

Experimentation with an electrical sliding sheet device in the local Hospital of Crèvecœur-le-Grand

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The number of elderly people over eighty will have increased by 94% by 2040, reaching about seven million people [1], and the dependent elderly will reach 2.3 million by 2060, against 1.1 million in 2010 [2]. Facing this demographic development, their treatment leads to addressing three major challenges: medical, social and financial. The first requires the provision of increased

care needs, based on a level of dependency becoming more marked and polyopathy issues. The second will be linked to developments in the composition of families and to the aspirations of the aging people. The last will have to combine a necessary investment policy with a constrained economic environment. In this context, it is necessary at best to adapt, or just to rethink, the nursing homes for the dependent elderly (Nursing homes) of tomorrow. These are at the heart of the economic and societal challenges inviting the consideration of ways to support them and the development of the role and missions of facilities, with nursing homes appearing as an essential method for their treatment.

A profession at risk

The nursing homes are at the heart of the knowledge of taking care of the elderly. But working conditions within them are not without risk: falling, slipping, chemicals, infections, psychosocial, or related to physical activity and more particularly to handling. To prevent these, technical aids have emerged, such as patient hoists, transfer rails, sit-to-stand lifts, transfer discs or sliding sheets. However, it is still common that handling a resident in bed, a principal role of professionals, causes injuries - the average number of work accidents that result in a judgement in one year is 74.1 per thousand employees in the Nursing homes sector, against a national average for all occupations of 3.5 % [3]. In nursing homes, the main reasons for stoppage of work and incapacity of the personnel causing problems of absenteeism, and therefore management of human resources, are back pain and falls, as well as musculoskeletal disorders (MSDs) [4,5]. Facilities therefore have to take "the necessary measures to ensure safety and protect the physical and mental health of the workers" [6].

Summary

The nursing home of Crèvecœur-le-Grand (Oise) is the first French facility to experiment with an electric sliding sheet system. This handling device contributes to the prevention of occupational hazards and the good treatment of residents. A socio-economic evaluation conducted by the Ireps of Picardy will measure the effectiveness in advance of eventual deployment in the entire hospital park.

Keywords : innovation ; electrical sliding sheet device ; socio-economic evaluation ; good treatment ; ergonomics ; prevention of occupational hazards.

The prevention of occupational hazards is essential, just like the welfare of the inhabitants. It is in this logic of good treatment and responding to demographic development that the local hospital of Crèvecœur-le-Grand is part and demonstrates innovation.

Innovation serving good treatment

The local Jean-Baptist Caron hospital of Crèvecœur-le-Grand has been engaged for several years in a process of innovation and improvement of working conditions in order to ensure providing quality care for its residents and to prevent occupational hazards for its employees. In the light of this, at the end of 2015 it acquired an innovative device: the Danish Vendlet® electrical sliding sheet system; a first in France - on this occasion it received a visit from Laurence Rossignol, then Secretary of State for the Family, children, the elderly and self-sufficiency. On the market since 2012 (New Zealand, Germany and the United Kingdom), this device aims to improve the handling conditions of the caregivers and the comfort of the inhabitants. It provides an automatic rotation system for moving and handling patients confined to bed. It consists of two motorized fixed bars on each side of the bed (blue bar on the left of the patient, red bar on the right) and is equipped with a velcro strap (3.50m long) for attaching and winding the sheet. The caregiver uses it

well as occupational hazards causing work accidents and therefore absenteeism.

Socio-economic evaluation

Eager to extend this device to the entire facility, in January 2016 the management requested the Regional forum for education and health promotion of Picardy (ireps.picardie.fnes.fr) to conduct the evaluation. The economic evaluation consists of "the comparative analysis of various options in terms of their costs and of their consequences" [7]. It therefore aims to shed light on the possible choices. However, it is only meaningful if correlated to the discourse and use of the device by the caregiver staff and the residents. That is why Ireps favoured a socio-economic evaluation. This analysis consists of an economic axis to measure the return on investment of the experimental device (amortization and profitability), and a medico-social axis covering the feedback of the experience of the caregiver staff and the residents, as well as on the conditions of use of the device.

Method

The evaluation took place from January till June 2016 in four phases: preparation, collection, analysis and writing. A literature search enabled better understanding of the context and the social and economic issues of risks associated with the handling. It was supported by a collection of contextual data



with the aid of a remote control which thus avoids the manual handling of the patient. In order to test this device, four beds have been equipped with it, with the aim to use one employee instead of two for handling, to further mitigate the resident position changes, and to prevent the risk of bedsores due to less chafing, as

(hospital organisation, accounting records, user manual ...). It was a question, moreover, of mobilising the relevant collection tools. So the evaluation procedure is based on documents, technical data recorded by a questionnaire, empirical data collected by non-participating direct observations timed *in situ*, and discursive data from semi-structured discussions with the healthcare team and the residents. The latter took place with sixteen health professionals during six days from 7hrs to 21hrs between March and April, punctuated by handing out eight questionnaires and conducting twelve interviews. In order to refine the analysis, three situations of handling at the bedside of the resident were differentiated: 1) toilet performed in the morning on waking; 2) change of coverage during the day; 3) bedtime of the resident after dinner.

Medico-social axis: analysis of the conditions of handling

Strengthening the good treatment of the residents

Regarding the care of the residents, the professionals met declared that the electrical sliding sheet device provides a turning technology that is softer than manual handling. Associated with the use of specific sheets, thicker and smoother than conventional hospital fabrics, controlling the power helps to reduce irritation and chafing on the skin of residents, contributing to the prevention of bedsores. Furthermore, in view of the observations and discursive data, controlling the power does not seem to induce any particular reluctance nor stress for the resident. The professionals also emphasise a reduction in stiffness for some residents during manipulations, thus facilitating their care.

Improvement of the handling conditions

The analysis identifies a positive feedback of experience. According to the caregivers, besides meeting the needs of residents, the device reduces handling difficulties because it involves fewer repetitive gestures and less physical effort. The state of fatigue associated with this task is thereby greatly reduced. So this device contributes to the prevention of occupational hazards linked to handling.

Individual handling *versus* handling in pairs

During the analysis of observations, two variables were considered: the condition of handling (electric or classic) and the number of caregivers used (single or in pairs). In all the situations observed, individual handling is preferred (79.3 % in classical handling and 43 % in electrical

The nursing home of Crèvecœur-le-Grand is the first in France to trial an electrical sliding sheet system.

handling). The analysis reveals a contradiction between the discourse of the professionals and the observation of practices: handling in pairs appears to be proportionally higher in electrical condition (28.6 %) than in classical condition (20.7 %), whereas, according to their statements, 62 % of caregivers interviewed consider that classical handling requires working in pairs. Some of them also declare that they "lose" time in removing the barriers and handling the device in relation to the task to be performed. The device then proves to be restrictive in providing care due to differences in use observed.

Duration of handling

The observations also show that the duration of electrical handling performed by a caregiver is greater than the duration of manual handling, no matter the situation or conditions of handling. This can be explained because of the specific nature of the residents benefiting from the device, their serious illnesses requiring time for taking greater care. However, the professionals who answered the questionnaire believe that the duration of handling with the device is reduced by 57 % and recognize, paradoxically, that it requires more time than manual handling. They explain this time difference by the number of actions to be performed with the device (removal of the protection barriers, lowering the roll, unwinding the roll ...) and they declare that they favour using the device in the case of "heavy" care, such as the toilet (situation 1), and they consider that the device loses time in change situations (situation 2). The medico-social axis highlights an improvement in the handling conditions of caregivers as well as a strengthening of good treatment of the resident. However, the observations reveal two contradictions. On one hand, while electrical handling should need only one caregiver, it is preferably performed in pairs, which can be explained by the feeling of a lack of training expressed by the caregivers and the fear of using the device, which is linked to lack of knowledge. On the other hand, the duration of electrical handling is greater than the duration of manual handling, regardless of the handling situation.

And the device is expected to optimise the duration of handling, making it less than the duration of manual handling. This second contradiction is to be correlated with the short period of experimentation with the device and the low number of beds equipped. Although the caregivers recognize it is a device that is easy to use, it still requires familiarisation time. These contradictions restrict optimum use of the device, thus limiting a reduction of costs linked to handling. The evaluation approach of the economic axis must therefore take into account these two paradoxes.

Economic axis: alternative scenarios

Among the three observed situations of handling, the second (change of protection) presents the greatest difference in cost and doubled time in electrical condition. And it is the most frequent during the day of work of a hospital attendant. These three criteria (cost, time and frequency) confer on it a character of pertinence for developing economic scenarios. Simulations were imagined, including two changes of protection of an inhabitant per day and per hospital attendant, a criterion of duration of five years corresponding to the estimate of return on investment determined for nursing homes, the initial cost of investment of the device of electrical handling, of 4 695 € and the average cost per hour of 20,18-€/per hospital attendant (based on the average of the costs of a hospital attendant and of a hospital service agent).

Economic analysis of the handling situation 2

To change the protection of an inhabitant, a hospital attendant has to count on average with four minutes in manual, versus 9,25 in electrical condition, that is a cost that was respectively estimated at 1,35 € and 3,11 €. The handling with device does not give rise to economic benefit, the differential created by the cost of the initial investment (4695 €) being never recovered. At the end of five years, electrical handling costs 11 123 € more than manual handling. The electrical device does not give rise to direct profitability, in this case. Nevertheless, the main objective of the electrical sliding sheet device being

The electric sliding sheet system aims to improve the handling conditions of caregivers and the comfort of residents.

to allow the handling of a patient by a single hospital attendant, alternative economic scenarios were worked out. **International studies** assessing the same device [8,9] estimate its economic profitability at the end of 42 weeks for a minimum use of the sliding sheet of ten minutes a day and by a single hospital attendant.

Alternative economic scenarios I and II

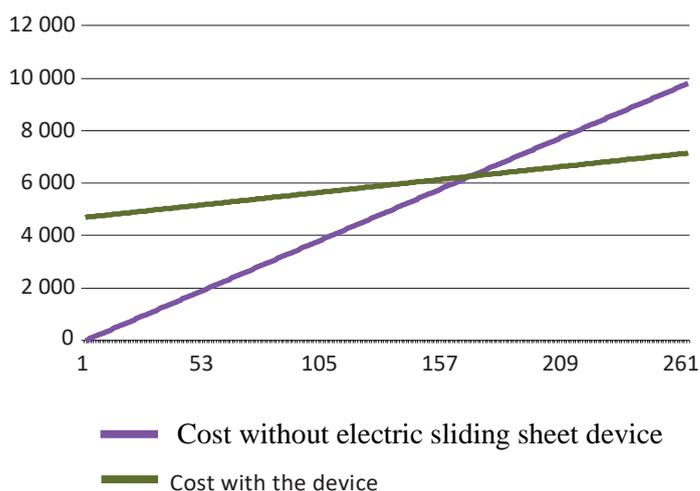
A first scenario is based on the hypothesis of the presence of two hospital attendants in the classical condition of a change of protection, versus the presence of a single hospital attendant with the sliding device. The duration of handling thus changes from four to eight minutes in manual handling condition, when electrical handling remains estimated to be at 9,25 minutes. In this scenario, a differential, although lower, always remains at the end of five years. The use of electrical handling therefore does not give rise to a direct economic advantage either. A second scenario is based on the hypothesis that a hospital attendant using the device puts in as much time as two hospital attendants in classical condition, with equivalent handling duration of eight minutes. The costs of use would be identical as a result, the gap of the cost of handling in five years corresponding to the sole cost of investment at the start (4 695 €). On the basis of the data of observation, a decreased duration with the sliding device can be envisaged with a better workmanship of this device over the course of time. The duration of an electrical handling by a hospital attendant could then, eventually, be less than that of a manual handling by two hospital attendants, allowing a return on investment. For this reason, scenarios III and IV are based on the question of handling duration.

Alternative economic scenarios III and IV

For the third scenario, the following hypothesis is issued: the duration of electrical handling is reduced by half, still when comparing two hospital attendants working in classical condition versus one hospital attendant working in electrical condition. A hospital attendant in the electrical situation would thus accomplish the handling in four minutes, as the single hospital attendant manually. Here, a return on investment is noticed at the end of four years and ten months. The electrical device would then allow to reduce the duration of handling by half under optimum conditions of use. The last scenario is based on the hypothesis of an electrical handling duration reduced to three minutes, knowing that observations show a duration of classical handling being possible in 2,38 minutes. In that case, the return on investment is noticed at the end of three years and eleven months, which is

lower than the expected return on investment - a differential gap of +14,83 € is noted. At the end of less than four years of use, the device would be profitable by allowing a return on investment and an economic benefit (Graph 1). Although the economic evaluation shows a return on hypothetical investment only if the duration of handling achieves to be three minutes for a specific situation, the experience feedback reveals a benefit for working conditions of the hospital attendants as well as an additional comfort for the inhabitants. The socio-economic evaluation therefore calls to correlate the economic data with empirical data.

Graph 1 - Alternative economic scenario IV



Beyond an economic evaluation in the strict sense for dating a return on investment of the installed device, the research step of monographic type is also intended to measure if working conditions of the hospital attendants were improved and if the quality of taking care of the residents was preserved with such an innovation. The electrical sliding sheet system meets the needs of carers for the improvement of working conditions. It facilitates the handling of the residents, where the time of confinement to bed represents 80 % daily because of their fragility and of an average age of 80 plus. This innovation contributes to quality care and good treatment of the resident. The physical efforts related to handling are reduced and allow to assume an increased future use of the device, notably by reinforcing the training. Nonetheless, the practices of handling remain to be optimised. Indeed, observations *in situ* reveal an individual not exclusive use of the device, while the objective of the establishment is to make individual handling easier.

Nursing homes favour a socio-economic assessment.

The same is true for the duration of handling, still greater than classical handling. The innovation, upsetting professional practices, requires a time of adaptation on behalf of teams. Optimisation could be attained as a result with a better understanding of the device: training, regular use. In spite of an investment sometimes feared in the minds of health care teams when we deal with technology, while the hospital attendants would wish for more personnel in view of good treatment of the residents and of themselves, the electrical medical device introduces a socio-economic potential to be exploited. From an economic point of view, the return on investment is to be expected in the long term and second-hand. In fact, the articulation of the medico social axle and of the economic axle of valuation indicates an economic impact within five years, but also an impact on working conditions and by rebound on absenteeism and work stoppages linked to handling. The deployment of this electrical sliding sheet device would therefore be in the service of « deployment of good treatment » [10] of the resident and good managerial treatment. ■

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