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**REPORT TOPIC: DIFFERENT TECHNOLOGIES USED IN THE MODERN HEALTH
CARE HOMES**

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Introduction

This is a descriptive report on the use of modern technologies in healthcare workplace.

Care homes are instrumental in the safeguarding of the vulnerable people and in particular the elderly. The dynamics in the health and social care have an influence on the care outcomes in the care homes. The use of modern technology to enhance quality of care and outcomes is an example of the dynamics that the care homes should adopt. This interim report provides background on the report regarding the use of electronic fall sensors in care homes for the aged people. According to public health England (2020), the UK government's policy is that incidences of falls among old people should be highly prevented. NHS (2018) stated that falls and fall-related injuries are part of the problems in nursing homes. People aged 65 and above have a high risk of falls due to their impaired physical stabilities, eyesight, and medications, particularly those with chronic diseases been controlled.

Sheehan & Russell (2020) state that falls has significant personal costs such as physical injuries, depression, disability, and isolation leading to increased dependency. The injuries caused by falls have a significant effect on healthcare systems in that they led to about 4 million bed stays a year in the UK. The estimated cost of hospital stay as a result of the injuries is about £303 per day per hospitalized case. The study provides the introduction, methodology, presentation of the selected sources and emerging themes, and conclusion.

DIFFERENT TECHNOLOGIES USED IN THE MODERN HEALTHCARE WORKPLACE.

Electronic health records: According to WhatIs.com electronic health records are individual official health document that is shared among multiple facilities and agencies. The role of EHRS is becoming increasingly influential as more patient information becomes digital and a larger number of individuals express a desire to have mobile access to their health records. The importance of EHRs (Jamoom E, Beatty p et al 2011) is the ability to automatically share and up-

date information among different offices and organizations, it has more efficient storage and retrieval, and the ability to share multimedia information, such as medical imaging results between locations. Potential long-term lower costs to medical systems and less redundancy of effort.

THE USE OF ELECTRONIC FALL SENSORS FOR AGED PEOPLE IN CARE HOMES.

For the purpose of this report PICOT approach was adopted.

The approach is used in testing the suitability of a research question to use and the search terms to focus on. It focuses on the population of the patients of focus, the intervention at hand, comparison, outcome, and time/place/setting. In this regard, the research question in consideration with the approach includes *The Use of Electronic Fall Sensors (intervention) in Care Homes for the Aged (population) in Fall Detection and Prevention (outcome)*.

The purpose of the study is to investigate the effectiveness of the use of wearable sensors in preventing falls in nursing homes. The report questions include:

- What are the wearable technologies adopted in care homes to detect and prevent falls?
- What is the effectiveness of the use of wearable technologies in the detection of falls in care homes?
- What are the barriers to the adoption of wearable technologies in the detection of falls in care homes?

Methodology

Research Design

The current study is secondary designed because it is easy to undertake, and the sources related to the study topic are available. The study can also be exploratory, experimental, or descriptive. The exploratory study involves the findings the insights about the given study problem, and the experimental study involves the adoption of scientific approaches (Edmonds & Kennedy, 2016). A descriptive study is focused on describing something such as a function or characteristics. The current study would use an exploratory design in which the wearable body sensors

system would be identified, the effectiveness of the technology used, and the barriers faced to their adoption would be outlined (Omar, 2015). In this case, a systematic literature review strategy is selected as the method of the study.

The Search Strategy

The materials for systematic review should be highly reliable for the findings to be relevant and usable in practice. The process of the search and sources selected is therefore fundamental for the realization of the intended findings. The journal articles used are all searched online. The databases through which the search took place include Google Scholar and EBSCOhost. The phrases run to search for the materials include i) wearable technologies adopted in care homes to detect and prevent falls; ii) effectiveness of the use of wearable technologies in the detection of falls in care homes; iii) barriers to the adoption of wearable technologies in the detection of falls in care homes. The selection of the phrases was influenced by the fact that they were relevant and likely to assist in the access to materials relevant to the research questions and topic. The search is filtered in consideration of the publication date with the focus on 10 years and below as the limit. In this case, ten sources were considered.

The Selection Criteria

The focus of the systematic review study is to collect data and information from the most reliable sources available and hence a selection criterion is of fundamental importance. The first aspect considered in the selection is that the source is peer-reviewed because they are effective in enhancing the reliability of the findings. It is also noble to acknowledge that the CASP evaluation criterion was adopted to assess whether a source is peer-reviewed and relevant for the study. Long et al. (2020) states that according to the model an article is peer-reviewed it has components including a relevant title, the purpose of the study stated, description of the method used, presentation of results, and conclusion made based on the findings. The other criterion is that all the sources selected were based on the consideration that they were published in English. The

importance of this is that it assists in avoiding the chances of misinterpretation of the findings. Based on the selection criteria, ten sources were selected for the review.

Sources and Emerging Themes

The report findings for the study are presented in three themes as discussed in this section.

The technologies Adopted in Care Homes to Detect and Prevent Falls

The four sources on the theme include Perch et al. (2021), Pier Leoni et al. (2016), Hedge et al. (2018), Zhu et al (2017), and Mishkhal et al. (2020).

Pech et al. (2021) undertook a systematic review of fall detection and prevention systems. According to Pech et al. (2021), the technologies used in the detection and prevention of falls can be categorized into wearable and non-wearable ones. The wearable in this case may include a watch, pendant or wearable cameras that are usually attached on the clothes or wrist. Non-wearable systems are largely mounted in the usual environment. The devices, in this case, may include pressure sensors as well as ambient sensors such as visual fixed cameras and kinetic sensors as well as acoustics such as microphones (Pech et al. 2021).

Pier Leoni et al. (2016) undertakes experimental research on the application of wearable fall detectors for elderly people based on AHRS and barometric sensor. Pier Leoni et al. (2016) found that wearable devices are more reliable because they have the capability to detect changes in movement, and planes of motion as well as the impact on the body with a high level of accuracy.

Hedge et al. (2018) undertook an analysis of the automatic recognition of activities of daily living utilizing. The experiment involved the assessment of the application of insole-based and wrist-worn wearable sensors using laboratory testing on 13 different activities under controlled conditions. Hedge et al. (2018) found that it is possible to have different types of connections adopted

in making wearable devices more effective. Hedge et al. (2018) identified Smart Step as an example of such a system. A sensor is mounted on the shoe sole and is used in recording user motions and incorporates a 3D accelerometer, pressure sensors, and Bluetooth connectivity.

Zhu et al (2017) undertook an experimental study to assess the effectiveness of the use of RFIDs to monitor the status of the elderly living alone. The study findings reveal that Zhu et al (2017) detection systems that combine both wearable and non-wearable sensors are effective in sensing falls among elderly people living alone. The smart and connected home health monitoring systems in which several sensors are placed in objects that are in strategic places and sensors. The sensors are worn in form of a belt, keyring, or pendant mounted with an alarm button, an interface, and software data collection system (Zhu et al. 2017).

Mishkhal, (2020) undertook an experiment to analyze signals from the network sensors distributed in different places in two clinical rooms at the Elizabeth hospital. The aim was to test the effectiveness of the convolutional neural network (CNN) in detecting and perfecting falls among elderly patients in hospitals and nursing homes. such as W²ISP and RFID sensors. The findings from the experiment concluded that the deep learning methodology is effective in assessing fall risk based on wearable sensors.

Effectiveness of the Use of Wearable Technologies in the Detection of Falls in Care Homes

The three sources providing this theme include Lu and Chu (2018), Buisseret et al. (2020), and Awais et al. (2018).

Lu and Chu (2018) infer that an Image-based Fall Detection System (IFADS) for nursing homes involves equipping public areas within the facility with surveillance cameras to detect cases of falls. The IFADS applies an object detection algorithm aimed at identifying people in a video

frame. The system has the capability of checking the relative positions of the chairs and the people in the given area in the facility. The experimental analysis revealed that IFADS had an average accuracy rate of 95.96% in the detection of falls (Lu & Chu, 2018).

Buisseret et al. (2020) undertook an investigation of the efficacy of the Timed Up and Go (TUG) system which is a wearable device used as a walk test system. The findings from the analysis revealed that the system had an accuracy of 75%. Buisseret et al (2020), added that the application of wearable sensors in combination with an Artificial Intelligence system has significant potential in enhancing the monitoring of the risks of falls among home care-based elderly people. Awais et al. (2018), analyzed two sets of sensing technologies with edge-to-edge wearable device systems. The findings revealed that the use of wearable sensors and the internet of things enhanced fall detection efficiency. The end-to-end systems assisted in enhancing the entire communication process from the sensing of fall to the transmission and alerting the relevant workers below a second. It implies that action is taken very fast and in case of preventable injuries first aid and treatment are commenced immediately.

The Barriers to the Adoption of Wearable Technologies in Detection and Prevention of Falls in Care Homes

The two sources with the theme include Pech et al. (2018) and Wandke, Sengpiel & Sönksen (2012).

According to Pech et al. (2018), inequality in the access and acceptance of technology between generations, and the exclusion of individuals in certain social groups. The underlying factors, in this case, include physical, social background, and economic status making it not possible to access the relevant digital technologies required in the implementation of wearable sensors and connections through the internet of things (Pech et al., 2018).

Wandke, Sengpiel & Sönksen (2012) undertook a systematic review of the myths regarding human-computer interaction (HCI) and older people. The findings identified six myths that lead to social stigma as one of the key barriers to the adoption of the technology. The use of the new technology may be perceived to be a new form of dependency and illness. Age-related stereotyping is a manifestation of the potential negative effects on the mental and physical health of elderly people leading to a high likelihood of resistance among elderly people.

Conclusion

The report findings revealed that the use of wearable sensor technologies is increasingly gaining popularity in the detection and prevention of falls in care settings. Advancements in technologies including motion and posture sensors interconnected through the internet of things enhance the use of the technology. End-to-end encryption plays a vital role in enhancing the efficiency of the detection with some systems able to raise an alert in less than a second. However, barriers to the adoption of digital technology such as generational technology gaps, social stigma, cost of the technology, and lack of skills among home care staff are a great hindrance.

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