



**EFFECTS OF PATIENT SAFETY AND ERGONOMICS IN PROMOTING HEALTH
AT ELDERLY CARE INSTITUTION.**

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<p>Abstract</p> <p>Patient safety has received much recognition after the Institute of Medicine's publication of "To err is to human: building a safer health system", To summarize the existing evidence and examine the extent at which patient safety and ergonomics influence health promotion in elderly care, this study employed a literature review to search literature and inductive content analysis to analyze the findings. The results suggest supports the hypothesis that health could be promoted in caring for the elderly by implementing patient safety interventions and considering ergonomics at stages of care delivery. Some of the categories identified include technology and building design, medication safety and health information technology, patient safety, patient outcomes and health care quality.</p> <p>Patient safety and ergonomics are vital elements which require unique attention in order to improve and achieve the work, purpose and vision involved in health promotion with the best possible safety culture, safety climate, work environment, organization and leadership styles, technology and excellent communication which promote optimum patient satisfaction and outcome, nursing staff job satisfaction and motivation as well as enhancing the productivity and effectiveness of healthcare organizations in the care of the elderly.</p>	
Keywords:	patient safety, ergonomics, safety climate, safety culture, work environment, quality of life, health promotion, patient satisfaction, job satisfaction, elderly care
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1 Foreword

I give thanks to God almighty for the protection, wisdom and ability he provided me. Secondly I would like to express my sincere gratitude to my family home and abroad for the support offered. I also acknowledge the supervision and academic support of Pamela Gray from the beginning to this end of this study, I appreciate the lot of advice, encouragement, criticisms from Pamela which has greatly help to make this study successful.

To my parents Mrs Hannah Pokuah and the late Peter Akumfihene Nyame I dedicate this work to, God richly bless them for their sacrifice to my life.

LIST OF ABBREVIATIONS

ACE:	Acute Care of the Elderly
AIDS:	Acquired Immune Deficiency Syndrome
CINAHL:	Cumulative Index of Nursing and Allied Health Literature
CONNECT:	Connections, communications, and problem solving intervention
EE:	Effort expectancy
EPR:	Electronic patient record
FC:	Facilitating conditions
FLNS:	Front-line nursing staff
HFE:	Human factors and ergonomics
HIT:	Health information technology
HIV:	Human Immune Virus
IOM:	Institute of Medicine
IT:	Information Technology
MSDs:	Musculoskeletal diseases
NICHE:	Nurses Improving Care for Health system Elders
NMs:	Nurse managers
NPE:	Nurse Practice Environment
OC:	Organizational culture
OSC:	Occupational safety climate
PE:	Performance expectancy
PICO:	Population, intervention, comparison and outcome
PSC:	Patient Safety Climate
SC:	Safety climate
SCOPE:	Safer Care for Older Persons Environment
SEIPS:	System Engineering Initiative for Patient Safety
SI:	Social influence
TB:	Tuberculosis
TBI:	Traumatic brain injuries
TFL:	Transformational leadership
TREC:	Translating Research in Elderly Care
URAUT:	Unified Theory of Acceptance and Use of Technology

WHO: World Health Organization

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2 INTRODUCTION

Safer Care for Older Persons Environment (SCOPE) is a vital component of Translating Research in Elderly Care (TREC) (Norton et al., 2012). Implementation of best practices has proved to enhance the quality of care process and its outcome (Norton et al., 2012). Yassi and Hancock, (2005), indicated that, it is widely recognized that patient safety and access to elevated quality healthcare are both attributed to well-being of the healthcare professional, meanwhile Yassi et al., (2002a), stated working conditions as a significant worldwide challenge in healthcare.

Poor nursing management practices and lack of teamwork as main factors undermining patient safety culture and indicated the need for safety culture assessment for the achievement of awareness concerning resident safety, evaluation of safety interventions, benchmarking, identification of areas requiring improvement and also to fulfill regulatory requirements (Wagner et al., 2009).

The existence of high rates of working injuries and illness, absenteeism and associated cost is evident in the healthcare sector (Yassi and Hancock, 2005). Healthcare professionals are leading in a high risk of workplace injuries and mental health challenges which impede their ability to consistently provide quality care relative to other professionals (Yassi and Hancock, 2005), while suggesting that an intervention that enhance the healthcare setting such as infection control, and promotion of safe patient handling, physical and mental health with the aim of improving the safety of workers, patient safety and the quality of care is required (Yassi and Hancock, 2005).

The greatest source of injury and time loss being patient handling requires the maximum attention and therefore it is imperative to establish a workplace-based program that integrates primary and secondary prevention due to its effectiveness and cost-benefit (Yassi and Hancock, 2005), meanwhile EI- Jardali and Lagace, (2005), suggested that, a focus on measures to promote a healthy healthcare workplace is significant to advancing patient safety, whereas Nicklin and Mc Veety, (2002), pointed out that, stress, fatigue, overload and burnout are major obstacles to consistent quality healthcare delivery. Similarly, Yassi et al., (2002a), emphasized that, job stress, attributed to un-

derstaffing and poor work environment, could impose a negative effect on the health of nurses, the rate of nurse turnover and nurses injuries such as stress and burnout which plaque the healthcare labour force. Also, Yassi and Hancock, (2005), argued that, adverse events due to errors are caused by factors including organizational factors such as lack of communication or miscommunication, inadequate attention to safety procedures, excessive workload and under-staffing.

The purpose of emerging patient care ergonomics is the re-designation of patient care with decreased exposure to physical hazards, whereas safe patient handling in healthcare prevent occupational injuries and enhance patient safety (de Castro et al., 2006).

de Castro et al., (2006), predicted an increase confidence, protected patient dignity, promoted patient autonomy, and independence with the use of equipment in healthcare. The implementation of safe patient handling interventions is an indication that healthcare facilities are embracing the concept of patient care ergonomics and providing requisite techniques to reduce manual patient handling, hazard assessment of patient care areas, in-service training whiles investing in patient handling equipment (de Castro et al., 2006). Research to identify the significant factors that are affecting the safety climate (SC) and recommendations to improve the safety climate is therefore required (Yeung et al., 2012). This study was commissioned by the GROW-project of the Arcada University of Applied Sciences.

3 BACKGROUND

Patient safety has received much recognition after the Institute of Medicine's publication of "To err is to human: building a safer health system", patient safety includes the avoidance, prevention and amelioration of adverse events emanating from health care delivery procedures and it comprises of systems of patient care, error reporting, and starting new systems aimed at reducing risk of errors in patient care as well as care functions which nursing has sole responsibility (Berland et al., 2012).

Patient Safety Climate (PSC) is described as an important factor of the work environment which determines patient safety and quality of care in healthcare systems (Ausserhofer et al., 2013). According to Ausserhofer et al., (2013), the relationship between PSC and patient outcomes is not well studied. Despite the relevance of safety culture (SC), few published research has examined the occupational safety climate (OSC) of elderly care homes (Yeung et al., 2012).

Yassi & Hancock, (2005), reported that emerging determinants of both caregiver well-being and patient safety are organizational culture (OC) and safety climate.

The validity and reliability of PSC dimension are required in home sector to achieve enormous benefits for the elderly, as both technical and psychological perspectives of workplace safety lead to enhance a positive patient safety culture; a concept recently applied in healthcare (Yeung et al., 2012). According to Yeung et al., (2012), elderly homes lag behind other sectors of the healthcare system and are characterized by less developed occupational safety initiatives, described as most criticized, with issues related to the provision of quality and safety.

Knowledge of best practices for preparing students to address safety issues in the home to ensure successful aging for the geriatric population is limited, meanwhile falls are exacerbating public health concern for the elderly (Smith et al., 2013) and is largely preventable (Center for Disease Control and Prevention, 2010), also environmental and home safety issues are known to be factors resulting in increased rate of falls in the elderly (Smith et al., 2013).

The Center for Disease Control and Prevention, (2010), reported that, millions of adults aged 65 and beyond fall annually, suggesting that it could result in moderate to severe injuries like hip fractures and head traumas, eventually increasing the risk of premature deaths mostly due to traumatic brain injuries (TBI).

The range of 2.9% to 16% of hospitalized patients being affected by adverse events including medication errors, healthcare-associated infections and falls, with a considerably significant proportion resulting in temporary or permanent disability and deaths, is an indication that recent patient care in healthcare organizations is anything but safe (Ausserhofer et al., 2013). Meanwhile Baker et al., (2004), suggested that a wide range of these adverse events are preventable whiles according to Wachter, (2008), patient harm prevention is imperative to attaining an improved quality of care.

Ausserhofer et al., (2013), associated most adverse events to organizational factors such as inadequate expertise, poor communication, heavy workloads, and stressful environments, similarly, Kaissi, (2006), argued that argue that the patient safety movement has failed to attain its goals of eradicating or if not, significantly reducing errors due to inappropriate focus on provider and patient-level factors without real attention to the organizational factors that affect patient safety.

According to de Castro et al., (2006), inadequate staffing and inappropriate skill mix could be the outcome of increased absenteeism, lost work time, burnout, deficient recruitment and high turnover posed on healthcare organizations.

Yeung et al., (2012), stated that occupational safety and health hazards are rampant in residential care facilities whiles manipulating mechanical devices and accessories that support patient care is straining. Poor safety culture leads to adverse events that affect elderly home workers and consequently hinder residents' safety and the quality of care provided (Yeung et al., 2012).

WHO, (2009), suggested the understanding of organizational behaviour as the bedrock to minimize the incidence of adverse events and improve patient safety. Meanwhile Wagner et al., 2009, indicated clear leadership expectations between nurse managers (MNs) and front-line nursing staff (FLNS) to facilitate teamwork; a key concept in patient safety culture, suggesting that nursing leaders equipped with expertise to incorpo-

rate patient-centered care, quality improvement, teamwork and collaboration, evidence based practice, safety and informatics could enhance resident safety outcomes and reduce staff turnover.

According to Kaissi, (2006), patients and care providers deserve safe and reliable systems and suggested that, regulation, reporting systems, information technology, malpractice system, and workforce issues are basis for rating patient safety and indicates the question of healthcare policy makers, providers, researchers, and patients as what to be done to improve patient safety.

According to Carayon et al., (2014), human factors systems approaches are critical for development of both healthcare quality and patient safety, health care professionals, leaders and organisations agree to the relevance of human factors and ergonomics as a scientific discipline with the focus of producing adequate information for redesignation of healthcare systems and procedures targeted at improving patient safety and quality of care.

Consistent with Carayon et al., 2014, de Castro et al., (2006), reported that, prioritizing ergonomic approach and application of a formal program in a work environment does not only provide nurses with workplace safety but also play a significant role to a safe environment for patients by enhancing the quality of nursing care delivery and securing processes for lifting, transferring and repositioning task to reduce possibility of patient injury like falls, dislocations and skin tears.

Research to identify the significant factors that are affecting the safety climate and recommendations to improve the SC is therefore required (Yeung et al., 2012).

3.1 DEFINITIONS OF TERMS

3.1.1 Health promotion

According to Whitehead, (2004), health promotion refers to the procedure through which ecologically-driven socio-political-economic determinants of health are dealt with due to the influence they have on individuals and the community in which they interact. It is an inherently political process depending on health policy as a basis for social action resulting in community coalitions via shared consciousness with the objective of radically converting and enabling communities by engaging them in activities that impacts public health, mainly through social education programs, political lobbying and advocacy, increment of critical awareness and agenda setting to develop and reform social structures achieved by participation among representative stakeholders in diverse sectors and agencies (Whitehead, 2004).

Health promotion assures fundamental reform of health structures within communities and society aimed at facilitating concerted social empowerment to create optimized and organized community involvement and maximize self-reliance (Whitehead, 2004).

3.1.2 Occupational Health

WHO defines Occupational Health as the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations by preventing departures from health, controlling risks and the adaptation of work to people, and people to their jobs (ILO/WHO 1950). Occupational health and safety is an area which tends to dwell on the welfare and total wellbeing of the people engaged in a work or employment. It entails ensuring that the working environment is safe enough for the workers. (Burton, 2010)

According to WHO (2006), occupational health consists of all aspects of health and safety in the workplace with the primary focus on prevention of hazards. The main focuses in occupational health are on the maintenance and promotion of workers' health, the improvement of working environment to become conducive and finally the devel-

opment of work organizations and working cultures in a direction that supports health and safety at work. (WHO, 2006)

Worldwide, the healthcare workforce represents 12% of the working population. Healthcare workers operate in an environment that is considered to be one of the most hazardous occupational settings. In addition to the usual workplace related exposures, healthcare workers encounter diverse hazards due to their work related activities. (Goniewicz et al, 2012).

Social determinants of occupational health include geographical location, gender and culture. People living and working in deprived areas where equipment and gadget to ensure safety at the workplace are scarce tend to be at risk of hazardous injuries that can cause them to be affected deeply. Workers in these deprived areas tend to improvise to substitute for required equipment and items needed to perform their job. Although these improvised gadgets protect them in some way, because that is not the right equipment the workers tend to pose threats to other people in the facilities. Those who are in the developed areas where resources are at their disposal tend to have better occupational health because they have the right equipment and protective gears and safe environment. (Campos-Serna, et al., 2013).

According to Campos-Serna, et al., (2013), although occupational health is vital in every working environment for all workers, there are however some health inequalities among different population groups. Gender inequality is one major factor. According to a research conducted by Campos-Serne et al on gender inequalities in occupational health related to the unequal distribution of working and employment conditions between 1999 and 2010 in Europe, they found out that men were exposed to dangers and had higher degree of physically demanding work, lower support, higher job status and worked longer than women, therefore being at risk to occupational hazards more than the women. (Campos-Serna, et al., 2013).

Wilburn & Eijkemans, (2004), indicated that, most of the conditions of the working environment in the health care setting present a great variety of hazards due to the multiplicity of the tasks performed by the health workers. The nursing sector consists of more women than men. The nature of the workplace makes it absolutely vital that the health and safety of the workers is a priority, this is however not the case. Healthcare

work environment continues to be neglected by governments and organizations. Although the leaders of the sector try their possible best to make the place less hazardous, exposure to threats of physical and verbal violence is highly prevalent compared to other sectors, the female workers are often the victims to these instances (Wilburn & Eijkemans, 2004).

Healthcare workers are exposed to blood-borne infections such as HIV, TB, and Hepatitis B and Hepatitis C. Substantial morbidity and mortality among these workers inevitably lead to loss of skilled personnel and adversely impact healthcare services which are already strained in many low and middle income countries. (Nsubuga & Jaakkola, 2005).

In sub-Saharan Africa, the scarcity of human resource for health is described as a humanitarian resource crisis due to significant emigration of trained professionals, difficult working conditions, poor salaries, low motivation, and high burden of infectious diseases, particularly HIV/AIDS (Dovlo, 2005). Evidence from sub-Saharan Africa indicates that healthcare workers are frequently exposed to chemical and biological occupational hazards. They are constantly in contact with patients that expose them to infections and thus require proper protective measures to reduce their risk of acquisition of disease or injury

Safety measures are always in place to reduce the risk of occupational hazards such as biological risks example risk of infections caused by needle stick injuries, ergonomic risks such as patient handling and chemical risks such as drugs used in treatment of certain conditions. There are provisions of safety boxes for sharps and needles. These boxes are usually placed at vantage places to ensure that the health workers have access to them when they need to dispose any sharps and instruments. Recapping of needles after use is also not advised since it can increase the chances of getting needle pricks. Health workers are thought and provided with materials for infection prevention and control. Lifting techniques as well as assistive devices are available to help in handling of patients. This will help health workers to be able to handle their patients correctly and also not to exert pressure on themselves while doing that (Wilburn & Eijkemans, 2004).

Healthcare workers continue to face several hazards in their workplaces which include physical, chemical, biological and social determinants such as geographical location,

gender and culture. Interventions should be instituted to mitigate these hazards such as providing required equipment and tools, education on occupational health and instituting policies to address gender and cultural factors affecting occupational health.

According to Punnett et al., (2009), gender, socioeconomic status, race and nationality enhances differential distribution of physical and psychosocial work related features which are unpleasant in diverse settings and are enlisted in a context of efforts to boost the health of individuals in the low socioeconomic class whereas the target of traditional health promotion practice has been to alter health lifestyles like exercise, nutrition, stress management, tobacco smoking, which all contribute to obesity, high blood pressure, cardiovascular diseases and diabetes. Consistent with the objectives of the WHO's Ottawa Charter for health promotion, the goal of health promotion interventions include the reduction of differences in recent health status and ensuring equal opportunities and resources, therefore suggesting that effective health promotion programs requires attention for organizational factors in addition to individual lifestyle (Punnett et al.,2009).

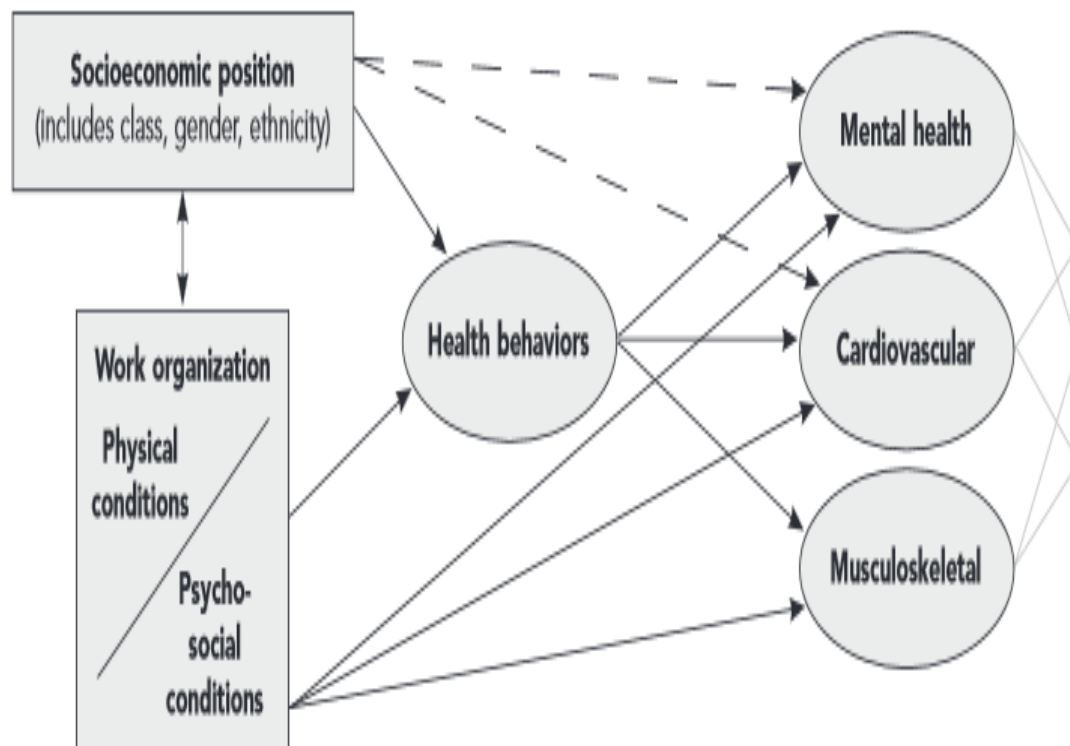


Figure 1: Association among working conditions, socioeconomic positions, health behaviors (tobacco and alcohol consumption, sleep, nutrition, aerobic exercise) and selected health domains, (adapted from Punnett et al., 2009).

3.1.3 Safety Culture

According to Wagner et al., (2009), culture of safety refers to values, attitudes, perceptions, competencies and behavioral patterns that determine the commitment to, and the style and proficiency of an organizations health and safety management targeted at systems instead of individuals. Wagner et al., (2009), reported lack of safety culture in nursing home residents. Feng et al., (2008), described patient safety culture as a subset of organizational culture specifically linked to the values and beliefs with regard to patient safety within healthcare organizations which reflects the capacity of individuals and organizations to manage with risk and hazards to avoid harm or losses and attain their objectives.

Safety culture of long-term care is either a culture of blame or that of mutual distrust, despite the Institute of Medicine (IOM) report “To Err is Human” urge of healthcare

organizations to improve patient safety (Wagner et al., 2009), while Feng et al., (2008), stated that, the 'blame and shame' patient safety culture in healthcare organizations has been criticized to obstruct the possibility 'learning from the errors'. Meanwhile Feng et al., (2008), argued that application of safety culture to healthcare is relevant since safety applies to both the workforce and patients. Characteristics of organizations with positive safety culture include mutual trust communication, shared perception of significance of safety and confidence in the efficacy of preventive measure (Feng et al., 2008).

Feng et al., (2008), outlined factors supporting development of patient safety culture as managers, immediate supervisors, individual behavioural factors, reporting systems, rules and procedures as well as healthcare organizational subcultures, and emphasized that there is an unequivocal association between a positive patient safety culture and positive health outcomes.

3.1.4 Stress and Burnout

According to Maslach, (1976), the condition when the caregivers "lose all concern, all emotional feeling for the people they work with, and come to treat them in a detached or even dehumanized way" is termed as burnout. Also, Kravits et al., (2010), defined burnout as a psychological state characterized by constellation of symptoms such as emotional exhaustion, depersonalization, and decreased perceptions of personal accomplishment. Available result indicates that work relationships, tension-releasing and instrumental, problem-focused coping are the major predictors of burnout (McGrath et al., 2003). Disturbance of life-style and circadian rhythms by night duty, overheated conditions in theatr and ethical challenges linked to critical care settings, long term elderly care were outlined as causes of stress by McGrath et al., (2003).

Kravits et al., (2010), suggested emotional exhaustion as the basis of burnout leading to elevated sentiments of depersonalization and declined personal accomplishment and further associated emotional exhaustion and burnout to chronic exposure to environmental stressors coupled with ineffective coping resources.

Stress refers to a consequence of the interaction between the stimulus and the response as well as any force that pushes psychological or physical factors to exceed the range of

ability to produce strain in an individual, it is a construct based on humanistic existentialism (Clegg, 2001). According Clegg, (2001), stress is somewhat elusive concept but a phenomena with credibility in positivist and phenomenological epistemology and indicated that its study is significant due to political and economic implication of stress-related illness.

According to McGrath et al., (2003), nursing is an occupation naturally subjected to elevated stress such as stark suffering, grief and sometimes possibly death, sometimes distasteful, disgusting, often degrading and frightening and further suggested that available evidence proves nursing in all specialities to be stressful. Apparently, staff turnover, patients well being and relationships between nurses links to the prevalence of anxiety, uncertainty and communication blockage in hospitals (McGrath et al., 2003), similarly, Clegg, (2001), emphasized that staff sickness and truancy is a major challenge of the health service and that occupational stress is a main issue in exacerbated sickness and absence rates but simultaneously, Clegg, (2001), reported that nurses who adapted to work stress with high job satisfaction were highly capable to adopt problem-orientated coping mechanisms relatively.

Management and decline of occupational stress are identified as major factors leading to enhanced employee well being and nursing is described among disciplines contributing enormously into research seeking to establish causes and complications of the ill-defined concept of occupational stress (Clegg, 2001).

According to Kalichman et al., (2000), occupational burnout and stress is linked associated to long-term job dissatisfaction and possibly result in immunosuppression and increased susceptibility to illness. Experience of stress by nurses is influenced by patient care, workload, interpersonal relationship, bureaucratic political constraints and role ambiguity (Clegg, 2001), likewise, Kalichman et al., (2000), suggested that diverse source of multiple stressors might be experienced by nurses, stating professional distress, patient care and motivation, time and workload management, personal time disruptions, emotional reactions, behavioral manifestation, fatigue and physiological manifestations per utilization of factor analysis of the Nurse Stress Inventory as occupational stressors.

McGrath et al., (2003), suggested a scope for further research to study exact causes of stress in diverse clinical settings, and to investigate stress alleviation or coping strategies with stress in a manner that promotes health. Available evidence of work stress in some people increases activities that possibly degrade health (McGrath et al., 2003).

3.1.5 Stress and burnout management

According to McGrath et al., (2003), interventions focused on organizational issues and provision of assistance in utilizing coping strategies could result in decreased burnout, but also suggested quality working relationships in environment as the most effective intervention. Avoidance behavior, reduction in workload and recreation are all strategies in dealing with stress (McGrath et al., 2003).

Results of Boey, (1998), indicated that nurses more elevated in adopting problem-based coping strategies are those who normally are able to adapt to stress with exacerbated work performance. Meanwhile , Clegg, (2001), suggested that healthy organizations associated with open management and employee empowerment maintain good health and safety records and that the analysis of organisational culture is significant to addressing effective stress reduction.

Redesignation of task and work environment, establishment of transformational leadership, improved motivation and stress management based on the principle of humanism is vital for both actors in dealing with stress and job satisfaction (Clegg, 2001).

4 THEORETICAL FRAMEWORK

Nurse researchers employ both nursing and non-nursing frameworks as basis of context for their investigations (Polit & Hungler, 1995). According to Polit & Hungler, (1995), conceptual frameworks entail formal explanations of aspects of nursing with reference to the point of view to that of the developers'. Polit & Hungler, (1995), indicated that conceptual frameworks could serve as a spring-board for generating research hypotheses and provide a significant context for scientific research and enable the audience to define and delimit the problem being investigated, the principal objective of theoretical and conceptual framework is to present meaningful and generalizable scientific result.

The theoretical frame that guides this study is the System Engineering Initiative for Patient Safety (SEIPS) model (figure 1), developed by Carayon et al., 2014. The System Engineering Initiative for Patient Safety (SEIPS) model, is the most widely utilized healthcare human factors systems model (Holden et al., 2013).

According to Fawcett (1989), person, Environment, health and nursing are the core concepts of nursing conceptual frameworks. Besides the fact that the SEIPS model is the most widely used healthcare human factors model as argued by Fawcett (1989), it also tackles all the four main concepts required of nursing conceptual frameworks.

Carayon et al., 2014, described the system model and suggested that it could be used in healthcare in relation to the work of clinicians, other healthcare professionals, care teams as well as patients and care givers but indicated healthcare professionals as the centre of focus. The benefit of both patients and healthcare professionals and organizations is a major outcome that requires attention, it is also recommended that the redesign of healthcare systems should be with such purpose (Carayon et al., 2014). Human factors and ergonomics (HFE) techniques have been on the rise in healthcare delivery in diverse context which include the domains of how systems and design have been addressed in healthcare with approaches for organisational and socio-technical systems and design for patient safety (Hignett et al., 2013). According to Hignett et al., (2013), HFE contribute to systems and design initiatives for both patients and clinicians to improve everyday performance and safety, and enable the reduction and control of spiraling healthcare costs.

Consistent with Carayon et al., 2014, Punnett et al., 2009, indicated that occupational ergonomics seeks to enhance the fit between the workforce and its environment by optimum designation of jobs and work systems, emphasizing that ergonomics interventions are often targeted at physical job features including tool or workstation dimensions, heavy lifting, awkward postures and recurring tasks. Interventions to reduce the adverse effects on health sometimes require dealing with upstream organizational factors operating at the group or system level despite the primary focus on decreasing physical job demands (Punnett et al., 2009).

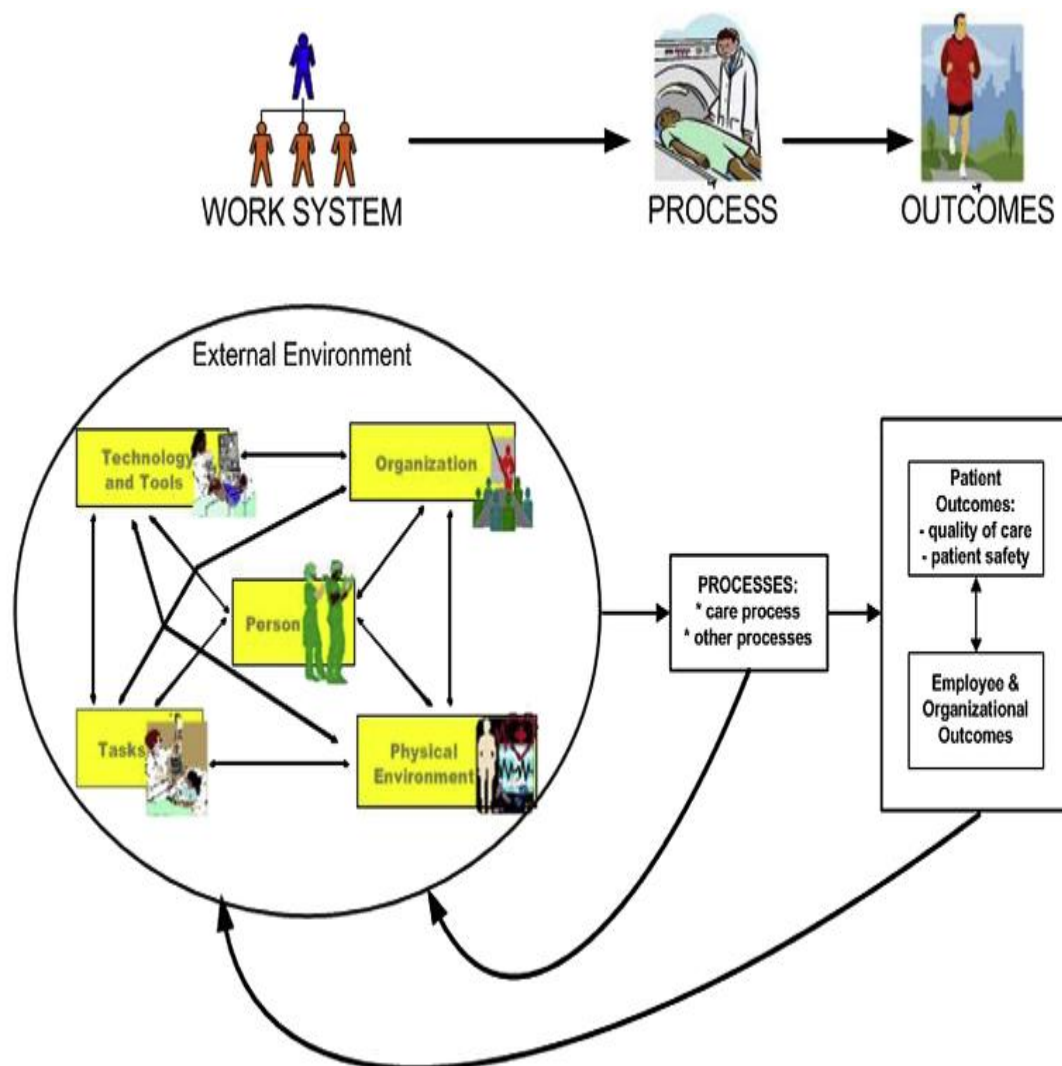


Figure 2: The System Engineering Initiative for Patient Safety (SEIPS) model of work system (Carayon et al., 2014).

5 AIMS AND RESEARCH QUESTION

The Objective of this study is to investigate the effect of patient safety and ergonomics in promoting health at elderly care institutions. The purpose is to summarize the available evidence and examine the extent at which patient safety and ergonomics help healthcare professionals in promoting health at elderly care institutions via prioritizing patient safety and ergonomics.

What are the effects of patient safety and ergonomics in promoting health in elderly care institutions is the research question.

6 METHODOLOGY

Notably, systematic literature review appears the perfect procedure which aid analysis and scrutiny of existing vast data regarding the study due to the use of primary investigation for searching ordinary themes and findings for evidenced based practice.

This study employed a literature review. Allsop & Saks, (2007), indicated that, to stress on judgement of evidence quality and reduce bias require a systematic review. According to Lage Junior et al., (2010), usually literature review methodology studies diverse ways of the topic under investigation. Green et al., (2006), who argued that literature review might offer a high standard of evidence to guide critical decisions in nursing practice.

6.1 Data collection

The search for articles was conducted between January and March, 2015. The databases sorted include CINAHL (EBSCO host), PUBMED.

Keywords include patient safety, ergonomics, health promotion, nursing and elderly. The PICO (population, intervention, comparison and outcome) guided the formation of the keywords used in the search whiles the structure was guided by the PRISMA 2009 checklist consistent with Moher et al, (2009). And the inclusion criteria entails title, abstract and keywords available, articles published in

academic journals between 2010 to 2014, written in English, full text available, and peer reviewed and research articles while the exclusion criteria was that the search targeted the elderly and duplicate articles. The search procedure is represented in appendix 1.

Three articles were published in the same year (2012), but in different journals while two were attributed to the same principal author with focus on patient safety and falls, and patient safety culture, but the other studied about improvement of the healthcare system. There were four articles published in 2013, article 3 focused on health and safety of healthcare workers, article 4 discussed the influence of organizational culture and patient safety and article 9 studied about fall prevention while HFE was investigated in article 10 but were all published in different journals. One publication in 2010, article 5 narrated about technology and building design and article 1 published in 2014 discussed medication safety support by use of technology. Article 8 was published in 2011.

6.2 Data analysis and interpretation

Qualitative content analysis (inductive method) was used to analyze articles included in this study. Data analysis is among the challenging aspects of conducting qualitative research (Priest et al., 2002). Priest et al., (2002), stated that analysis and interpretation of qualitative data could be by: grounded theory, content analysis and narrative analysis, these have much to provide to enable exploration and understanding of qualitative data (Priest et al., 2002). The development of knowledge for evidence-based nursing practice has led to a rise in qualitative research methods with the goal of describing, exploring and explaining an investigated concept (Priest et al., 2002) and understanding of human health experience combines the science and artistic natures of nursing (LoBiondo-Wood & Haber, 1994). Qualitative research entails broadly stated questions about human experiences and realities, investigated by sustained relationship with people in their natural environment, generating rich, descriptive data that enables understanding of their experiences (LoBiondo-Wood & Haber, 1994).

The qualitative method permits broader understanding and deeper insight into complex human behaviors and has the capacity to guide nursing practice, contribute to instrument and theory development as demonstrated in the work of Morgan & Laing (1991) who explored the meaning of a diagnosis of Alzheimers disease for caregiving spouse (LoBiondo-Wood & Haber, 1994). The researcher is the main instrument conducting interviews, observing and gathering data while being responsible for eliminating personal bias (LoBiondo-Wood & Haber, 1994).

This approach embraces the wholeness of humans, paying attention to human experiences in naturalistic setting (LoBiondo-Wood & Haber, 1994). The basic elements of qualitative research include; identifying the phenomenon, structuring the study, gathering the data, analyzing the data and describing the findings (LoBiondo-Wood & Haber, 1994). Analysis of qualitative data focuses on codes, themes and patterns, increasingly computer software programs aid with coding and analysis (Priest et al., 2002).

The outcome includes rich, deep description of the phenomenon under investigation or a theory about the phenomenon which allows researchers to generalize to a theoretical understanding of the phenomenon (Priest et al., 2002).

6.3 Ethical Considerations

This study ensured adherence to general research ethics. Ethics are “norms of conduct in subjects of study, research ethics facilitates knowledge, truth and prevent error while protect against fabrication, falsification or misrepresentation of research data” (Stichler, 2014). Stichler (2014), argued that adherence to ethics in research, writing and publication are significant in nursing and that they enhance moral and social value besides ensuring the trustworthiness of the quality and integrity of the research. It also promotes respect for intellectual (Stichler, 2014). The study was commissioned by the GROW-project of the Arcada University of applied sciences and no conflict of interest was declared.

6.3.1 Scientific rigor

The scientific rigor of qualitative work is judged by credibility, auditability, fittingness and confirmability (LoBiondo-Wood & Haber, 1994). According to Elo & Kyngäs (2008), credibility of research findings deals with how well the categories cover the data and that to increase reliability requires demonstrating an association between the outcome and the data. Credibility exhibits the truth of findings as judged by participants and others within the discipline (LoBiondo-Wood & Haber, 1994). Authentic citations are used to also increase trustworthiness of the research and a clear description of the context, selection and characteristics of participants, data collection and process of analysis help to facilitate transferability (Elo & Kyngäs, 2008). Fittingness is characterized by detailed description of daily reality of the subjects to enable evaluation of the importance for practice, research and theory development (LoBiondo-Wood & Haber, 1994). When the outcome reflects implementation of creditability, auditability and fittingness standards then confirmability is assured (LoBiondo-Wood & Haber, 1994). This study ensured credibility by conducting the research in a way that attains plausibility by searching for disconfirming evidence and transferability was achieved by associating the findings to experience and outlining in-depth description of the research procedure. Confirmability due to the neutrality of the investigator and bracketing was achieved.

7 RESULTS

AUTHOR	TITLE OF ARTICLE	JOURNAL, YEAR
1. Ming-Hseng, T. & Hui-Ching, W.	A cloud medication safety support system using QR code and web services for elderly outpatients	Technology & Healthcare, 22(1): 99 – 113, (2014).
2. Cape-zuti, E., Bohz, M., Cline, D., Dick-son, V. V., Rosen-berg, M-C., Wag-ner, L., Shuluk, J. & Nigoli-an, C.	Nurses improving care for health system elders: A model for optimising the geriatric nursing practice environment.	Clinical Nursing, 21(21/22): 3117 – 3125, (2012).
3. Capsi, C. E., Den-nerlein, J. T., Ken-wood, C., Stoddard, A.M., Hopkia, K., Hash-imoto, D. & Sorensen, G.	Result of a pilot study inter-vention to improve health and safety for healthcare workers	Journal of Occupational Envi-ronmental Medicine, 55(12): 1449-1455, (2013).
4. Kauf-man, G. & McCaughan, D.	The effect of organizational culture on patient safety	Nursing Standard, 27(43): 50-56, (2013).
5. Hignett, S.	Technology and building de-sign: Initiatives to reduce in-patient falls among elderly.	Health Environmental Re-search and Design, 3 (4): 95 – 105, (2010).
6. Berland, A., Holm, A. L., Gundersen, D. & Bentsen, S. B. (2012).	Patient safety culture in home care: Experiences of home care nurses	Journal of Nursing manage-ment, 20 (6): 794 – 801, (2012).

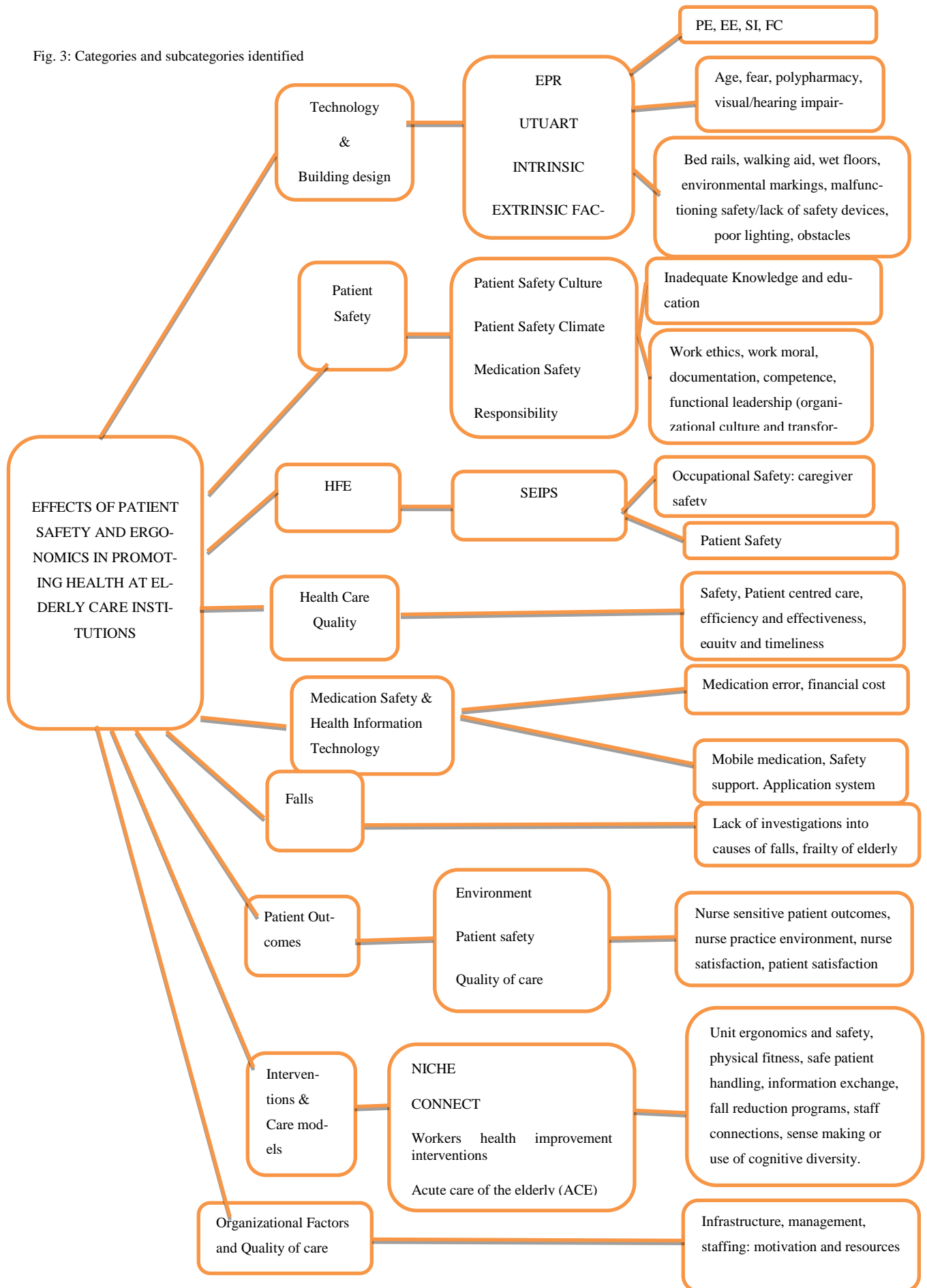
7. Berland, A. Gunder- sen, D. & Bentsen, S. B.	Patient safety and falls: A qualitative study of home care nurses in Norway	Nursing and Health Sciences, 14(4): 452 – 457, (2012).
8. Friman, A., Klang, B. & Ebbeskog, B.	Wound care by district nurses at primary healthcare centres: a challenging task without authority or resources	Scandinavian Journal of Car- ing Science, 25 (3): 426 – 434, (2011).
9. Colon-Emeric, C. S., McConnell, E., Pinheiro, S.O., Co-razzini, K., Porter, K., Earp, K., Landerman, L., Beales, J., Lipscomb, J., Hancock, K. & Anderson, R.	CONNECT for Better Fall Prevention in Nursing Homes: Results from a Pilot Intervention Study.	Journal of The American Ger- iatrics Society, 61(12): 2150- 2159, (2013).
10. Hignett, S., Carayon, P., Buckle, P. & Catchpole, K.	State of Science: Human Fac- tors and Ergonomics in Healthcare	Ergonomics, 56 (10): 1491- 1503, (2013).

Table 1: list of articles included in the study

7.1 Categories and subcategories of the findings

The categories and subcategories as illustrated in fig. 3 were generated after the data were collected to help ensure that the results really answered the research questions. After the systematic literature review, the following categories and subcategories were generated. 1. Technology and Building design which consists of EPR, UTUART, intrinsic and extrinsic factors, 2. Patient Safety which comprises of Patient Safety Culture, Patient Safety Climate, Medication Safety, Responsibility and Patient Autonomy, 3. HFE which includes SEIPS, 4. Health Care Quality, 5. Medication Safety and Health Information, 6. Falls, 7. Patient Outcomes which entails Environment, Patient Safety, Quality of care and Communication, 8. Interventions and Care Models which entails NICHE, CONNECT, Workers health improvement interventions and Acute Care of the Elderly (ACE) and 9. Facilitators and Barriers of Interventions.

Fig. 3: Categories and subcategories identified



The categories and subcategories identified as depicted in fig.3 gives a broader elaboration of the different elements forming the theoretical framework in fig. 2. The diversity of factors identified could immensely contribute to the effectiveness and efficiency of the work system to facilitate the processes (care process and other processes) and simultaneously enhance patient outcomes (quality of care and patient safety) as well as employee and organizational outcomes.

7.2 Medication safety and Health information technology

Due to the IOM report on quality in health care (Ming-Hseng & Hui-Ching, 2014; Berland et al., 2012), focusing on medication safety promotion, significant attention is directed towards re-engineering the care environment aimed at maximizing the quality of healthcare delivery (Ming-Hseng & Hui-Ching, 2014).

Ming-Hseng & Hui-Ching, (2014), indicated that, despite the significance of drug in disease treatment, the rising frequency of medication errors is posing financial and clinical effects and the complex medication management task is faced by the elderly emanating from their chronic conditions. Ming-Hseng & Hui-Ching, (2014), by the use of a three-tier architecture comprising a front-end tier, the mobile tier and the cloud tier, the mobile tier hosted the personalized medication safety on android platforms to provide some primary functions including reminders for medication, assistance with pill-dispensing, recording of medications, position of medication and notices of forgotten medications for the elderly. The hybrid technology acceptance model was then used to understand the intention and level of satisfaction of potential users to use this mobile medication safety support application system (Ming-Hseng & Hui-Ching, 2014).

7.3 Patient outcomes: Environment, quality of care and patient safety

The paucity of evidence regarding the influence of the care environment on outcomes is obvious. Meanwhile, much positive experiences and limited concerns with the quality of care and minimized risk of patients are associated to better care environments. To obtain elevated quality of care, there is the need to optimize care environments (Aiken et al, 2008).

Better nurse staffing to better outcomes is attributed to strong evidence base, but Aiken et al., (2008), reported higher mortality rate in facilities with poorest patient care environments compared to that of better care environments.

Capezuti et al., (2012), deduced that even though there are a lot of geriatric and chronic care models available, the Nurses Improving Care for Health system Elders (NICHE) was the one which succeeded most in terms of hospital membership recruitment and added the geriatric hospital program. According to Capezuti et al., (2012), the NICHE was the only program that dwelled solely on the staff's ideology of the conducive care environment for geriatrics practice. Capezuti et al., (2012), suggested that the NICHE could be successful if the Nurse Practice Environment (NPE) in which the framework and processes of hospital services focused on patient care needs. It is well noted that the NPE is imperative for nurse satisfaction and to nurse-sensitive patient outcomes, units with specialized care models focused on the elderly such as the Acute Care of the Elderly (ACE) produces better outcomes or results than the units without these models, the category of people who use the health services more often are the elderly and they are more likely to develop or encounter complications such as delirium and pressure sores and adverse events such as fall-related injuries during their stay in the hospitals thus there will be a high need for health services (Capezuti et al., 2012). This makes it unreasonable to separate the elderly to specific units but instead it will be better if age-sensitive principles are adopted to guarantee that the elderly gets the highest quality of care throughout their hospitalization regardless their unit location, the NICHE program is the program that helps integrate geriatric care models in health care systems to enable older adults receive the care that they need wherever they are hospitalized (Capezuti et al., 2012). Also, Colon-Emeric et al., (2013), indicated that, nursing home staff connections, communications, and problem solving (CONNECT) intervention would enhance improved implementation of falls reduction education programs (FALLS), since falls are adverse events that frequently affect the elderly and impact patient safety (Berland et al., 2012). According to Colon-Emeric et al., (2013), a priority of nursing homes is to improve care for frail older adult residence due to various adverse health outcomes in older adults resulting from the interaction of multiple risk factors. A more appropriate multifactorial risk reduction intervention for many of geriatric syndromes affecting nursing home residents such as falls, incontinence, etc., Colon-Emeric et al., (2013), suggested that CONNECT has the potential to improve resident's outcome via its impact on staff connections, information exchange, use of cognitive diversity and sense-making.

7.4 Patient safety, patient safety culture and ergonomics

To explore home-care nurses' experience patient safety in their delivery of home care to older clients, Berland et al., (2012), employed four focus group interviews comprising 20 nurses working in home care setting and conducted a qualitative thematic analysis which yielded struggling with responsibilities in diverse conditions as the main theme with poor work morale and work ethics, documentation, lack of functional leadership, lack of updated routines and guidelines, and competence as subthemes. These themes coupled with inadequate knowledge and education among health care professionals compromise patient safety culture and hence nurse managers are required to be updated of these dilemmas so as to reshape into transformational leadership styles for the efficiency and effectiveness of safety measures in healthcare delivery (Berland et al., 2012). Meanwhile, Hignett et al., (2013), stated that SEIPS provides an analytical framework to reflect on how systems components affect human behavior at the organizational, health professional and patient safety level, the focus of HFE in healthcare is directed at either occupational ergonomics or patient safety while the IOM enlisted the components of healthcare quality as: safety, patient-centred care, effectiveness, efficiency, equity and timeliness.

7.4.1 Caregiver safety

Capsi et al., (2013), stated that musculoskeletal diseases (MSDs) constituted about one third of occupational injuries and infirmities in the United States and the most reported cases were lower back pain. The occupational safety and health administration estimates that MSDs made employers spend much money per year in direct costs. Among nursing staff, injury rates have been reported at 12.89 per 100 full-time staff and the rate might be increased for nursing aids (Capsi et al., 2013). According to Capsi et al., (2013) long work hours, consecutive shifts, mandatory overtime and on call status may be factors that leads to the development or worsening of such conditions, job stress, tiredness and patient lifting tasks have also been associated with MSDs. Occupational intervention such as education alone has not been successful in reducing MSDs but

there has been some evidence that suggests that exercise training which consists of both physical fitness and strength endurance activities may have positive impact on improving musculoskeletal health in an occupational setting (Capsi et al., 2013). To help reduce these MSDs, intervention activities were conducted on seven patient care units in two large hospitals in Boston during the summer in 2011 and these intervention activities sought to improve the health of the workers through the involvement of unit managers, implementation of unit-wide safety changes and worker education (Capsi et al., 2013). The intervention activities were sub-divided under subthemes namely: unit ergonomics and safety, safe patient handling and the third being worker physical fitness. The interventions were most effective at modifying safe patient handling behaviors and hence future larger-scale interventions would do well to add to the strategies to modify safe patient handling as a good prevention strategy to relieve workers of pain. Meanwhile, human factors and ergonomics (HFE) techniques have been on the rise in healthcare delivery in diverse context which include the domains of how systems and design have been addressed in healthcare with approaches for organisational and socio-technical systems and design for patient safety (Hignett et al., 2013). According to Hignett et al., (2013), HFE contribute to systems and design initiatives for both patients and clinicians to improve everyday performance and safety, and enable the reduction and control of spiraling healthcare costs.

7.5 Technology and building design in healthcare

In the aspect of the design of technology (equipment and furniture) and buildings , Hignett, (2010), narrates exploration of interventions for inpatients falls among the elderly, majority of the contributory risk factors, injury rates and incidents are comparably unaltered, meanwhile, interventions are dominated by staff-focused and organizational change-directed measures such as monitoring and communication whiles clinical feedback is to modify the clients by reviewing medication, continence management and impact protectors.

Despite the lot of attempts to minimize the incidents and fall-related injuries, not much is available to exhibit sustainable milestone in the frequency of injury or incidence even

though these leads to exacerbated financial, regulatory and resource challenges associated to existing healthcare budget and litigation, this elevated rate could be attributed to a combination of extrinsic and intrinsic risk factors (Fig. 3) but as depicted in Fig. 4 , these interventions could help to drastically decline if not ameliorate inpatient falls (Hignett, 2010). Also Berland et al., (2012), explored safety and falls based on home care nurses experience by use of four focus group interviews conducted with 20 home care nurses and identified the themes; patient safety as not being a primary prevention, lack of investigations into causes of falls, and the frailty of the elderly unable to live at home safely and independently, patient autonomy and patient safety. The result of Berland et al., (2012), indicated that more attention was instead directed at fall treatment than prevention of falls while patient autonomy was placed before patient safety.

Intrinsic (Patient)	Extrinsic (Environment)
Age (older than 65 years)	Bed rails
Strength and mobility issues	Bed/toilet height
Visual and/or hearing impairment	Attachment to equipment: catheter
Cognitive impairment, confusion	Ill-fitting footwear/socks
Medicine use, polypharmacy (taking 4 or more medications)	Walking aids
Postural hypotension, dizziness, vertigo	Slippery/wet floors
Urinary incontinence or frequency	Poor lighting
Fear of falling	Lack or malfunction of safety equipment (e.g., grab rails)
Unwilling/unable to seek assistance	Environmental markings, e.g., signage
	Equipment mobility (e.g., tables on wheels)
	Obstacles (including entanglement)
	Doorway and furniture design
	Access to items (e.g., reaching for call bell)
	Lack of or inappropriate care (usually referring to patient location on a ward inappropriate for presenting complaint or because of staff shortages)

Table 2: Contributory factors of falls (Hignett, 2010).

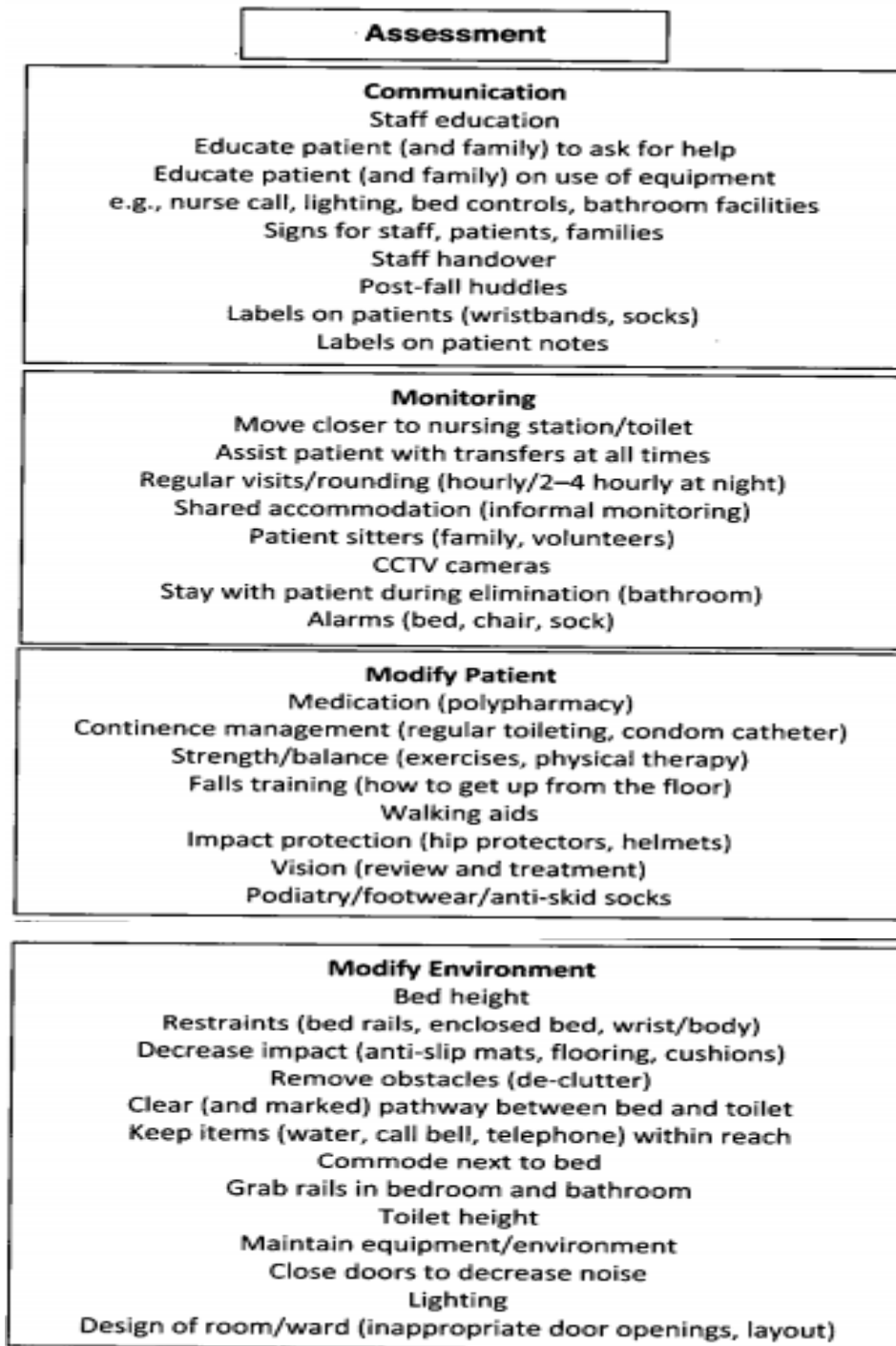


Figure 34: Interventions for inpatient falls (Hignett, 2010).

8 DISCUSSION

The broad nature of the main categories channeled to reflection of major component of the theoretical framework is consistent with the various subcategories as discussed below. This confirms how the work system, the person, environment, technology and tool, organization and how processes influence patient outcomes, employee and organizational outcomes. The findings of the study are in agreement with the basis of the theoretical framework which calls for the redesign of the healthcare system to optimize patient safety and ergonomics aimed at promoting health in elderly care institutions.

8.1 Nursing Leadership and Management

A nurse leader refers to an individual who is capable of developing and communicating an ethical and compassionate vision of patient-centred care and encourage others to do likewise by virtue of transformational nurse leadership values which has proven by research evidence to support patient safety with regard to minimized adverse events and complication (Kaufman & McCaughan, 2013).

According to Kaufman & McCaughan, (2013), transformational organizational cultures are highly anticipated to result in quality improvements while effective teamwork is described as the foundation of good patient care.

The improvement of outcomes of the elderly requires advanced knowledge of nursing leadership and management (Holm & Severinsson, 2014). According to Holm & Severinsson, (2014), advanced nursing knowledge is imperative to enhancement of the work and vision in nursing leadership and management, indicating that, the ability to alter the altitude towards elderly, developing trust, ensuring efficacy in management decisions, inadequate knowledge of addressing relational challenges, collaboration of the health system and exposure of staff to meaning and possibility to influence their work are very instrumental to effective nursing leadership and management in the care of the elderly.

Both leadership and management are requirements for high quality organizational service and performance, these are necessary to optimize the health outcomes of care delivery and management despite its complexity in the care of older persons (Holm & Severinsson, 2014). Also, Kaufman & McCaughan, (2013), attributed enhanced quality and safety to effective leadership in a clinical setting while indicating that poor stand-

ards of communication and inadequate patient participation in decision making are detrimental to both patient and caregiver satisfactions.

Holm & Severinsson, (2014), suggested transformational leadership as a means to understand nursing leadership and management, mostly in periods of organizational change where the roles of first-line nurse managers (FLNMs) are extended to direct, coach, and encourage their staff and ensure overall responsibility for the quality of patient care, personnel and budgets for effective and efficient organizations. The diverse role, skills and knowledge expectations of leadership and management in nursing evolved from changes in the health care system (Holm & Severinsson, 2014).

Holm & Severinsson, (2014), again suggested that, situational leadership, a form of transformational leadership could be used to develop a person-centered framework for nursing in elderly care. Also Aiken et al., (2008), indicated that nurse leaders possess three main aspects for improving nurse retention and patient outcomes: improving registered nurse staffing, moving to enhanced educated nurse work-force and improving the care environment.

Research evidence suggest that, leadership of nurse managers (NMs) have a direct impact on performance of nursing units, while transformational leadership (TFL) behaviours leads to organizational effectiveness and superior performance whereas increased staff nurses' (SNs) retention, job satisfaction and empowerment are attributed to TFL behaviours of NMs (Casida & Parker, 2011).

Casida & Parker, (2011), argued that, staff satisfaction and organizational commitment are significantly promoted by TFL which also encourages innovative practices, utilization of TFL shapes a nursing unit culture to manifest trust, confidence, collaboration, autonomy, shared governance and organizational commitment, all significantly boast patient outcomes.

8.2 Information Technology (IT) In Healthcare

Research evidence suggest the existence of advocate for the utilization of health information technology (HIT) due to its significance in the transformation of the healthcare

system and its associated role in patient safety, healthcare effectiveness and cost savings (Unertl et al., 2010).

Solutions to challenges encountered in healthcare delivery for addressing population health concerns include information technology (Maillet et al., 2015). According to Maillet et al., (2015), adoption of innovations like the electronic patient record (EPR) favors professional culture of nurses, meanwhile, effective response is an influential factor for decisions and behaviours of IT users. Maillet et al., (2015), indicated that, functionalities including relevant information, patient evaluation, health promotion, clinical interventions and organisation of service which uniquely contribute to health care systems are facilitated by an EPR.

Maillet et al., (2015), stated that, the Unified Theory of Acceptance and Use of Technology (UTAUT) advanced constructs influencing the intention to use and actual use of IT as performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC), all focusing on perceptions of users' about the significance of the system in enhancing productivity, simplicity to learn operating the system, the duties undertaken by significant individuals in the work environment, and the measures taken to support change.

The results of Maillet et al., (2015), depicts that the simultaneous use of paper-based records (PBR) and an EPR may affect nurses' decision-making procedure as well as the quality and safety of care, emphasizing compatibility as a vital pivot and facilitator of the use of EPR in influencing PE and EE. Maillet et al., (2015), established that EPR support key aspects of nursing practice such as decision making, communication, coordination and care provided to patients, while reporting a favorable affective response with regard to nurses' satisfaction.

Also, Unertl et al., (2010), identified HIT as a key aspect of transitioning to a safe, effective, patient-centered, efficient, timely and equitable health care system, meanwhile, the impact of HIT on clinical workflow and productivity could be a possible obstacle to implementation.

8.3 Patient Safety, Safety Culture and Falls

In 1863, Florence Nightingale indicated the doing the patient no harm as the initial requirement of a hospital (Kaufman & McCaughan, 2013). The goal of delivering quality health care has resulted in increased awareness regarding patient safety. Avoidance, prevention and amelioration of adverse events or injuries associated to health care procedures are key elements of patient safety but systems of patient care, reporting of errors and designing new systems to minimize the risk of errors in patient care cannot be underestimated (Berland et al., 2012).

Berland et al., (2012), argued that not enough attention is allocated to safety in elderly care compared to hospital patients, despite the high risk of adverse events attributed to the elderly. According to Berland et al., (2012), falls are adverse events frequently affecting the elderly and lead to an elevated mortality rate among the elderly, thus threatening patient safety. Consistent with Berland et al., (2012), Tait, (2012), stated that, multiple medications, experiences of aged-associated physiological changes are more susceptible to falls due to medical conditions for elderly patients.

Meanwhile, Berland et al., (2012), discovered that, there is increased attention on patient safety after an incident, despite earlier emphasize on patient safety and further stated that post fall prioritization of patient safety will not avoid serious consequences since most injured elderly never regain their previous level of functioning, clearly indicating that prevention of falls and associated injuries are not adequately addressed but instead health personnel focused on already occurred injuries (Berland et al., 2012).

According to Tait, (2012), falls and fractures are rampant in elderly people and attributed it to financial and personal cost whiles suggesting the need for fall prevention by fall risk assessment to identify individuals at risk and strategize to minimize risk, thereby avoiding serious injury and accident related mortality. Meanwhile, Hignett, (2010), attributed exacerbated rates of falls to the combined effects of extrinsic risk factors related to environment (walking aids, slippery floors, poor lighting, bed rails, environmental markings, absence or malfunction of safety equipments and equipment mobility) and intrinsic risk factors whiles suggesting environmental modification, assessment and communication and monitoring as part of fall management procedures, but indicated that equipment availability and facility design are frequently identified categories of operational hinderances.

Basically, Berland et al., (2012), established that patient safety was not attended to as a primary prevention, there is limited investigation to ascertain the causes of falls and also patient autonomy mostly conflicts with patient safety, and frailty of elderly patients without ability to live safely and independently at home.

Tait, (2012), suggested adequate rehydration to play a significant role in fall prevention due to the linkage of postural hypotension to dehydration and that patients with cognitive challenges could use sensor mats which notify staff via an electronic alert system when a patient stands from a seated position.

Re-designation of the Registered Nurses' work environment and provision of structurally empowering work environment by leaders is required to boost patient safety culture and are also vital facilitators in delivering efficient, competent and quality care (Armelino et al., 2010).

8.4 Organizational Factors and Quality of Care

According to Montgomery et al., (2013), 'organizational factors play a crucial role in the development of health professionals' job burnout, which in turn impacts the patients experience and quality of care'. There is paucity of knowledge in process issues involved in the delivery of optimized quality of care (Montgomery et al., 2013).

Killet et al., (2013), identified infrastructure; (overcrowding, lack of equipment and poor physical environments), management and procedures; (poor leadership and inadequate policies, overly bureaucratic and instructive management styles), staffing (staff mix, remuneration and nursing home resources) poses a significant impact on motivation and self-esteem of staff, resident population characteristics and culture as the major groups organizational factors that mistreatment is attributed to and reported that routinized care of older people deviated from care quality in Finland.

According to Killet et al., (2013), there is a relationship between mistreatment and staff dissatisfaction of their working environment, inadequate training and burnout whiles establishing an inverse association between proportion of residents with elevated levels of need and quality of care.

Result of Killet et al., (2013), indicated that organizational factors interact to create unique systems where good quality care could be compromised, stating safety and secu-

rity of residents as well as relationships between fellow residents and staff as key components from the resident's point of view. Meanwhile the interchange of staff in caring for different groups of residents resulted in flexibility during staff shortage but reduced access to vital information about residents coupled with high staff and management turnover, consequently leading to destabilization of care quality (Killet et al., 2013). Congruent with Killet et al., (2013), Montgomery et al., (2013), emphasized that, job burnout is a significant mechanism through which work environments affects the quality of care while interventions to minimize burnout and consequently reduce error and improve patient safety focus on structural changes, further argued the existence of a symbiotic association between health of staff and that of care recipients'.

8.5 Barriers and Facilitators of Interventions

Result of Krill et al., (2012) indicate that adequate education and equipment are required to change practice for patient safety. Ergonomics programs reduce job-related health care injuries and proved to decrease health care costs and also improve the safety of both patients and staff (Krill et al., 2012).

According to Krill et al., (2012), barriers identified include lack of : a "no lift" policy, adequate lifting equipment and adequate space, follow-up training. Proper training and purchase of sufficient equipment for easy access to staff by organization is instrumental (Krill et al., 2012). Krill et al., (2012), also argued that proper infrastructural development is a prerequisite before an institution of "no lift" policy to support safe and patient handling but emphasized that healthcare organizations should not rely solely on equipment to solve challenges associated to patient handling, instead suggested inclusion of adequate quantity of equipment, plans for storage, maintenance and cleaning as well as continuous personnel development.

Krill et al., (2012), attributed difficulty in operation, universal inappropriacy for all patients, time consuming to attitude of staff as a reason for not using safe handling equipment while risky task for injury include catching patients to avoid fall, repositioning and transferring which require equipments, staff and teamwork to make them easier. Utilization of handling equipments and instruments, in-service training, and

“no lift” policies prove to reduce injuries to patients and healthcare professionals drastically (Krill et al., 2012).

9 Conclusion and recommendations, strength and limitations

9.1 Conclusion and recommendation

The effectiveness, efficiency, cost and safety of healthcare delivery coupled with patient outcomes which promote health imperatively could be enhanced by implementation of measures and interventions such as CONNECT, NICHE, HFE, HIT, building design and technology, knowledge and education of healthcare professionals, responsible leadership as well as ensuring improved healthcare systems within the NPE and adherence to evidence based practices. Also patient safety culture and supportive organizational culture with transformational leadership as the core could also facilitate the patient safety and outcomes while sustaining job satisfaction of not only nurses but the entire collaborative health care system together with the re-designation of the systems to support patient safety. An extensive enquiry into the link between the factors which facilitate the association of human factors and ergonomics, patient safety and health promotion in health care is required. Also triangulation could help enrich data and eradicate the weak nature of the data sources.

9.2 Strength

The broad nature of the topic resulted in the identification of diverse, effective, efficient and safety promotion interventions such as translating Research in Elderly Care,

Unified Theory of Acceptance and Use of Technology, human factors and ergonomics, health information technology, electronic patient records, and others which when utilized will go a long way to enhance the safety of both patient and caregivers. The geographical distribution of the studies included in this study at least provides a wider coverage of global patient safety and human factors principles in the healthcare system. The relationship established by the study between patient safety and human factors associated to transformational leadership, health information technology, NPE and OC provides an evidence based approach to an integrative healthcare which facilitates nurses' job satisfaction, quality patient outcomes to promote health at elderly care institutions. The study also consistently adhered to ethical principles of research and scientific rigor.

9.3 Limitations

The major limitations regarding this study include the broad nature of the topic, language, and demographics. As a type of restraint, language covers some points that need consideration, relevant articles published in languages besides English were ignored and hence language therefore became an impediment during assessing the entire research conducted globally despite the global nature of the study. Also translational errors in the articles where the study was conducted in non-English native countries could have possibly distorted or affected the outcome of these studies and consequently affected the review of such articles.

The generalizability of the study could therefore not be authenticated due to language, demographical settings of the included articles, experience of the researcher and the number of articles. The focus of the study on the elderly also was a limitation, and despite some studies on falls, there was no link between the articles with regard to falls.

9.3.1 Validity

The study suffered some weakness in the procedures despite the efforts of the researcher to reduce risk of sampling bias. The heterogeneity of most of the articles finally included in the review made it difficult to compare them with regard to specific issues related to the topic. Selection bias might have been induced as a result of the wide inclusion criteria and this calls for narrowing of the study focus and refining the inclusion criteria in future review. Predictive validity due to bias in confirmation made the study vulnerable to subjectivity.

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11 APPENDIX

11.1 Appendix A

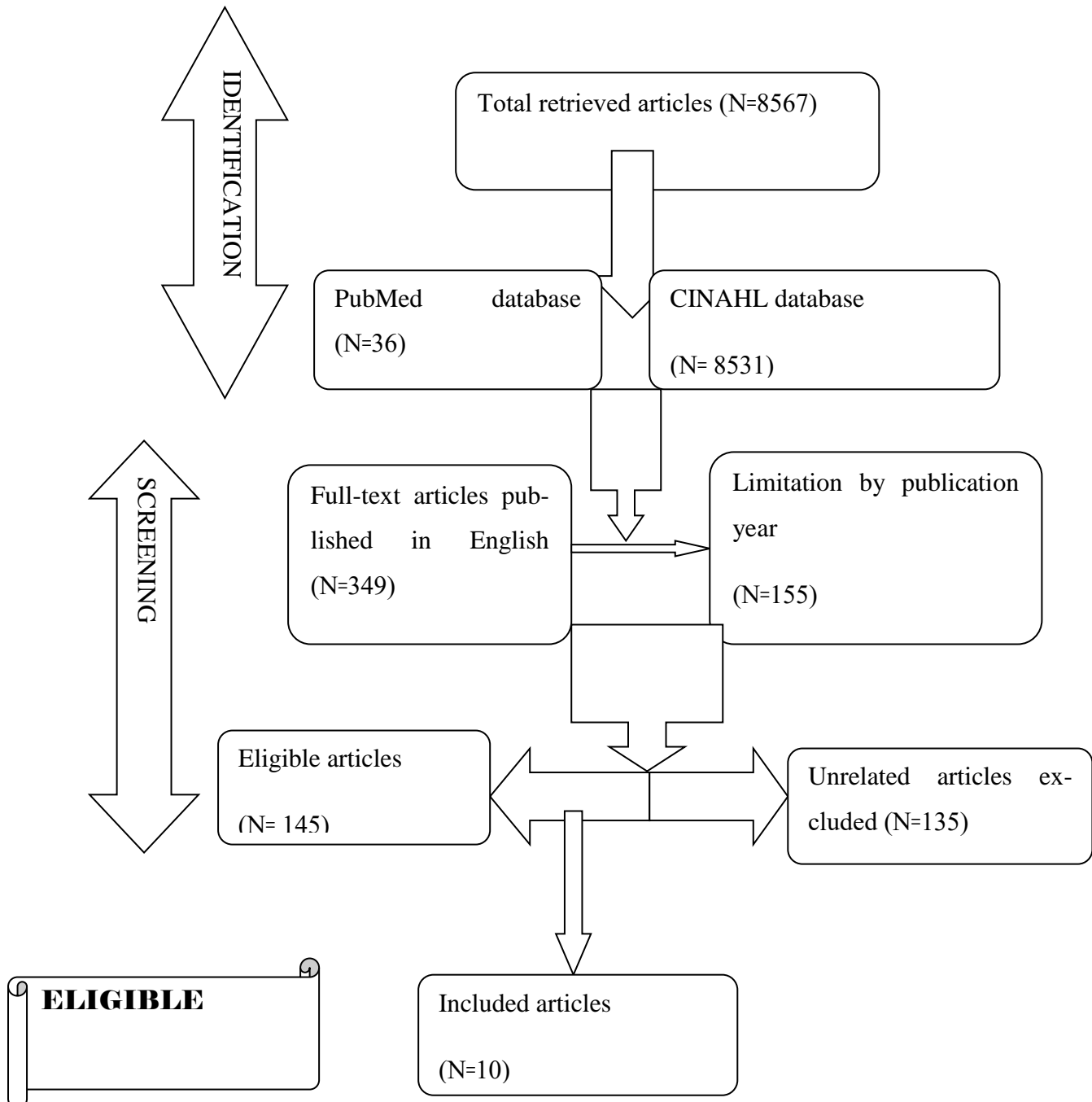


Figure 45: Flow Chart of literature search

11.2 Appendix B

Author/s (Year)	Title	Journal/vol./Issue	Objective(s)	Method	Result	Conclusion
1. MinHseng, T.& Hui-Ching, W. (2014).	A cloud medication safety support system using QR code and web services for elderly outpatients	Technology & Healthcare, 22(1): 99 – 113.	To reduce the medication errors for elderly outpatients with diseases.	Cloud medication safety supporting system designed, demonstrated and evaluated.	The developed system, implementing patient-centered services is highly accepted by elderly.	The proposed M-health system could help outpatients' homecare in preventing medication errors and improving their medication safety.
2. Capezuti, E., Bohz, M., Cline, D., Dickson, V. V., Rosenberg, M-C., Wagner, L., Shuluk, J. & Nigolian, C. (2012).	Nurses improving care for health system elders – a model for optimising the geriatric nursing practice environment.	Clinical Nursing, 21(21/22): 3117 – 3125.	To explain the relationship between a positive nurse practice environment (NPE) and implementation of evidence-based practices. To describe the components of nurses' improvement care for health system elders (NICHE) programs.	Selective critical analysis of the descriptive and empirical literature.	NICHE is the most successful in recruiting hospital membership and contributing to the depth of geriatric hospital programming.	Only NICHE geriatric care model focuses on the nursing staff's perception of the care environment for geriatric practice.
3. Capsi, C. E., Dennerlein, J. T., Kenwood, C., Stoddard, A.M., Hopkia, K., Hashimoto, D. & Sorensen, G. (2013).	Result of a pilot study intervention to improve health and safety for healthcare workers	Journal of Occupational Environmental Medicine, 55(12): 1449-1455	To test the feasibility of a multicomponent pilot intervention, safety and wellness in two Boston Hospitals	Intervention activities conducted and baseline surveys and follow-up surveys were administered.	Frequent reports of pain and intervention increase in safe patient handling, safety practices, ergonomics and supervisor support but no changes in musculoskeletal disorders and physical activity.	Frequent reports of pain and intervention increase in safe patient handling, safety practices, ergonomics and supervisor support but no changes in musculoskeletal disorders and physical activity.
4. Kaufman, G. & McCaughan, D.	The effect of organizational culture on patient safety	Nursing Standard, 27(43): 50-56	To address the effect of organizational culture on patient safety	Exploring the association between organizational culture and patient safety.	Key elements of safety culture were identified (teamwork, effective leadership, creating an	Healthcare needs to address human factors, ergonomics principles and methods to make further progress in improving patient safety.

(2013).					environment of trust, learning from lessons of failure	
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Author/s (Year)	Title	Journal/vol./Issue	Objective(s)	Method	Result	Conclusion
5. Hignett, S. (2010).	Technology and building design: Initiatives to reduce inpatient falls among elderly.	Health Environmental Research and Design, 3 (4): 95 – 105.	To offer a narrative exploration of interventions for inpatient falls among elderly with respect to design of buildings and technology.	Narrative exploratory review.	Interventions for inpatient falls among elderly with respect to design of buildings and technology.	If technology and building design can facilitate independence for elderly inpatients by creating safer environments, there could be decreased incidents and injuries associated with falls.
6. Berland, A., Holm, A. L., Gundersen, D. & Bentsen, S. B. (2012).	Patient safety culture in home care: experiences of home care nurses	Journal of Nursing management, 20 (6): 794 – 801.	To explore home-care nurses experiences of patient safety in their delivery of home care to elderly clients.	Focus group interviews and qualitative thematic analysis.	Struggling with responsibility in different situations	Patient safety culture is Compromised by lack of: Responsibility among Leadership, routines, Knowledge and education among health-care professionals and failure of updating procedures.

Author/s (Year)	Title	Journal/vol./Issue	Objective(s)	Method	Result	Conclusion
7. Berland, A. Gundersen, D. & Bentsen, S. B. (2012).	Patient safety and falls: A qualitative study of home care nurses in Norway.	Nursing and Health Sciences, 14(4): 452 – 457.	To explore patient safety and falls based on experiences of home care nurses.	Exploratory qualitative research design (content analysis) with four focus group interviews	Health professionals were more concerned with treatment instead of fall prevention, patient autonomy was prioritized before patient safety	Further research was Recommended on the topic.
8. Friman, A., Klang, B. & Ebbeskog, B. (2011).	Wound care by district nurses at primary healthcare centres: a challenging task without authority or resources.	Scandinavian Journal of Caring Science, 25 (3): 426 – 434.	To describe district nurses experience of their nursing actions when treating patients with different kinds of wounds at primary health care centres and in home care to increase understanding.	Qualitative, descriptive study.	Three themes and nine sub-themes were identified.	Lack of time, limited access to treatment rooms and equipment, poor lighting, hygiene aggravated by lack of authority and resources made task inefficient and difficult.
9. Colon-Emeric, C. S., McConnell, E., Pinheiro, S.O., Co-razzini, K., Porter, K., Earp, K., Landerman, L., Beales, J., Lipscomb, J., Hancock, K. & Anderson, R. (2013).	CONNECT for Better Fall Prevention in Nursing Homes: Results from a Pilot Intervention Study.	Journal of The American Geriatrics Society, 61(12): 2150-2159.	To determine whether CONNECT would improve implementation of a falls reduction education program (FALLS).	Cluster-randomized trials comparing the effect of CONNECT and FALLS with that of FALLS alone.	Significant improvement in staff perceptions of communication quality, safety climate, caregiving quality, participation in decision making and use of local interactions strategies were observed in intervention community.	CONNECT has the potential to improve residents outcome through impact on staff connection, information exchange, use of Cognitive diversity and Sense-making.
10. Hignett, S., Carayon, P., Buckle, P. & Catchpole, K. (2013).	State of Science: Human Factors and Ergonomics in Healthcare.	Ergonomics, 56 (10): 1491- 1503.	To provide a state of science commentary using four illustrative examples to review and discuss analytical and implementation challenges.	Review and discussion of analytical and implementation challenges.	Application of HFE leads to enhancement of safety and minimize healthcare costs.	HFE contribute to systems and design initiatives for both patients and clinicians to improve everyday performance and safety, and enable the reduction and control of spiraling healthcare costs.

