Briefing Paper

Monitoring for the Elderly Living Independently

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Home of the Future

Safety and security are ever more at the forefront of people's minds as shown by many studies into the additional support techniques needed for the elderly who wish to be independent and continue living at home for longer. This is not so much about protection against burglary, but rather protecting the person himself, reflecting the fact that, when the elderly live at home alone, a major concern is that they will not be able to contact anyone were they to get ill, fall or for whatever reason suddenly to need help. Rapid and even automatically triggered communication with care providers, volunteers, family, and the like is essential. In this article we will look at what is currently available to set this up, always bearing in mind that the choice of a given solution should be tailored to suit the mental and physical condition, the needs and requirements of the individual in question.

Figure 1:
An elderly person living independently first and foremost thinks of his own safety.
(Illustration source: Ascom)

Modifications to the standard techniques

The most common way for people to contact the outside world is still the telephone and where the risk of acute danger is low (illness, falling, etc) this is still the most commonly used method to get in touch with care providers and family. However, for those who find dialling or remembering numbers difficult, telephones with pre-programmed photo-buttons can offer a solution as can the provision of larger telephone buttons that reduce the risk of dialling the wrong number.

Figure 2:
Telephone with large pre-programmed picture buttons. (Illustration source: Fysic)

Ordinary mobile phones can also be replaced by an easy-to-use models with larger pre-programmed buttons and some telephones are also fitted with additional features such as a built-in GPS receiver and an emergency button. When that is pressed, the mobile phone of, say, a family member, instantly shows where the caller is, which in itself further increases the feeling of personal safety for the elderly who go out regularly.

Figure 3:
A simple mobile phone with fewer but larger keys. (Illustration source: ITT)

The standard PAS

A Personal Alarm System (PAS) is often installed in an elderly person's home to improve their feeling of safety. As an example we will discuss the Carephone 52 system from Bosch Security Systems. In its simplest form, such a PAS consists of a unit powered by a mains adapter backed up by a battery for when there is a power cut. The unit is also connected to a standard analogue telephone line.

The PAS unit is usually fitted with a large red button on to be pressed to raise the alarm. This activates a two-way voice link with a help point for example, a care centre, a nursing station, a dispatching service or a neighbour or family member. The unit has an automatic volume control so that the resident and the responder can hear each other clearly and this two-way voice link is naturally hands free. Depending on the service chosen, the responder can not only investigate the problem by asking questions, but can also consult the person's file. This generally contains a certain amount of medical information (diabetes patient, heart patient, etc) and also the contact details of professional care providers (GP, nursing, physiotherapist, etc) and volunteers (neighbour, family). The first point of contact of this alarm call can respond and, depending on the situation and if necessary send a professional care provider to the home. The resident thus always knows that the right help is never far away.

Figure 4:
A PAS unit in the home gives a feeling of security. Help can be reached whenever it is needed. (Illustration source: Bosch Security Systems)

Other buttons on the PAS unit

The Carephone 52 unit also has a number of other features besides the red alarm button. When that is pressed, the unit goes to a pre-alarm state for a given period of time that is variable. During this period, the emergency call can be cancelled by pressing the grey S button. This S button can also be programmed as a service button and by pressing it for more than 2 seconds it connects to a meals service, for example, where the resident can then report that he/she will not be at home for lunch, so cancelling any pre-ordered meal delivery.

Figure 5:
The Bosch Carephone 52 PAS unit. (Illustration source: Bosch Security Systems)

The yellow button is used by the resident to reset the activity monitor. When it is not pressed on time, for example once a day, or within a certain period, say daily between 5 pm and 7 pm, an automatic emergency call is sent to the care centre. Such a break in routine could mean that the resident is ill, might be incapacitated, suffered a fall and be unconscious and be unable to sound the alarm for whatever reason. Finally, with the green button, the resident can let the system know whether he is in or out of the house, in which case the activity monitor is cancelled so that no emergency call is sent while the resident is out.

The PAS unit has a speech module in the resident's own language. An appropriate spoken confirmation is always given after a button has been pressed. The standard package also comes with a transponder, which is a wireless alarm button that can be worn by the resident as a wrist band, as a medallion around the neck or attached to clothing. The alarm button is thus always close to hand so that people, who are bedridden, less mobile (wheelchair bound) or have fallen, can always send an emergency call.

In a number of PAS brands, the transponders have a red alarm button. Depending on the country where the unit is sold, the Bosch transponder is also available with a less conspicuous grey button.

Figure 6:
Left, the transponder as a wrist band, and right, the transponder attached to clothing.
(Illustration source: Bosch Security Systems)

Figure 7:
The transponder is waterproof so that it can also be used in the bath or shower.
(Illustration source: Bosch Security Systems)

Expanding the PAS

A PAS can incorporate other features by including a number of wireless sensors. For example, passive infrared detectors for automatically monitoring activity or welfare, smoke detectors, CO detectors, window and door contacts, a fall detector that is worn around the neck, and a relatively inconspicuous wristwatch fitted with an alarm button.

To communicate with the wireless components, the Carephone uses the social alarm frequency (869.225 MHz) within the security band. This band cannot be used by other wireless units thus ensuring good communication.

The unit also has a voltage-free input and output, which enables first alarms to be generated by an integrated home system connected to it or second integrated home systems to take certain actions when there is an alarm. An example of this second feature would be the switching off of television and radio sets so that the two-way voice link is not disturbed by these units. Finally, an external microphone and loudspeaker can

also be connected.

New ways of operating a PAS

Ascom has gone a step further with its new Service Unit, which is primarily a PAS unit with a touch screen offering the user other services.

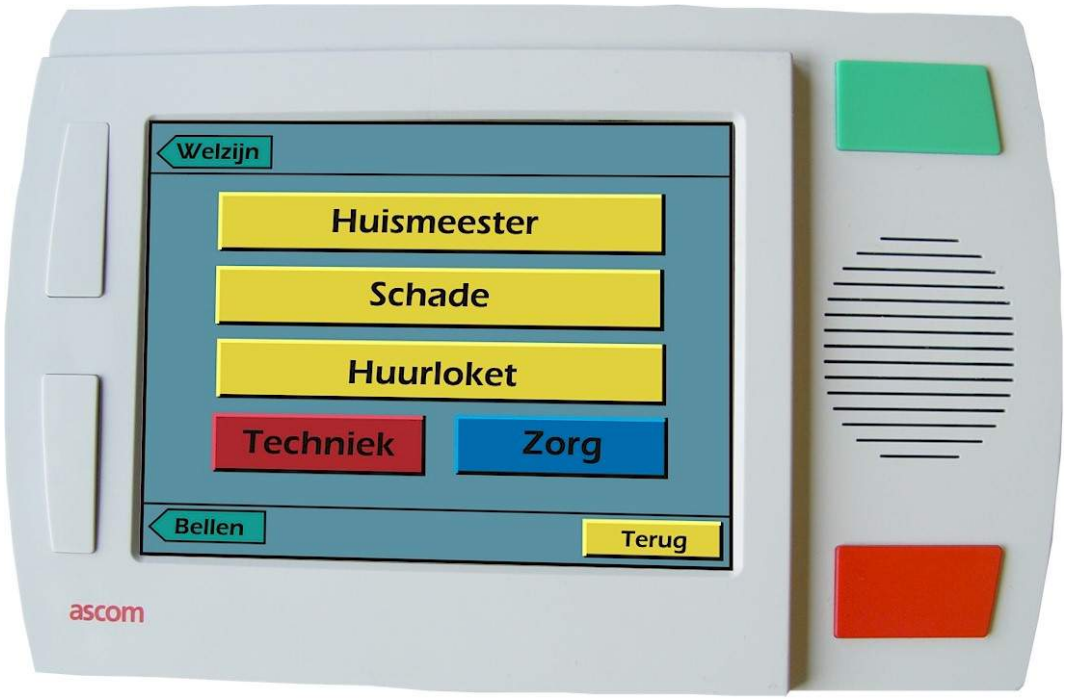

Figure 8:
The Service Unit with touch screen. (Illustration source: Ascom)

Aside from the PAS functions mentioned above, the user is given greater control over and access to contacts and services. For example, he can telephone pre-programmed numbers of his family and also reach the technical manager of the building or call the nursing station, among others. A connection to the meals service can deliver a menu for the choice of the day's lunch. Calling the taxi service brings the outside world a little closer and, ordering via the shopping service, means that heavy items such as water and milk bottles (as well as the rest of the "shop" if requested) will be delivered direct to the home.

The Service Unit is connected to a Base Unit fitted to the distribution board via a LAN connection. Up to 32 wireless sensors can be connected to the Service Unit.
16 wired inputs and 16 contact outputs can be used via the Base Unit (for integrated home system applications). It also has a LAN connection, an RS232 and RS485 connection, an alarm output and a connection for analogue telephony. If desired, a mobile phone module can also be fitted.

Several other brands also use touch screens. We should mention here that touch screens are not a universally appropriate interface. First of all, for many older users it is a new medium and, as with anything new, lack of familiarity can make them anxious and consequently result in their not using this feature. Also, for people whose hands are not as steady as they used to be, a touch screen is not that easy to use.

Video systems

The level of monitoring can be substantially increased through the use of cameras. In addition to the two-way voice link, there is also a visual link between the resident and the person they are calling. The benefits of these systems enhance social contacts (a grandmother can talk to her grandchildren and also see them playing) and counter loneliness and can be used for social alarms, advice, remote care and telemedicine.

Figure 9:
This lady has visual and audio contact with the care centre. (Illustration source: TeleZorgSupport B.V.)

Certain brands of video monitoring also use videophones. The television, installed in the home, is increasingly being used as an interim medium.

We can give a brief example of the possibilities provided by TeleZorgSupport.

A small black box is placed next to the television by the installer. The TV is connected to the black box by a scart cable and the set also has a broadband internet connection. A Pan, Tilt, Zoom camera is connected close to the TV with a microphone being integrated into the box. Using a small remote control, the user can not only operate the basic functions of the television, but can also make a call. This gets through and immediately connects to a nursing station for example, where the operator not only sees the camera picture, but also has access to a lot of useful information about the caller.

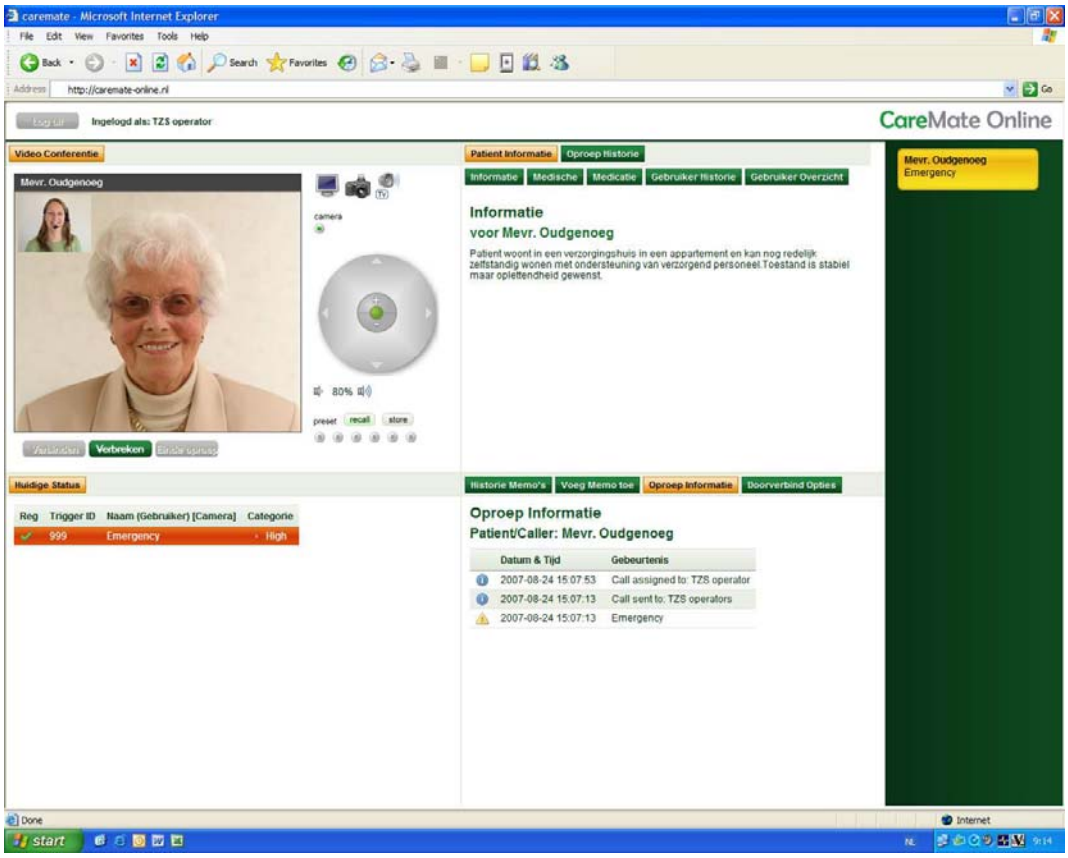

Figure 10:
The operator (top left in the picture) can control all functions of the camera (pan, tilt, zoom) from her screen. (Illustration source: TeleZorgSupport B.V.)

Clearly a picture gives a lot more information than a simple two-way voice link. Where it can be difficult to hear any signs of neglect in a resident, any signs of distress can be immediately picked up visually. Further, should someone have a question about a certain medicine, the camera can zoom in to have a closer look at the medicine box and give advice.

Monitoring for telemedicine applications

Using the above video systems, it is also possible to check an injury a person has suffered and to decide whether or not a nurse must visit. A step further can be taken for specific chronic illnesses. Data from various medical equipment such as wireless scales, a small ECG unit, a blood pressure meter and even the blood-glucose levels can be sent through the same channels to the nursing station or directly to the doctor.

Figure 11:
Wireless medical sensors send their information to the doctor. (Illustration source: TeleZorgSupport B.V.)

The measured values can be saved on the computer at the medical centre or nursing station and a log of the values can always be called up. When there is an abnormal value, the nursing station or doctor can call the patient over the video system, or visit them for a consultation. Patients who would otherwise have to live in an old peoples' home, because they require daily or more frequent monitoring, can continue living independently at home thanks to this technology. It not only substantially reduces the costs for the patient (expensive hospital admission) but also the costs to the community (healthcare). The patient generally also feels better in their own environment than in a care home. Important social contacts with family, friends or neighbours can be easily continued with the video monitoring, thereby minimising the risk of loneliness.

Medically, socially and personally these technological advances permit us to live safely longer and more comfortably at home than has been possible hitherto.

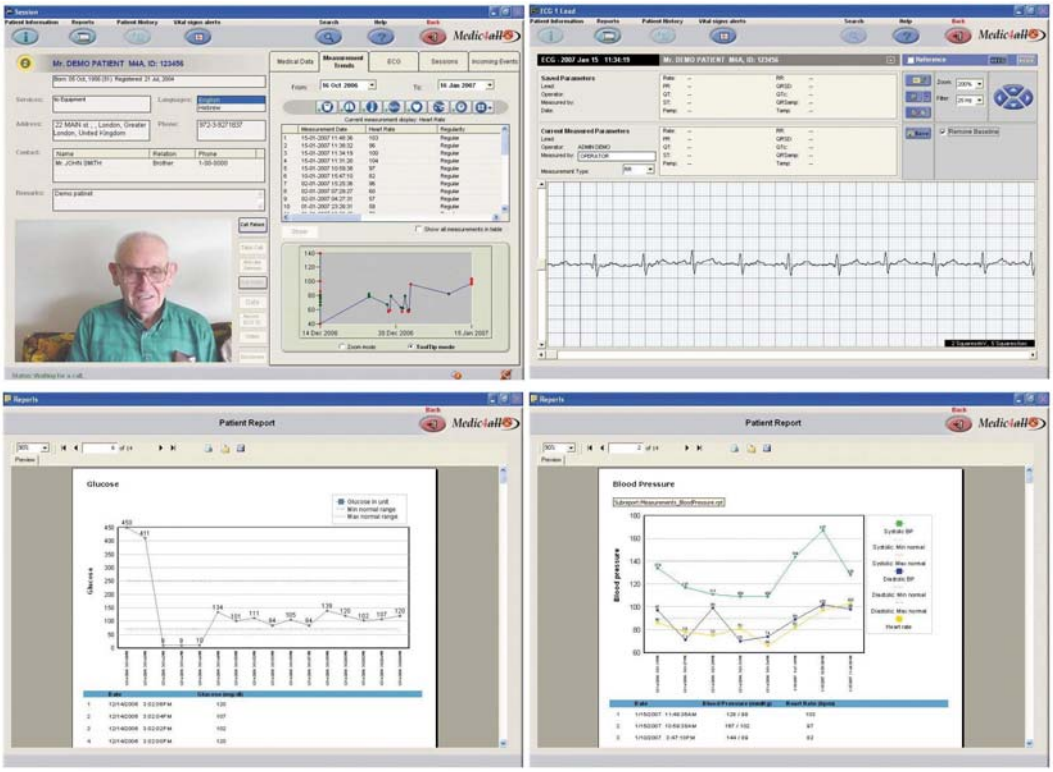

Figure 12:
The state of health of the patient living at home can be closely monitored through the various screens. At the top left are the patient details, top right the profile of an ECG sent in, bottom left the glucose level is set out in a log and bottom right the same for the blood pressure. (Illustration source: TeleZorgSupport B.V.)

Links
Ascom: www.ascom.com
Bosch Security Systems: www.boschsecurity.com
Fysic: www.fysic.nl
ITT: www.itt.com
TeleZorgSupport B.V.: www.telezorgsupport.nl