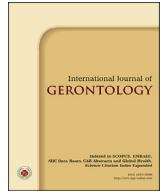


Contents lists available at [ScienceDirect](#)

International Journal of Gerontology

journal homepage: www.ijge-online.com

Original Article

Using Balanced Scorecard on Reducing Fall Incidents and Injuries Among Elderly Cancer Patients in a Medical Center in Taiwan

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ARTICLE INFO

Article history:

Received 9 March 2016
Received in revised form
21 March 2016
Accepted 8 May 2016
Available online xxx

Keywords:

balanced scorecard,
elderly cancer patient,
fall incident,
fall injury

SUMMARY

Background: Elderly cancer patients undergoing cancer treatments were vulnerable to fall incidents and injuries, an important issue in patient safety. The aims of this study were to explore the effects of using balanced scorecard management strategies on reducing fall incidents and injuries among elderly cancer patients in a medical center.

Methods: A prospective, intervention study was employed using records of fall incidents of elderly cancer patients retrieved from Taiwan Patient safety Reporting system (TPR). The intervention, balanced scorecard measures designed to reduce fall incident and injury, was added to the customer, internal process, learning and growth, financial perspectives of the balanced scorecard implemented by the medical center. SPSS 20.0 was used in statistic analysis for frequency, percentage, mean, standard deviation, and Chi-square test.

Results: Prior to the intervention, 41 fall incidents (all sustained injury) recorded in 2010: fall incident (3.26%), fall injury (100%). With the intervention, 24 fall incidents (17 sustained injuries) recorded 2011: fall incident (1.87%; $\chi^2 = 4.985$, $P = 0.026$) and fall injury (62.5%; $\chi^2 = 17.845$, $p < 0.001$) both significantly reduced. With the intervention extended in 2012, 17 fall incidents (11 injuries) in 2012: fall incident (1.38%; $\chi^2 = 0.914$, $P = 0.339$) and fall injury (64.7%; $\chi^2 = 0.021$, $P = 0.885$) maintained low.

Conclusion: The results of present study provided references to healthcare institutes using balanced scorecard management strategies as intervention to reduce to fall incidents and injuries in elderly cancer patients and to prompt patient safety and quality of care.

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1. Introduction

The Joint Commission on Accreditation of Healthcare Organization (JCAHO) added fall prevention as one of the patient safety goals in 2005. In recent years, most hospitals were committed to promote and improve patient safety and quality of care. The Taiwan Joint Commission on Hospital Accreditation constantly monitors

fall incidents reported from the local healthcare organizations and highlights fall incidents as important patient safety issues.

The structure of Taiwanese population exhibits a rapid shift toward an aging society¹. In 1993, only 7% of total population was people ages 65 and above, whereas today, Taiwan is recognized as an aging society. In 2015, 2.93 million (12.51%) were senior citizen². One-third of people older than 65 has fall experiences annually in global statistics. Elderly face fluctuating health conditions causing by chronic illnesses such as osteoporosis. Fall incidents have more serious consequences: physical injuries, lowering quality of life, or even death. Fall incidents are common cause of psychological stress and extending hospitalization and costs incurred^{3,4}.

Fall incidents are among the most common accidents happened in hospitals. Elderly inpatients increasingly become victims of fall

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<https://doi.org/10.1016/j.ijge.2016.05.012>

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incidents due to chronic frailty or treatments of their illnesses. The fall injuries sustained are generally severer than those of younger patients. Statistics from the Taiwan Patient Safety Reporting System (TPR) showed that patient fall incidents in 2014 posited second in the list of patient safety accidents. There were 12,928 reported patient fall incidents of which 2898 (40.9%) pertained to elderly patients ages 65 and above and 35% elderly patients had fall-related injuries⁵. Inpatient fall incidents can cause various degrees of damage; fall injuries degrade health condition extend hospital stay and medical cost⁶.

Fall incidents are preventable. Individual characteristics such as age, gender, falls history, diabetes, visual impairment, and low hemoglobin attributed to the occurrence of fall incidents. Characteristics in falls history, fear of fall, losing balance, frailty, immobility, emotional condition, and whether family accompanied during falls were attributed to fall incidents^{7–9}. Fall injuries affect patient behaviors, independence, sense of security, and willingness to engage in activities and rehabilitation, and increase hospital liability and medical disputes⁶.

Cancer patients are high risk group of fall incidents; frailty, fatigue, insomnia and functional degradation due to chemotherapy can increase their risk to fall incidents^{8,10,11}. Studies confirmed elderly cancer patients undergoing treatments such as chemotherapy, adjuvant endocrine therapy, and cancer medication were at high risk to fall incidents^{1,11–13}. In recent year, new therapies and medicines prolong cancer patients' survival and risk factors linking fall incidents were well explored, these make fall incidents and patient safety in elderly cancer patients more pressing.

The balanced scorecard (BSC) was often used in industrial enterprises for performance improvement. Growing number of hospitals implemented BSC to elevate performance for financial and non-financial senses. The BSC proposed by Kaplan and Norton in 1992 was consisted of four perspectives: financial, customer, internal process, and learning and growth. BSC helps organizations identify visions, formulate strategies, and ultimately achieve target goals. The internal process involved coordinating limited resources for optimal results and the learning and growth involved vesting personnel competence and professionalism: these two were generally regarded as driver indicators. The customer involved tracking client satisfaction and values and the financial involved fiscal results and budgets: these two were generally used as outcome indicators^{14–17}.

BSC was useful in coordinating workflow among clinical nursing staff¹⁸. Graumlich et al.¹⁹ formed a focus group of pharmacists, nurses, and physician, built consensus to formulate BSC measures, and found teamwork and care quality for surgery patients improved. BSC was found to improve family satisfaction and performance of external transfer high-risk newborns²⁰. BSC measures should be reviewed and adjusted for workflow efficiency, quality of care, job satisfaction, thereby achieve holistic and patient-center medical services^{15,21–23}. The medical center where present study was conducted had implemented BSC since 2001 and enlisted patient safety as one of its missions.

Fall incidents in elderly cancer inpatients were often avoidable if preventive measures existed such as reminder posters to raise attentions, patients walking with companies, medical records using color labels, patients wearing special wristband²⁴. Overcash²⁵ found the Instrumental Activities of Daily Living Scale (IADL) can be used to predict fall incidents of elderly cancer patient. A fall-risk factor analysis method was proposed for screening elderly at high fall risk²⁶. To prevent fall incidents, validated risk assessment tools were required to identify high-risk patients of fall incidents; nursing staff needs trainings to detect and recognize risk

factors of fall incidents and to provide personalized preventive measures per patients; as for the patients and caregivers, self awareness and self compliance should constantly reinforce. Meanwhile, fall incidents required monitoring process and report system with streamlined workflow in order to reduce fall incidents and injuries²⁷.

Based on literature reviewing, fall incidents were an important safety issue for hospitalized patients and more pressing for elderly cancer patients. Fall incidents were often avoidable; however, fall prevention needed to be comprehensive. Numerous studies had explored the risk factors associated with fall incidents in elderly cancer patients. However, few studies had explored the effects of intervention on fall prevention among elderly cancer patients with a representative sample in Taiwan. In 2010, 1256 elderly cancer patients were admitted by the medical center where present study was conducted; 41 fall incidents of elderly cancer patients reported and all sustained in injuries. The medical center was ones of hospitals implemented the BSC system. The aims of present study were in two folds: 1) to use BSC measures as intervention of fall prevention for elderly cancer patients; 2) to explore the intervention effects on fall incidents and fall injuries of elderly cancer patients.

2. Materials and methods

A prospective, intervention study was employed. Fall incidents of elderly cancer patients (patients ages 65 and above) admitted to the medical center between 2010 and 2012 were retrieved from TPR. 82 elderly cancer patients were identified. A set of BSC measures was designed for fall prevention merging into the overall BSC matrix of the medical center (Fig. 1). The effects were explored. The dependent variables included 'fall incident rate' and 'fall injury'. The control variables encompassed demographics and care factors. Demographics covered patient's gender, whether patient belongs to high-risk group, fall history, and level of consciousness. Care factors included work shifts, daily companion, and whether patient was accompany during fall incidents. The statistical methods included frequency distribution, percentage, standard deviation, Chi-square tests, and StatXact Perason's Chi-square test. Ethical approval for the present study was obtained from the Institutional Review Board (13MMHIS066) of the medical center. Patient consent was waived for present study.

2.1. Balanced scorecard measures for fall prevention

A set BSC measures was developed as fall prevention in 2011. With success on reducing fall incident and injury in elderly cancer patients, the BSC measures were extended in 2012 and minor modified. These BSC measures were depicted in Table 1. Items in the internal process and the learning and growth perspectives were designed as the performance drivers. Items in the customer and the financial perspectives were regarded as the outcomes.

3. Definitions

Fall incidents: patient fall events documented in the TPR system of the medical center.

Fall incident rate: division, the numerator number of elderly cancer patients involved in fall incident and denominator the number of elderly cancer patients admitted by the medical center in one calendar year.

Fall injury: a dichotomous value, one represented fall incident sustained in injury that met severity levels specified by the Taiwan Clinical Performance Indicator otherwise zero.

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