

A FUZZY PROACTIVE SYSTEM TO PREVENT PRESSURE ULCERS ACQUIRED VIA PROLONGED AILING PATIENTS

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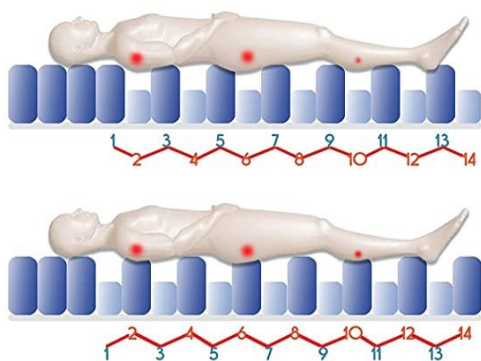
Abstracts:

Pressure ulcers acquired in the sick patients have emerged as one of the major problems that affect approximately one of twenty patients who are admitted for sudden illnesses. These ulcers often take place when patients cannot move themselves to change their position in a bed. Traditionally, the development of HAPUs, or Hospital Acquired Pressure Ulcers, is minimized through their turning every 2 hours to alternate to lateral and supine positions, and by pressure redistributing mattresses. Difficulty in continuous monitoring of patient position, lack of turn reminders/alerts and suboptimal caregiver staffing ratio increases the occurrence of Pressure Ulcer. A new approach towards the prevention need related to pressure ulcers is proposed especially for bedridden patients at home. The method includes a wearable device which continuously monitors the patient's position and communicates with caregiver when a patient turn is in due.

Keywords: Pressure Ulcer, Ailing, HAPUs, Turning protocol.

I.INTRODUCTION

Pressure ulcers are also known as bedsores. These are injuries on the skin and underlying tissue that result from prolonged pressure on the skin. The most common sites for bedsores to occur are areas of the body covered with bony prominences, such as the heels, ankles, hips and tailbone. Pressure ulcers causes destruction to the particular area of the skin due to continued pressure on the area for quite a period. Such pressure could ultimately weaken blood flow in the affected area, which may lead to tissue damage and tissue death.



II.PROBLEM STATEMENT

In HAPU prevention system, the patient's position is changed every 2 hours to alternating lateral and supine positions by statement provided by the caregiver and manual record is being noted. In HAPU prevention system, the patient's position is changed every 2 hours to alternating lateral and supine positions by statement provided by the caregiver and manual record is being noted. Such a patient repositioning schedule is not always maintained owing to low caregiver compliance to turning protocols in many healthcare facilities. Sensors are also fixed in the patient's body in the hospital to sense the parameters that cause bed sore, which might affect the human body.

III. PROPOSED METHOD

The new method for dealing with the urge for better Pressureulcer preventive methods using accurate sensors of lower cost is presented in this paper. This method's scope is that it helps the caregiver implement an effective procedure for preventing pressure ulcers through the automatic r

epositioning of the mattress according to the value of Braden. Repositioning details are embedded in the LCD display so that manual noting is not required. Different subsystems of the proposed method and the functionality of each of these subsystems are discussed in the sections below.

Block Diagram

The Fig.1 shows the pressure ulcer prevention system done by the help of PIC Controller the major component in this diagram, Pressure Sensor, Moisture sensor, Tactile sensing array, Temperature sensor, LCD display, Pump drivers, Regulated power supply.

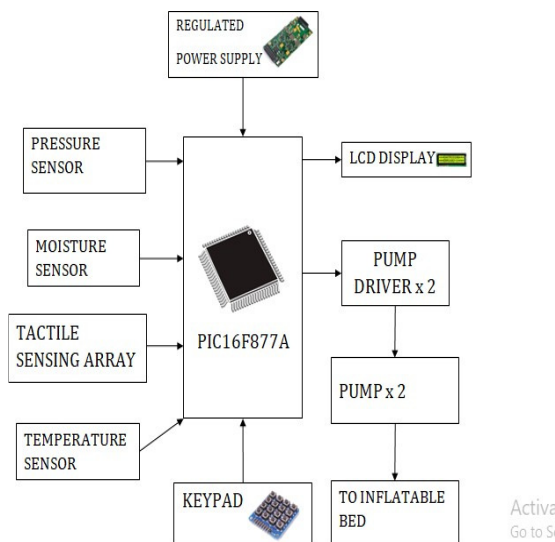


Fig.1. Block Diagram

B. PIC16F877A

PIC microcontroller PIC16f877A is one of the famous microcontrollers in the market. It is very handy to use; the coding or programming of this controller is also easy. One of the main advantages is that it can be written and erased as many times possible because it uses FLASH memory technology. It has the total pin count is 40, and the input/output pins are 33. Many PIC microcontroller projects are performing using PIC16F877A.

PIC16F877A also have much application in digital electronic circuits.

C. Temperature Sensor

A temperature sensor is an electronic device that detects and measures hotness and coolness and transpires into an electrical signal. A temperature sensor functions by providing readings through electrical signals. Sensors are made of two metals, which would produce an electrical voltage or resistance whenever a change in temperature occurs by measuring the voltage across the diode terminals. When the voltage increases, the temperature also increases. A temperature sensor is an integral part of any process heating application due to the provision of feedback about the process temperature, which can be used to monitor or control the process.

D. Pressure Sensor

A pressure sensor typically functions as a transducer; that is, it provides a signal proportionate to the pressure imposed on it. For this article, such a signal is electrical. Pressure sensors are applied in control and monitoring thousands of daily applications. Pressure sensors can in addition be utilized indirectly to measure other parameters such as fluid/gas flow, speed, water level and altitude. Pressure sensors can alternatively be referred to as pressure transducers, pressure transmitters, pressure senders, pressure indicators, piezometers and manometers.

IV. WORKING

At Stage 1 sores are not open wounds. The skin may ache to touch but is not a break or tear in the skin. The skin looks red and does not blanch (become pale for a short time when you press your finger on it and remove it). On a dark-skinned individual, it may look like a different colour, but it isn't red. Skin temperature is generally warmer. And the stage 1 sore

can be both harder and softer than the tissue around it. At stage 2, the skin breaks open, wears away, or forms an ulcer, which is often tender and painful. The sore extends to other layers of the skin. It may resemble an abrasion, blister, or a depression in the skin. It may sometimes appear like a blister full of clear fluid. At this stage, some skin may be damaged irreparably or may even die. In stage 3, it worsens and extends into tissue under the skin in the form of a shallow crater. Fat may be visible inside the sore, but no muscle, tendon, or bone are in view. That is, at stage 4, the pressure injury is deep into the muscle and bone, with severe tissue damage. Deeper tissues, including tendons, and even joints become damaged. It is one of the most widely used risk assessment scales for pressure sores—the Braden scale. The scale is comprised of 6 items (subscales):

- Temperature
- Pressure
- Moisture
- Mobility/Activity
- Sensitivity
- Nutrition

FUZZY SYSTEM:

Improved Fuzzy System to Prevent Pressure Ulcers Obtained for Prolonged Ailing patients also known as bedsores, is a common problem in prolonged bedridden patients.

They are brought about by prolonged pressure on the skin, which may cause tissues lying beneath to be damaged. Wounds can be painful and lead to serious complications if left untreated. In the past, fuzzy logic systems were applied in the prevention of pressure ulcers but they could better be improved to be more accurate and specific.

Input Variables: The system should take

into account a number of factors that are likely to cause pressure ulcers. These could be such as but not limited to, the age, weight, mobility level, nutrition status and the medical history of the patient. Inputs should represent linguistic variables and be described using membership functions.

Rule Base: The rule base should be developed by expert knowledge and literature review. Rules should preferably be in IF-THEN

format defining the relation between input variables and the output (prevention or non-prevention of pressure ulcers). This crisp value indicates the degree of pressure ulcer prevention at the final output. This value will be applied to make decisions on whether or not the preventive measures, such as turning a patient or applying devices to relieve pressure, should be administered.

BRADEN VALUE	LOW RISK	HIGH RISK
TEMPERATURE	4	1
PRESSURE	4	1
MOISTURE	4	1
MOBILITY	1	4
ACTIVITY	1	4
SENSITIVITY	1	4
NUTRITION	4	1

- 1- Very high risk
- 2- High risk
- 3- Moderate risk
- 4- Low risk

V. RESULTS AND DISCUSSION

It is very difficult to completely prevent pressure ulcers; however, you or your caregivers can take a few measures to

reduce the risk.

Some of them include:

- Reposition yourself regularly - should you not be able to move, it will be up to a relative or carrier to
- Looking for signs and symptoms of pressure ulcers in your own skin daily. Your care team will do this for you if you are in a hospital or care home.
- A healthy, well-balanced diet high in protein with a good range of vitamins and minerals- if you are concerned about your diet or are caring for someone whose diet may not be adequate, ask your GP or healthcare team to refer you to a dietitian.

Quit smoking:

Smoking increases the risk for pressure ulcers due to the tissue damage from smoking that impairs blood circulation.

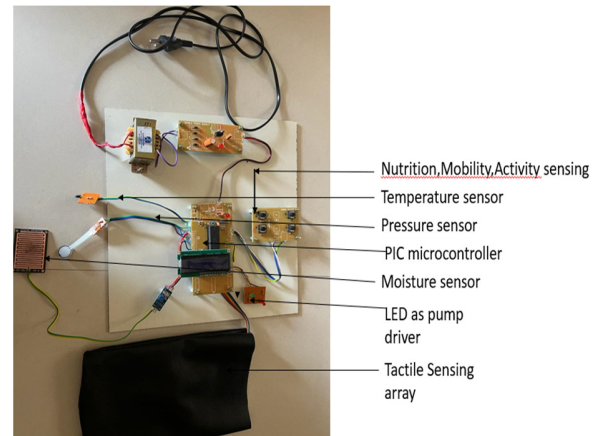


Fig.3.Hardware

VI.CONCLUSION

Pressure ulcers are largely preventable in nature and their management also depends on severity. The available literature on severity of pressure ulcers, classification and medical care protocols have been described in this paper. Nutrition plays a very vital role in any process of wound healing so, in pressure ulcers, compounding the effect of older age, diabetes and many other medical conditions hampering adequate take of nutrition. Protein energy malnutrition is directly related to the occurrence as well as healing of the pressure ulcer. Besides biochemical data nutritional assessment ought to be done by other changes, like weight changes, fluid intake, wound healing or progression. Pressure ulcer prevention and treatment guidelines ought to include nutritional guidelines which have nutritional recommendation too such as National Pressure Ulcer Advisory Panel/EPUAP guidelines. Most often, but not always, pressure ulcers are preventable. This might be considered an ulcer occurrence that signals the presence of a chronic comorbid disease and must point out a search for underlying risk factors in patients for whom such ulcer treatment seems acceptable.

SIMULATION OUTPUT

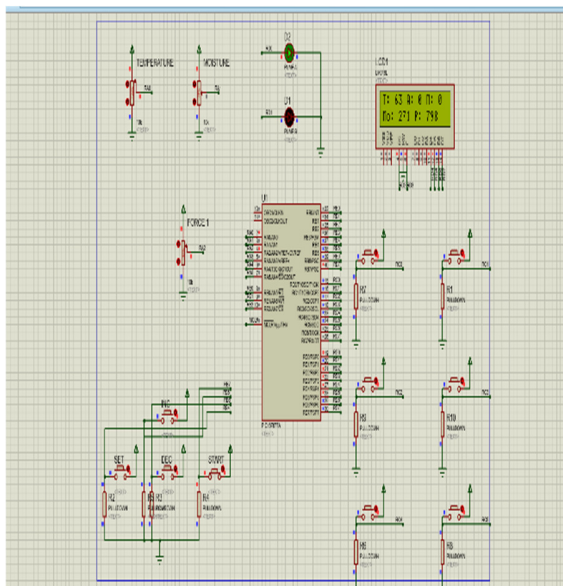


Fig.2.Simulation

HARDWARE

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