

A Video-based Education and Analysis System for Professional Caregivers of Cognitive Impaired Elderlies

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Background

In the rapid growth of an aging society, The behavioural psychological symptoms of dementia (BPSD) management is one of the key challenges.

Objectives

To evaluate the differences between conventional care and Humanitude® care, and to verify the validity of the analysis by informatics on the professional caregiver's performance to dementia patients.

Method

The French-originated multimodal comprehensive care methodology; Humanitude® was compared to conventional care. Oral care and walking assistance for the same patients were evaluated by different care methodologies. The care provided was video-recorded and analysed by three elements of communication modalities: eye contact, verbal communication, touch, as well as the comprehensiveness of the modalities. Analysis was done manually by researchers of artificial intelligence and automatically using informatics analytical software.

Results

Two caregivers who performed multimodal care methodology and two caregivers who performed conventional care were enrolled in the study. Communication elements: eye contact, verbal communication and touch during the oral care were 0%, 20%, 0% by conventional care and 38%, 35%, 50% by Humanitude® respectively. In walking assistance, eye contact, verbal communication and touch were 0%, 40%, 0% by conventional care and 13%, 22%, 36% by Humanitude® respectively. There was a significant difference in the two groups ($p < 0.05$). The comprehensiveness, to perform more than two modalities of care simultaneously, also showed significant differences. Auto-video analysis by an informatics software had the same output as manual analysis.

Conclusions

There was significant difference in the three care modalities and its comprehensiveness when compared between Humanitude® and conventional care. Auto-video analysis would be effective on standardised training for caregivers and would reduce the training cost.

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INTRODUCTION

Dementia is a progressive, incurable illness. Among patients with advanced dementia, the final year of life is characterised by a trajectory of persistently severe disability¹. Behavioural and psychological symptoms of dementia (BPSD) encompasses a range of symptoms including agitation, aggression, delusions, hallucinations, depression and apathy². BPSD is a key challenge in dementia care for both patients and caregivers³ and the typical difficulty is a refusal of care. This results in a poor quality of care to patients and leads to a poor quality of life.

The multimodal comprehensive care—Humanitude®—is a French-originated methodology for vulnerable elderlies focusing on their perception, emotions, and oral communication^{4,5}. This methodology has 38 years of clinical experience in France and other European countries. In a previous study, the effectiveness of this methodology was compared with conventional care. It showed a significant reduction of BPSD among dementia patients in a long term care facility compared to conventional care, and a reduction of burnout in professional caregivers who performed Humanitude® care^{6,7}. As the next step, the development of an effective education and evaluation system for caregivers with this methodology is needed. The aim of this study was to evaluate the differences between conventional care and Humanitude® care, and to verify the validity of the analysis of care by informatics.

METHODS

Four professional caregivers were enrolled in the study. Two had been trained to perform Humanitude® care and the others were to perform conventional care. Two residents with dementia in a nursing home agreed to participate the study. The consents were obtained from all the caregivers, nursing home residents and their families.

The caregivers performed oral care and walking assistance for the patients. The care was video-recorded by two methods. One was handy video camera by researchers as the third person camera. The other was a built-in camera in the frame of the glasses that the caregivers wore during the care, as the first person camera. The video was analysed from the point of view of the fundamental principles of care communication; three elements of communication modalities: eye contact, verbal communication, touch. The comprehensiveness of these three elements was also analysed. Analysis was done manually by researchers specialising in artificial intelligence and automatically by informatics analytical software.

RESULTS

Two types care records were analysed; one was by the third person camera and the other was by the one person camera. Table 1 shows the comparison between conventional care and Humanitude®, in oral care and walking assistance for dementia patients. The video used for this analysis was recorded by the third person camera. The modality of communication and interaction elements; eye contact, verbal communication and touch during the oral care were 0%, 20%, 0% by conventional care, and 38%, 35%, 50% by Humanitude® care respectively. In walking assistance, the modalities; eye contact, verbal communication and touch were 0%, 40%, 0% by conventional care and 13%, 22%, 36% by Humanitude® respectively. There was a significant difference in two groups ($p < 0.05$).

The definition of comprehensiveness of care is to perform more than two modalities of care simultaneously (eg. eye contact and touch, verbal communication and touch, or all of them). The comparison of comprehensiveness of interaction was done by the third person camera analysis. The result is described in Table 2. In conventional care, the comprehensiveness in oral care and walking assistance was 0%, which meant the caregivers used only one modality of communication during the care. In Humanitude®, 40% of the care had more than two modalities. There was also a significant difference between the two care methodologies.

The video recorded by the first person camera was also analysed and the results are summarised in Table 3. The caregivers performed oral care and walking assistance for the patient. The duration of care was 70,583 frames (2,367 seconds) in conventional care and 53,258 frames (1,786 seconds) in Humanitude®. The eye contact recorded by the first person camera was 3.7% (2,617 frames) for conventional care, while the caregivers using Humanitude®

performed 30.7% (16,007 frames) eye contact. In verbal communication, the talk was 26.2% (18,493 frames) in conventional care and 55.3% (29,452 frames) in Humanitude®.

A comparison of manual analysis and auto-video analysis was carried out. The oral care was recorded by the first person camera. In the auto-video analysis, the frames to recognise eye contact was 0.113% (80 frames) by conventional care and 39.3% (2,0952 frames) by Humanitude®, while manual analysis was 3.7% (2,617 frames) and 30.1% (16,007 frames) respectively (Table 4).

DISCUSSION

People living with dementia are increasing in an aging society. The total number of people with dementia worldwide in 2015 was estimated at 47.5 million⁸. Dementia is progressive and incurable, so to provide adequate care is the key for its management. The multimodal comprehensive care methodology Humanitude® is one of the non-pharmacological care approaches for this challenge. A previous study showed the effectiveness of Humanitude® for the management of BPSD.

In this study, comparisons between conventional care and Humanitude® were conducted. The uniqueness of Humanitude® was its multimodal comprehensiveness, using eye contact, verbal communications, touch and assistance for erectile positions. This study focused on three elements of modalities; eye contact, verbal communication and touch. There was a significant difference in the modalities and its comprehensiveness between conventional care and Humanitude®. The results in Table 1 showed that even if conventional caregivers believed “I am seeing the patient”, there was no eye contact to communicate with the patients. Caregivers touched patients during the care, however, our study suggested it focused more on “duties they had to complete”, and lacked the aspect of communication. The comparisons of comprehensiveness in Table 2 showed no inter-modality comprehensiveness of communication in conventional care. This tendency was also observed in the video taken by the first person camera. These results could be used for the evaluation of care, and further, as education for the caregivers.

Table 1. Time used for each modality of interaction during the care

A: Oral care		p<0.05		
	Eye contact	Talk	Touch	
Conventional care	0%	20%	0%	
Humanitude®	38%	35%	50%	

B: Walking assistance		p<0.05		
	Eye contact	Talk	Touch	
Conventional care	0%	40%	0%	
Humanitude®	13%	22%	36%	

Table 2. Inter-modality comprehensiveness during the care

	Eye contact	Walking assistance
Conventional care	0%	0%
Humanitude®	40%	22%

Because the global need for caregivers has increased, a high quality of training is crucial. An automated analysis system of care was evaluated in this study and it had the same tendency as manual video analysis. This suggested that auto-video analysis could be applied to the teaching of caregivers so that the scale of training would be able to expand. It would lead to standardised training for caregivers and thus, reduce the training cost.

Table 3. First person camera analysis of care

	eye contact (Frames) (% of care)	Walking assistance(Frames) (% of care)
Conventional care 70,583 frames (2,367 seconds)	2,617 (3.7%)	18,493 (26.2%)
Humanitude® 53,258 frames (1,786 seconds)	16,007 (30.1%)	29,452 (55.3%)

Table 4. Comparison of eye contacts during oral care by manual and auto video analysis

	Manual analysis	Auto analysis
Conventional care	3.7%	0.113%
Humanitude®	30.1%	39.3%

Finally, this study was conducted in collaboration with French institutions. The expansion of collaboration with Asian countries would contribute globally to improve the quality of life of elderlies globally.

CONCLUSION

Video analysis showed significant differences in the comprehensive multimodal care methodology Humanitude® and conventional care. Auto-video analysis would be effective in a standardised training of caregivers and would reduce the training cost.

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