A novel approach to integrated care using mobile technology within home services. The ADMR pilot study

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Highlights

- Social workers can participate in the health system by using a system that gives well-being alerts but not any medical information.
- Serious medical alerts were raised by social workers.
- Social alerts were also raised.

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Abstract

Background: The care model for supporting elderly people living independently at home relies on the informal and formal assistance of caregivers. Information and communication technology (ICT) offers new approaches for informal care services for this group.

Methods: A longitudinal observational pilot study was carried out in home services in France. Employees of the ADMR home services followed 130 elderly people living at home and who were no more than moderately impaired. A single visual analogue scale (VAS) was used on a smartphone to assess global health every time a person was visited. An alert system was devised to inform the elderly person and/or a responsible person of any deterioration in health status. All medical and social events were recorded throughout the 9-month study.

Results: 138 people were enrolled and 106 were evaluated. 37 alerts were observed. 21 were confirmed and 16 were false positives. Only employees untrained in the use of the system generated false positive alerts. Six severe medical alerts were observed, including one cancer undetected by the physician, one hospitalization for diabetes, one hospitalization which led to death 6 months later and one hospitalization which resulted in follow-up care.

Conclusions: Social workers can participate in the health system with all the ethical criteria of medicine. To our knowledge, this is the first ICT-based alert system that has been found to produce severe medical alerts by employees of home services.

Keywords: Social workers, mobile technology, home services, care model, elderly

Abbreviations

ADMR: Aide à domicile en milieu rural
CARSAT: Caisse d'Assurance Retraite et Santé au travail

GDPR : General Data Protection Regulation
ICT: Information Communication Technology
VAS: Visual analogue scale

Introduction

The demographic changes and the rapid increase of the old age population represent major challenges in the economy, the society and medical care. A major goal for old age care is to enable older persons to live in their homes under good circumstances (1). The care model for supporting the old age people in living independently at home relies on the informal and formal assistance of caregivers and social workers. There is a growing global recognition of the role of informal carers of older people (2). However, the role of social workers is less well approached. Information and Communication Technology (ICT) offers new approaches for informal care services in old age people (3). Informal carers and social workers of non-medical home services are gaining importance and may be able to participate in care pathways by detecting health deterioration and sounding an alert.

The ADMR (*Aide à domicile en milieu rural*, https://www.admr.org) is France's leading personal care non-profit network. Dedicated ADMR volunteers (over 100,000 people) and staff (93,700 workers) work together to deliver high-quality local services and enable families and vulnerable people, particularly seniors, to live well in their own home, meeting their wants and needs whilst maintaining their independence.

As a proof-of-concept, a longitudinal observational pilot study was carried out in the ADMR section of one of the French states (Gard). Employees of the ADMR home services followed 130 old age people living at home and who were no more than moderately impaired. A single visual analogue scale (VAS) was used on a smartphone of the home service employee to assess the global health status of the seniors every time they were visited. An alert system was devised to inform the old age person and/or a responsible person of any deterioration in health status. All medical and social events were recorded throughout the study. The study was funded by the CARSAT (*Caisse d'Assurance Retraite et Santé au Travail*, Regional retirement and occupational health insurance agency), a member of the French national Social Security organization (4).

Materials and methods

Setting: ADMR of the Gard state.

The ADMR is a national non-profit network that has been active throughout France for over seventy years. The organization helps families and vulnerable people to live well in their own home, throughout their life, by providing bespoke, reliable and professional day-to-day home services. They include housekeeping, shopping, meal preparation or delivery, nursing care, remote assistance, minor DIY/gardening and even childcare, nurseries and micro-nurseries. There are 2,700 organizations with 100,000 volunteers and 93,720 employees working nationwide to meet the daily needs of 716,000 clients. Within the Gard state (France), 18 local organizations with 106 volunteers and 611 employees serve 4,737 clients.

Dedicated ADMR volunteers and staff work together to deliver high-quality local services and enable families and vulnerable people, particularly seniors, to live well in their own home, meeting their wants and needs whilst maintaining their independence. Volunteers contribute to developing the services and running the organization. Administrative staff manage the launch of the care plans and visit schedules. The staff includes home helpers and carers (501 in Gard), social services technicians and personal assistants. Each service has its own team with specific qualifications combining people skills and professional expertise. In serving their clients, ADMR organizations create jobs in the areas where they operate. More broadly, the ADMR is seen by its clients and public leaders as essential to the community and local development.

Old age persons: Retired people of over 65 years of age and served by Gard-ADMR were classified by the French National multidimensional scale, known as the AGGIR autonomy evaluation scale, for "Autonomie, Gérontologie, Groupes IsoRessources" (5). This scale classifies people's autonomy from 1 (worst impairment) to 6 (normal). The participants included in the study were GIR 5 to 6.

Home services employees: 65 ADMR employees participating in the study used a smartphone for their work. Most were cleaning the household. All participants volunteered to be included in the study without any financial incentive. After finishing their work, they always noted their time spent with them.

The 1 hour training consisted of showing how the VAS should be used (10 min) and of discussing the study. In particular, the full study was presented to the employees to allow them to be able to answer any questions that might be asked by the old age subjects.

We highlighted several points:

• The difference between their feelings regarding the state of health of the senior and a medical diagnosis;

• Who to contact should they find themselves in a situation they considered problematic.

• Their role after triggering an alert;

• A reminder of the ethical rules such as the obligation to respect privacy, the privacy of the person and discretion. It was also pointed out that the employee should not attempt to make a medical diagnosis or replace the health care professional.

• Unless in an absolute emergency, the employee should not him/herself contact the doctor or nurse

The use of the VAS scale was systematically explained to the substitute employees.

Each session ended with an open discussion between supervisors and employees. The conclusions were used to improve the following training sessions.

Alert system: At the end of each working session, employees quoted the time spent and a single VAS (0 to 100 arbitrary units) with "evaluation of health state" and two smilies automatically appeared on the Smartphone (Figure 1). The reproducibility of the VAS was extensively tested in rhinitis (6-11). The employees used their finger on the VAS to report on the health status. Visits took place regularly but varied from daily to weekly.

An alert system was devised and used for all people. It complies with the EU General Data Protection Regulation (GDPR) for privacy. The European data protection law applies to personal data, i.e. "any information relating to an identified or identifiable natural person (Art. 4 para. 1 no. 1 GDPR) (12). As of May 2018, the GDPR applies: Directive 2002/58/EC (13) as amended by Directive 2009/136/EC (14). The information retrieved as well as the VAS levels were all included in a single database in an authorized system hosting personal data with automated anonymization.

After a baseline of one day, a drop of two consecutive days in VAS of ≥20% automatically initiated an alert. Moreover, an alert was systematically sent when VAS was 0/100, whatever the previous levels. The threshold of 20/100 was derived from our experience in over 15,000 users with rhinitis (MASK-air® Good Practice of DG Santé (15, 16)). If an alert occurred, a mail was sent within 24 hours to ADMR Gard notifying it through the private ADMR network. This mail was then sent to the local association that informs (i) the employee who noted the VAS to ensure that it was not a false alert and (ii) the person who was involved in the alert or a nominated referent person (reference person according to the French law 2015-1776: *Adaptation de la Société au Vieillissement*, December 28, 2015 or designed person).

The alert system was discussed in depth in order to avoid any medical information or intervention (diagnosis or management) carried out by the ADMR employee. Only the global health status assessed by VAS was used.

Each ADMR employee received one hour of training before starting the study. However, when the employee was replaced (holidays or other reasons), the new employee used the system without training.

Ethics: An ethical committee was not required since this was an observational study without any direct medical intervention. However, all persons participating in the study signed a written informed consent with the designation of the reference person.

Size of the study: As this was an exploratory pilot study, we could not determine the number of subjects to be tested. We estimated that we needed to enroll 150 subjects in order to evaluate 100 assuming that if 10% of old age people typically experience a severe situation in the study time period at population level, 100 subjects might be needed to observe multiple severe situations.

Analysis of the study

After each alert, medical and/or social events were carefully analyzed in a structured manner and an anonymized questionnaire was sent to the beneficiary or the reference person.

Descriptive analyses used parametric tests. Due to the low number of severe medical alerts, a statistical evaluation was not carried out.

Results

Demographic characteristics

130 people were screened ranging in age from 69 to 97 years of age. Eight did not accept the study and 106 were evaluated (Figure 2). Only 2/122 decided to stop the study. There were 8,402 evaluations.

Alerts

37 alerts were observed. 21 were confirmed and 16 were false positive. Only the untrained employees reported false positive alerts.

Severe medical alerts

Six severe medical alerts were observed (Table 1) including one cancer undetected by the physician, one diabetes which was worsening and which led to hospitalization, one hospitalization which led to death 6 months later and one hospitalization which resulted in follow-up care. Medical alerts occurred

between 3 and 84 visits, but one medical alert occurred on the first day of the study. Three alerts had a VAS score of 0 (50%).

Other alerts

Eight other medical alerts were observed. They included adjustment of treatment (2) and more regular medical visits (6). Moreover, the social plan was adjusted (5). One case led to a closer relationship with the family. Nine social alerts were observed including 5 adjustments of the social plan and 4 closer relationships with the family.

The age of the persons ranged from 67 to 97 years and the mean age was around 80 years. There were more females than males for both severe and other alerts. Baseline VAS was similar in both groups, but the mean value was lower in severe medical alerts due to a person with a zero score. There were fewer visits in the severe medical alert group than in the other one. In the “other alert group” only 4 had a VAS score of zero (23.5%)

Impact on the employees and on the old age people

None of the volunteering employees decided to stop the study. Every 6 months, during a meeting, they all reported their satisfaction in being part of the health system with their restricted capabilities. They were rewarded by the number of alerts reported. Many indicated that when they informed the persons or their referent, their alerts were not taken seriously. On the other hand, ICT alerts were considered.

Discussion

We attempted to determine whether social workers could participate in the health system with all deontological criteria of medicine. To our knowledge, this is the first ICT-based alert system that has shown that employees of home services can provide alerts that are subsequently found of medical interest by health care professionals.

This study surprisingly showed that social workers can detect severe medical alerts that have not been identified by health care professionals. Social workers spend more time than HCPs at the home of the old age people and, more importantly, they have a different viewpoint with regards to these people. Moreover, they regularly visit the people and are able to assess any changes in health status, attitude, mobility, cognitive function or behaviour. Redesigning the delivery of care in old age populations needs to include an integrated in-home programme of care, particularly for the low-income frail old age people (17). This study shows that social workers can participate in this approach. This study also proposes to better support people living at home and serves as a guide towards better ways of supporting ageing populations to live at home (18, 19).

The complementarity between social and health care workers may be used in different settings such as (i) the assessment of more handicapped people living at home or in nursing homes, (ii) patients using hospital care at home or (iii) the transition from hospital to home.

The population studied is not representative of the general population since people benefiting from home services in the study have specific characteristics defined by financial help from the French state or local public institutes. They usually have a low income and may be more prone to remoteness. These characteristics may also explain the high rate of alerts.

The employees who were trained for one hour to explain the study aims did not provide any false alerts. On the other hand, those who replaced the usual employees were not trained and elicited some false alerts.

The potential consequences of false alerts were not considered in this pilot study.

Conclusions

A new vision for ageing at home may be considered since social workers have been shown to be able to identify overall health care status and to send an alert of medical relevance. This study is now deployed to other ADMR federations in France in order to confirm it and to refine the alert system. The benefits of this pilot study are for the old age people, the employees and the medical system.

Contributors

Jean Bousquet conceptualized the paper, drafted the manuscript.

Marc Meissonnier conceptualized the paper

Véronique Michalet was responsible for the administration of the ADMR Gard project and the investigation.

Anne Toupnot was responsible for the administration of the ADMR Gard project and the investigation.

Delphine Paccard reviewed the project as the funding source.

Michel Noguès reviewed the project as the funding source.

Josep M Anto proposed the methodology.

Jean Pierre Riso is the director of ADMR Gard.

Maud Collomb was responsible for the administration of the project by ADMR France and the funding of part of the project.

Thierry d'Abboville was responsible for the administration of the project by ADMR France and the funding of part of the project.

Laurent Duranton was responsible of the IT.

All authors reviewed the paper and approved the final version.

Conflict of interest

The authors declare that they have no conflict of interest.

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Ethical approval

This is an observational study for which approval from an ethical committee was not necessary. However, written informed consent was obtained for each participant.

Provenance and peer review

This article has undergone peer review.

Research data (data sharing and collaboration)

There are no linked research data sets for this paper. Data will be made available on request.

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Table 1: Severe medical alerts

	Age	Sex	VAS first visit	VAS alert (% drop)	Number of evaluations Before alert	Medical problem	Social action	Medical action	Outcome
1	97	F	10	0	84	Worsening of health status		Hospitalization	Death (6 months later)
2	83	M	0	-	First visit	Recent vision problems in a diabetic patient	yes	Hospitalization	Nursing home
3	71	M	10	0	42	Worsening of health status	yes	Hospitalization	Follow up care
4	87	F	10	5 (50%)	88	Fall with fracture		Hospitalization	
5	68	F	10	5 (50%)	3	The emergency squad was called twice in the past week without medical follow up		Change in medical care by the physician	
6	77	F	10	4 (60%)	23	Patient treated for breast cancer with chemotherapy		Diagnosis of a pancreatic cancer	

Table 2: Characteristics of severe medical and other alerts

	Severe medical alert	Other alert
N	6	17
Mean age (yr)	79.7 ± 10.0	81.4 ± 8.8
Sex (M/F ratio)	2/6	5/24
Baseline VAS (/10)	7.7 ± 4.1	8.8 ± 2.6
Alert VAS (/10)	3.75 ± 2.5	2.0 ± 2.3
Number of visits before alert	28.8 ± 32.7	44.5 ± 34.8

Figure 1: The alert system

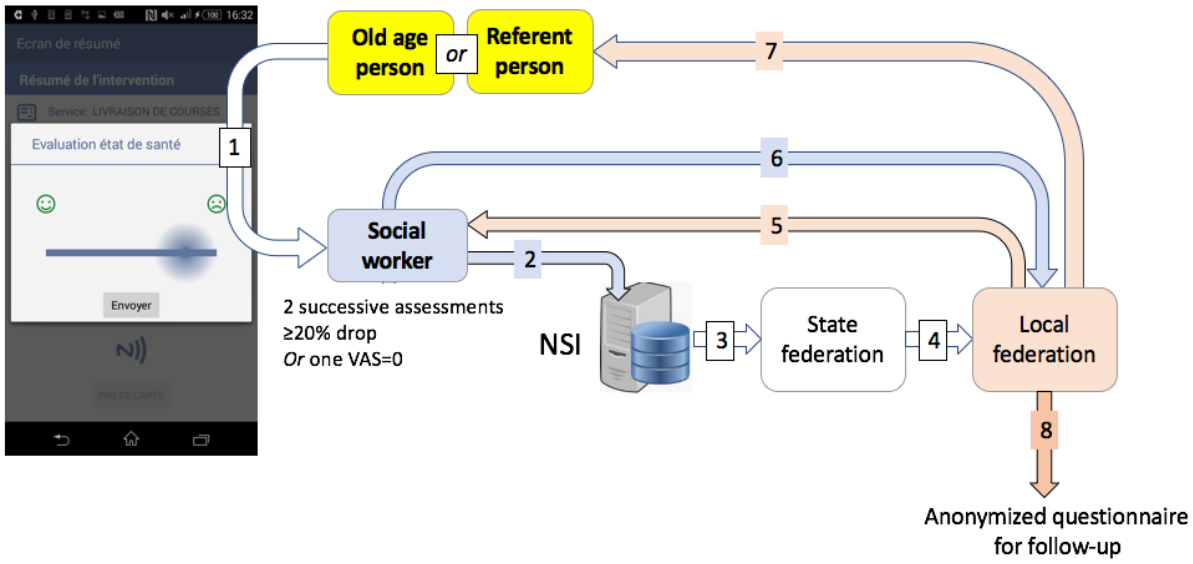

Figure 2: Flow chart