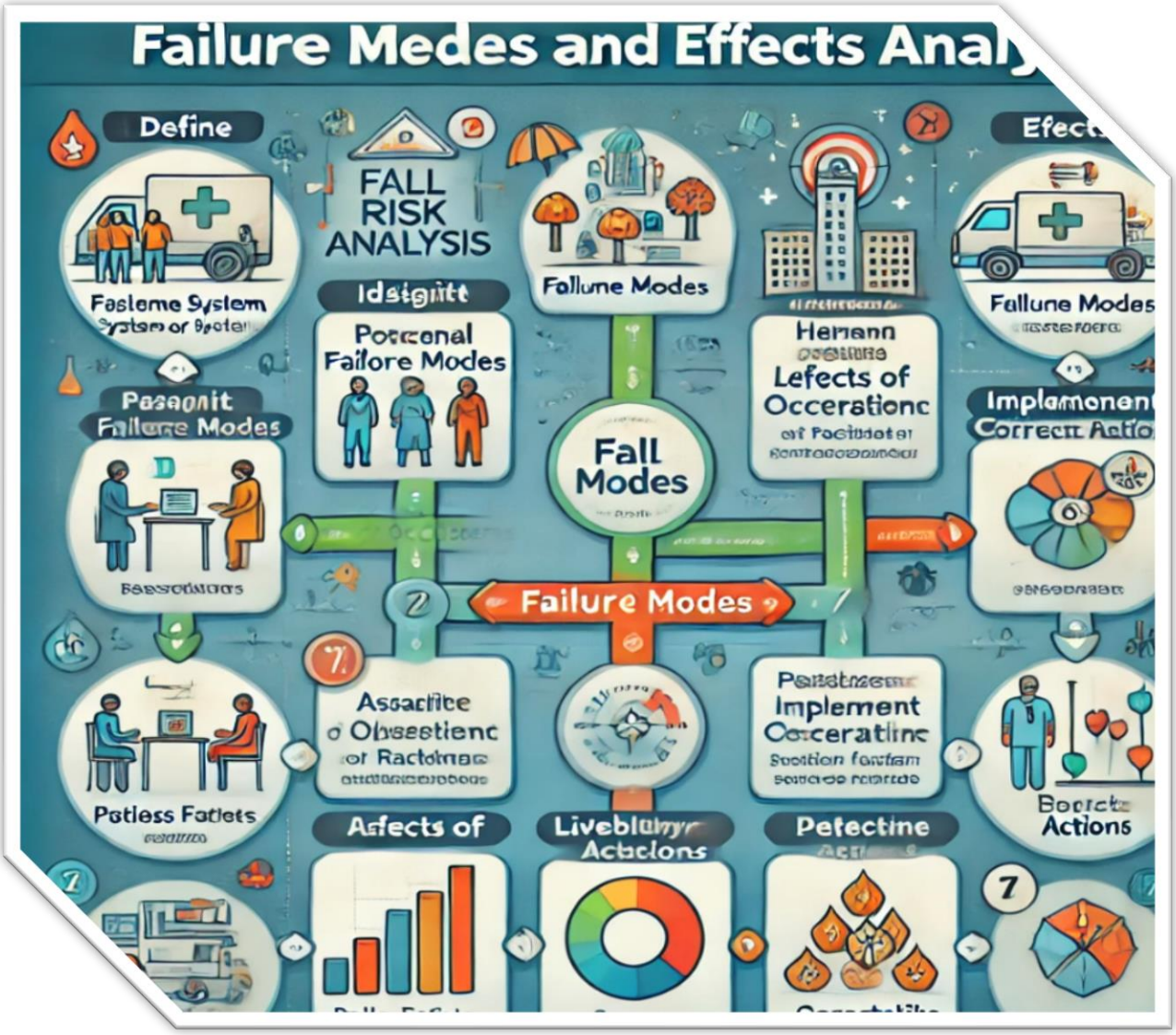
3. **Evaluating the Effects of Each Failure Mode:** Analyzed impacts of identified failures on patient safety and service delivery.

4. **Assigning Severity Ratings:** Rated each failure mode on a scale of 1 to 10 for severity.

5. **Assigning Likelihood of Occurrence Ratings:** Rated the likelihood of occurrence for each failure mode.

6. **Assigning Detection Ratings:** Rated the detectability of each failure mode.

7. **Identifying and Implementing Corrective Actions:** Developed and implemented targeted interventions to address identified failure modes.



Interventions

1. **Scale Modification:** Introduction of the Modified Morse Fall Scale to standardize assessments (Agency for Healthcare Research and Quality, 2013).

2. **Process and Responsibility Modifications:** Clear definition of responsibilities for conducting fall risk assessments.

3. **Resource and Information Technology Utilization:** Implementation of an electronic tracking system to monitor assessments in real-time (Huang et al., 2021).

4. **Policy Update:** Comprehensive policy updates incorporating new assessment procedures.

5. **Staff Education and Training:** Training programs for healthcare professionals on fall risk prevention strategies.

Results

The project identified several significant failure modes in the fall risk assessment process, each associated with high RPNs, indicating critical risk levels. Key issues included inaccurate assessments due to inadequate staff education, complex risk assessment scales, and unclear responsibilities for conducting fall assessments. These failures led to missed opportunities for timely intervention and prevention.

Main Failure Modes, Causes, Effects, and Pre and Post Risk Priority Numbers (RPNs) per Process

Process	Main Failure Modes	Causes	Effects	Initial RPN	Post intervention RPN	Difference (%)
Fall screening	Wrong assessment	Improper staff education	Lack of knowledge to screen the patients.	256	110	57%
		Complex risk assessment scale	Unable to assess patients periodically due to complex scale	288	105	63%
Fall screening	Missed fall assessment	Unclear process and responsibility for fall assessment	Premature process led to knowledge deficit and no proper patient screening for fall	360	72	80%
		Improper staff education	Lack of knowledge to screen the patients.	256	110	57%
		Complex risk assessment scale	Unable to assess patients periodically due to complex scale	288	105	63%
Fall risk precaution measures	Missed Fall risk precaution measures for high risk	Improper staff education	Lack of knowledge to implement fall precaution measures	256	110	57%
		Unclear fall precaution measures-responsibilities	No proper distribution of responsibilities	360	72	80%
		Missed bracelets for high risk	Absence of implementing precaution measurement for fall	256	110	57%
Fall risk precaution measures	Insufficient measures	Improper staff education	Lack of knowledge to implement fall precaution measures	256	110	57%
		Lack of proper distribution and available equipment	Unable to implement fall precaution measures	192	110	43%
Fall risk precaution measures	Un-documented intervention	No clear process (responsibilities)	No proper distribution of responsibilities	360	110	69%
		Unaware of the documentation requirement	Lack of fall precaution measures documentation	192	110	43%
Patient Education	No/improper education	Improper staff education	Lack of patient awareness	256	110	57%
		Unuse of educational material and resources	Absence of patient education	243	110	55%

Following the interventions, the project observed substantial reductions in RPNs across all identified failure modes, with an overall decrease of 62%. Significant improvements were noted in the accuracy of fall risk assessments, clarity of responsibilities, and implementation of preventive measures. For instance, the failure mode "Missed Fall Assessment" saw an 80% reduction in RPN, highlighting the effectiveness of the interventions.

Discussion

The results of this project demonstrate the effectiveness of FMEA as a tool for enhancing fall risk management in outpatient oncology settings. By systematically identifying potential failure modes and implementing targeted interventions, the project achieved substantial reductions in RPNs across various domains of fall risk management (Yamamoto et al., 2020; Sattar et al., 2021). The introduction of the modified Morse Fall Scale simplified and standardized assessments, addressing one of the key failure modes—complexity and inconsistency in risk assessment processes (Agency for Healthcare Research and Quality, 2013).

The success of the interventions can be attributed to several factors. The use of an electronic tracking system ensured real-time monitoring and documentation, allowing healthcare providers to promptly initiate fall precautions and communicate effectively across care teams (Huang et al., 2021). Additionally, the comprehensive policy updates and staff training programs helped improve awareness and adherence to best practices, reducing the likelihood of human errors (Filz et al., 2021).

However, challenges remain in ensuring consistent application of protocols and addressing resource limitations. Continuous monitoring and iterative improvements are necessary to sustain the gains achieved and further reduce fall risks (Fulton et al., 2019). Future studies should explore

the integration of advanced technologies, such as artificial intelligence and machine learning, to predict and prevent falls more effectively (Abdelbasset et al., 2021).

Conclusion

FMEA proved to be an effective tool for enhancing fall risk management in outpatient oncology settings at SQCCCRC. The project's proactive approach resulted in substantial improvements in the accuracy and effectiveness of fall risk assessments and interventions. The findings highlight the importance of continuous monitoring, staff training, and policy updates to maintain high standards of patient safety. While challenges remain, particularly in ensuring consistent application of protocols and addressing resource limitations, the project provides a valuable model for improving fall risk management and enhancing patient safety in outpatient oncology care.

References

Abdelbasset WK, Nambi G, Elsayed SH, Osailan AM, Eid MM. Falls and potential therapeutic interventions among elderly and older adult patients with cancer: A systematic review. Afr Health Sci. 2021;21(4):1776–83.

Agency for Healthcare Research and Quality. Tool 3H: Morse Fall Scale for Identifying Fall Risk Factors. Agency for Healthcare Research; 2013.

Christiansen TL, Lipsitz S, Scanlan M, Yu SP, Lindros ME, Leung WY, et al. Patient activation related to fall prevention: A multisite study. Jt Comm J Qual Patient Saf. 2020;46(3):129–35.

Filz M-A, Langner J, Herrmann C, Thiede S. Data-driven failure mode and effect analysis (FMEA) to enhance maintenance planning. Computers in Industry. 2021;129:103451.

Fulton JJ, LeBlanc TW, Cutson TM, Porter Starr KN, Kamal A, Ramos K, et al. Integrated outpatient palliative care for patients with advanced cancer: A systematic review and meta-analysis. Palliat Med. 2019;33(2):123–34.

Ha VT, Nguyen TN, Nguyen TX, Nguyen HTT, Nguyen TTH, Nguyen AT, et al. Prevalence and factors associated with falls among older outpatients. Int J Environ Res Public Health. 2021;18(8).

Haroun A, Al-Ruzzieh MA, Hussien N, Masa'ad A, Hassoneh R, Abu Alrub G, et al. Using failure mode and effects analysis in improving nursing blood sampling at an international specialized cancer center. Asian Pac J Cancer Prev. 2021;22(4):1247–54.

Huang X, Yan J, Yang T, Yi Q, Shen Z, Yang G. Cost-effectiveness of Morse Fall Scale assessment in fall prevention care in hospitalized patients. Zhong Nan Da Xue Bao Yi Xue Ban. 2021;46(5):529–35.

Oliver D, Daly F, Martin FC, McMurdo ME. Risk factors and risk assessment tools for falls in hospital in-patients: A systematic review. Age Ageing. 2004;33(2):122–30.

Sattar S, Haase K, Kuster S, Puts M, Spoelstra S, Bradley C, et al. Falls in older adults with cancer: An updated systematic review of prevalence, injurious falls, and impact on cancer treatment. Support Care Cancer. 2021;29(1):21–33.

Yamamoto S, Fujikawa N, Asano K, Toki M, Takao A, Arao H. Assessment of fall-related self-efficacy: Characteristics that influence the perception of patients with chemotherapy-induced peripheral neuropathy. Asia Pac J Oncol Nurs. 2020;7(2):190–5.