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Developing a Rule-Based Expert System to Infer Customized Care Plans for Long Term Care Patients

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Abstract. Systems of long-term care are needed in aging society to meet the needs of older people. In rapidly increasing demand for long-term care, how to ensure the quality of long-term care is an important issue. Therefore, we designed a rule-based expert system that automatically generates customized care plans based on the assessment results. Aims to provide health providers a useful tool in long term patients management.

1. Introduction

The National Development Council's Population Projection System projects that the number of seniors over the age of 65 will increase from 16.07% to 40% between 2020 and 2060. As of August 2020, there are already 3.78 million people aged 65 or older in Taiwan, accounting for 16.07% of the total population. As the elderly population rises, how to ensure the quality of long term care is important. In order to address the above problems, the objective of this study is to develop a rule-based expert system for care providers in customized care planning.

2. The Long Term Care System Structure and Design

This system was developed with health care providers in a long term care agency. It was composed of four major modules (Figure1): (1). Input: Care providers can do patient assessment and record the results by using dynamic assessment tool. The assessment results would store in electronic format and cloud based. Thus, care providers can access the records anytime, anywhere. (2). Knowledge Base: We gathered 24 kinds of assessment tools for long term care patients (e.g. Braden scale, Activity of daily living). And also we established 26 care plans and including its interventions. The criteria of care plan trigger were development by health care providers. (3). Reasoning Engine: Based on the assessment results, care plans are triggered using a rule-based reasoning engine. Figure2 shows the different risk of pressure ulcer rules in this system. (4). Output: The care plan consists of several elements: type of care, type of services, interventions and personalized health education. According to the customized care plans, health care providers can follow operational guidelines to deliver healthcare services.

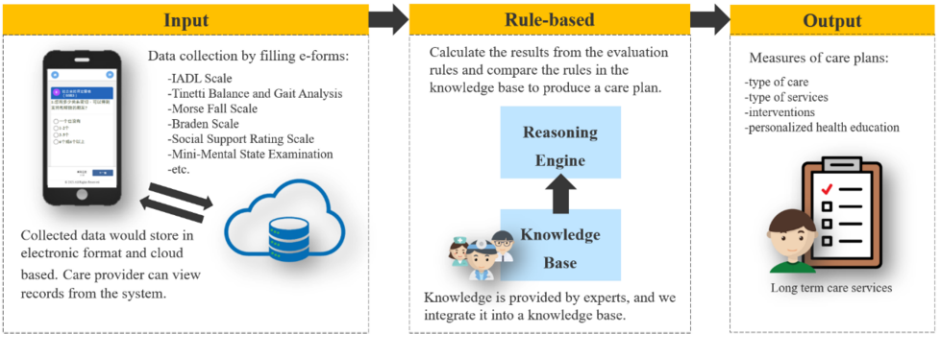

Figure 1. The structure of a care plan produced from a rule-based expert system.

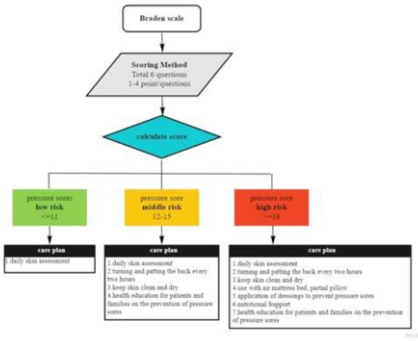

Figure 2. The flowchart of a rule example of the Braden scale, the results were classified into 3 risk levels.

Figure 3. The screen of the assessment scale, care plan and personalized health education in the export System.

Figure 3 shows the screenshot of the assessment tool, care plans and health education. Care providers can use this e-form to do patient assessment (Figure 3a). After the assessment, the system will automatically calculate a level of risk and trigger care plans that matches the patient's needs based on the assessment results. The health care providers can provide different services according to the care plans (Figure 3b). If patients have potential risk for pressure ulcers, the patients or families will receive personalized health education information from the system (Figure 3c).

3. Conclusion

We developed a rule-based export system which can automatically generate customized care plans and health education for the long term care patients. It can help health care providers to save amount of time for analyzing assessment results and customizing care plans. And patients can get adequate and better care.

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