

# Senior Alert: A Quality Registry to Support a Standardized, Structured, and Systematic Preventive Care Process for Older Adults

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The average life expectancy and the proportion of the elderly in the Western countries are increasing. The care processes used for the elderly are known to differ between the care providers in Sweden. Accordingly, the need to develop a system to support the processes in order to attain a standardized, structured, and systematic approach to improve preventive care processes for the elderly has been called for. The County Council of Jönköping developed a national Web-based quality registry, Senior Alert, with a focus on the following areas: falls, pressure ulcers, malnutrition, and oral health. The patients are evaluated using validated risk assessment instruments, and the care is planned, executed, evaluated. The registry supports the users to work with preventive care systematically and in a standardized way and provides feedback to the care providers on their preventive care processes. The registry helps the caregivers fulfill the preventive care according to the best available clinical knowledge and practice. The registry also provides the government and health care politicians with data for setting aims for elderly care. The registry is used in 90% of the municipalities and county councils throughout the country. The total number of risk assessments completed from 2009 to 2014 exceeded 1 000 000.

**Key words:** health policy, health services for the aged, preventive health services, quality improvement, registries,

## THE ELDERLY POPULATION

In many Western countries, the life expectancy is steadily increasing and the proportion of the elderly in the population is rising. The number of the elderly in the Western world is expected to double by the year 2050.<sup>1</sup> Sweden has a population of about 9.4 million, of which about 1.7 million (18%) are older than 65 years.<sup>2</sup> Sweden also has one of fastest growing rates of the elderly in comparison with the rest of the world, and the proportion of those who are older than 80 years in the population has increased from 3% to more than 5% between 1980 and 2000.<sup>3</sup>

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According to Swedish national government statistics, about 95 000 persons, 65 years and older, live in nursing homes organized through the municipalities. In addition, 206 000 persons receive home care.<sup>4</sup>

Diseases affecting the elderly are often complex, and many factors affecting health need to be addressed in order to provide quality health care. Particular attention has recently been directed toward the concept of “the frail elderly.” Frailty has been considered synonymous with vulnerable older adults, comorbidity, or disability.<sup>5</sup> However, it is commonly seen as a condition or a syndrome that results in a multisystem reduction in reserve capacity to the extent that a number of physiological systems are close to or past the threshold of symptomatic clinical failure.<sup>6</sup> The frail elderly are vulnerable to underlying conditions such as weakness and malnutrition and need help to minimize the risk of falls and pressure ulcers.<sup>7</sup> Malnutrition, pressure ulcers, and falls are severe conditions that are common among the elderly and are often associated with comorbidity and frailty.<sup>8</sup> Besides the personal suffering experienced by an elderly person who falls or develops malnutrition or a pressure ulcer, the conditions create a large burden on the health care system.

Falls among the elderly are common and of great concern since they can lead to great suffering, both physical and psychological, and socially adverse effects such as decreased quality of life, restrictive activity, and depression.<sup>9,10</sup> There are approximately 18 000 hip fractures per year in Sweden, and each fracture increases the cost of health care in the range of US \$18 000 to \$25 000, for the first year alone.<sup>11</sup>

The malnourished elderly have higher mortality, take more prescription drugs, and have a higher rate of

infections. Costs associated with malnutrition in hospitalized older adults include longer length of stay and increased rate of hospital readmission.<sup>12</sup> The increased costs have been calculated to be 60.5% higher for patients with malnutrition.<sup>13</sup> In some settings, the proportion of the malnourished elderly can be as high as 50%.<sup>14</sup>

Pressure ulcers are a severe condition that can lead to great suffering and diminished quality of life for the elderly.<sup>15</sup> The cost of treating pressure ulcers differs depending on the category of the ulcers. A UK study estimates the range from £1064 (category 1, discoloring of the skin) to £10 551 (category 4, extensive destruction and tissue necrosis). The total cost in the United Kingdom is £1.4 billion to £2.1 billion annually (4% of the total NHS [National Health Service] expenditure).<sup>16</sup>

Better oral hygiene and frequent professional oral care reduce the progression or occurrence of respiratory tract diseases in high-risk elderly people living in nursing homes and intensive care units.<sup>17</sup> Approximately 1 in 10 cases of death from pneumonia in elderly nursing home residents may be prevented by improving oral hygiene.<sup>18</sup>

## THE SWEDISH HEALTHCARE SYSTEM

The Swedish health care and welfare systems are mainly funded through taxation decided by each county council. All citizens have universal access to health care. The health care system is based on national legislation and is organized into 3 levels: national, regional county councils ( $n = 20$ ), and local municipalities ( $n = 290$ ). The county councils plan the development and organization of health care according to the needs of the population they serve. The Jönköping County Council (JCC) provides health care for its 340 000 inhabitants. It has sustained quality improvement programs for more than 20 years and has attracted national and international attention. The JCC was ranked third or higher in the national ranking of the 20 county councils in each consecutive year from 2005 to 2010.<sup>19</sup> It has continued to perform well, and the main hospital, Jönköping Ryhov Hospital, based on publicly reported data, was ranked by the national medical newspaper *The Daily Medicine* as the best middle-sized, nonuniversity hospital in Sweden for the last 3 years (2012–2015).<sup>20</sup>

## SENIOR ALERT, A PREVENTIVE QUALITY REGISTRY FOR THE ELDERLY

The Swedish quality registers contain data concerning diagnoses, treatments/interventions, and outcomes as well as provide possibilities to follow-up the achievements in health care. In 2015, a total of 106 national quality registers received funding from the National Board of Quality Registries.<sup>21</sup> Since the early 1990s, the JCC has undertaken a countywide effort to improve health and health care with measured success. From 2002 to 2005, the JCC performed several collaborative breakthrough series<sup>22</sup> together with health care teams from acute hospital care, primary care, and

nursing homes in the municipalities.<sup>23</sup> The participation in 2 US-led campaigns, “Saving 100,000 Lives” and “Saving 5 Million Lives From Harm,” created a focus in the JCC on patient safety and prevention. The vision of the leadership and the chief medical officer had noted the need to collaborate more closely with the national quality registers and to increase the use of feedback data from registers to provide regular feedback to the clinical staff.<sup>19</sup> Thus, a quality registry with a systematic approach to creating better care, a *local prototype*, was created to support better preventive care. The prototype evaluated the elderly for risks, made suitable interventions, and, thereafter, followed up on it. In 2008, the work with the care preventive process received a national award as the most innovative project in health care.<sup>24</sup> The lessons learned from this local prototype formed the basis for the development of a national registry, Senior Alert, which was launched in April 2008.

The pace at which the new health care service providers connected to the registry was increased when the Ministry of Health and Social Affairs decided in 2010 that the registry should be used in all Swedish health and social care systems. The Ministry also provided funding to the spread and development of the registry.

The aim of this article is to describe how a quality registry can enable better health outcomes for the elderly, as well as increase better system performance, and better professional development.

## THE REGISTRY AND HOW TO USE IT

The criterion for inclusion in Senior Alert is that the elderly person has a care contact. The default age for inclusion in the registry is 65 years; however, the health care provider has the possibility to lower the age limit, enabling more people to be eligible to participate. There are 3 main types of health care service providers that registry patients: nursing homes, hospitals wards, and home care. Nurses are the most common users, and nursing assistants are the second largest group, albeit all health care professionals can potentially use the system.

Senior Alert is Internet-based, which enables participating health care providers to registry data online. The users, that is, health care professionals, have the option of entering data at the time of the patient encounter or to use a paper version for later entry. The registering health care provider has the legal obligation to inform the elderly person that data will be collected in the registry. Currently, the registry is not linked to the electronic health record.

## THE LINK: USING SENIOR ALERT IN THE PREVENTIVE CARE PROCESS

The outline of the 6 steps of the *preventive care process* is described in detail as follows (Figure 1):

1. *Care contact.* A care contact is initiated when a patient is either admitted to a hospital ward, moved to an elderly home, had a visit with his or her



**Figure 1.** An outline of the 6 steps of using Senior Alert in the preventive care process.

primary care provider, or is admitted to home care service.

2. *Risk assessment.* A risk assessment is performed when a care contact has been established. It is mandatory to perform all the risk assessments concurrently. A scientific panel of experts in Sweden has selected the default instruments for the 4 risk assessments. In all 4 areas, alternative validated risk assessments scales are available for the health care providers to use. The use of risk instruments is an iterative process that is repeated at every step in the continuum of care.

It is also performed if the person's health changes, such as a deterioration of health or if a new event occurs (fall, pressure ulcer, and/or weight loss). The instrument indicates when there is some type of risk in any of the areas. The registry is then designed to alert the provider that the person needs a preventive care plan. The instrument for nutrition risk assessment is called the Short Form–Mini Nutritional Assessment; for pressure ulcer risk assessment, the Modified Norton Scale is used; and for falls, the Downton Fall Risk Index is used.<sup>25-27</sup> In 2011, “oral health” was introduced as an optional area for risk assessment. The risk assessment instrument used is the Revised Oral Assessment Guide.<sup>28</sup>

3. *Team-based analysis of risks.* A team-based analysis is performed for persons at risk. The composition of the health care teams is according to the situation at the local context level. The teams consist of professionals from different backgrounds including nurses, nurse assistants, physiotherapists, occupational therapists, physicians, and/or dietician, depending on the local context and the needs of the patients. It is mandatory to registry the patient whether or not the team-based analysis is performed.
4. *Planning and execution of preventive action plans.* The team-based analysis results in a “preventive

action plan.” The health care professional, who has identified 1 or more risks, registers the preventive action plan after the team meeting is held and when the next evaluation is due. The action plan is based on 100 possible interventions: 26 for pressure ulcers, 28 for malnutrition, 23 for falls, and 23 for oral health.

This process of planning and evaluation can be repeated without conducting a new risk assessment. Health care facilities where patients have a short length of stay usually perform step 4 once. In contrast, facilities where patients/persons stay for a longer period, for example, nursing homes and home care facilities, step 4 is often performed iteratively.

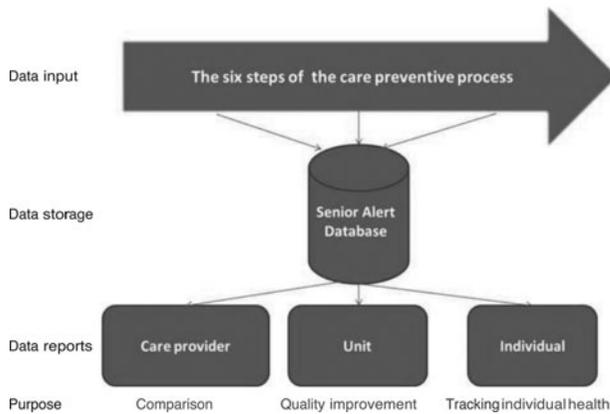
5. *Evaluation.* The registry automatically reminds the user to conduct a planned evaluation, that is, a renewal both of the risk assessments and of the preventive action plan. The team sets the date of evaluation at the first registration. In the evaluation, the registration consists of weight and pressure ulcer assessments. Furthermore, the team evaluates the specific types of preventive interventions that have been assigned and actually been performed.
6. *Leaving the caregiver.* The registration process does not necessarily end when the person leaves the caregiver. There is a possibility to report to the next step in the continuum of care.

## USE OF DATA

Each of the 6 steps of the preventive care process generates data to the Senior Alert database. The data are stored in a database at Uppsala Clinical Research Center, one of the national centers for quality registers in Sweden. The database has direct access to the Swedish population records. To create reports, the information in the database is processed using the SAS software. Users can have access to detailed information about persons who are registered in their own facility. The user also has access to data in the form of standardized reports at different levels. On a national level, the reports can be used for comparisons between different regions, counties, and municipalities. Each level has different needs and the system is designed to cater to that (see Figure 2). Reports can be generated to show a preventive care dashboard to monitor whether each of the different levels is on the right track or whether interventions are needed. The reports are also available online with a maximum delay of 24 hours.

## NUMBER OF RISK ASSESSMENTS

During 2009–2014, the total number of risk assessments were more than 1 000 000. A total of 13 400 risk assessments were conducted in 2009, 48 200 in 2010, 151 500 in 2011, 246 400 in 2012, 307 800 in 2013, and 324 000 in 2014. The total coverage of risk assessments has increased in the entire municipality



**Figure 2.** A schematic illustration of the report generation in Senior Alert: the 6 steps of the preventive care process, the Senior Alert database, the different data reports provided to different levels of health care and the main purposes of the reports.

in Sweden from 38% in 2011 to 67% in 2014. In 2014, 83% of the total risk assessments in Sweden disclosed a risk. Further subdivision of risks in 2014 shows 66% occurrence of fall risks, 58% of malnutrition risk, 23% of pressure ulcers risk, and 46% risk of bad oral health.

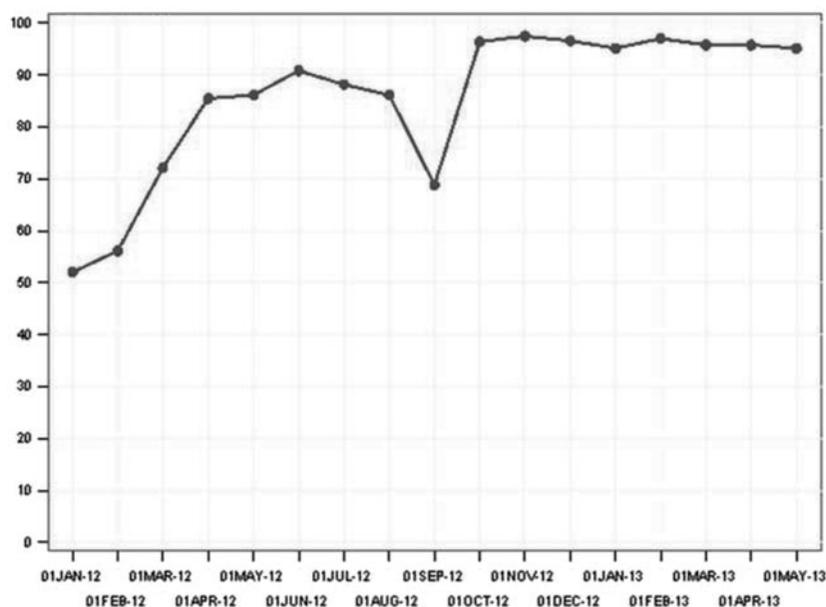
In 2014, 83% or 270 000 of the risk assessments in Sweden disclosed a risk. Further subdivision of risks in 2014 showed a 66% occurrence of fall risks, 58% of malnutrition risk, 23% of pressure ulcers risk, and 46% risk of bad oral health. Preventive action plans were created for 78% of the risk assessments for falls and pressure ulcers, 77% of the risk assessments for malnutrition and bad oral health, and 62% had a preventive action plan. Figure 3 shows a nursing home in

a municipality and the visualization of fulfillment of the planning and execution of preventive action plans. The use of a run chart enables comparison of the progress over time.

### IMPLICATIONS FOR POPULATION HEALTH OF THE ELDERLY

The quality registry, Senior Alert, has a focus on population health among the frail elderly. The American Medical Association stated in 1990 that the frail elderly would be one of the biggest challenges for health care organizations.<sup>29</sup> Senior Alert filled an important gap in the elderly care settings in Sweden because there were only a few quality registers and the national health focused on supporting a standardized and systematic preventive care process for the elderly. The use of Senior Alert has helped health care providers and professionals to visualize the everyday work and to make better clinical assessments. In some areas, there is a considerable gap between visual inspection and using a risk assessment tool. For instance, in a Finnish study, nurses determined that only 15.2% of the elderly patients were malnourished, although the risk instrument showed that 56.7% were malnourished. Those recognized as malnourished were actually anorectic.<sup>30</sup> The use of risk instruments, quality registries, and the electronic health records enables providers to evaluate these elderly patients at risk and access preventive processes to provide better health care.

The JCC, which has focused on quality improvement for more than 20 years, showed great foresight when creating Senior Alert, emphasizing preventive care.<sup>19</sup> It was expected that the use of Senior Alert would lead to the improvement of the knowledge base as well



**Figure 3.** Screenshot showing a run chart visualizing the improvement process during 24 months for a nursing home in a municipality. The x-axis shows the time in months and the y-axis shows the percentage of fulfillment of all steps in the preventive care process on an aggregated level. The name of the municipality has been redacted to not reveal classified data.

as the use of evidence among the staff. The question is whether we have seen this as an outcome of the program? It is difficult to draw any general conclusions. However, in a previous study, the nurses described the registry as an “eye-opener” for caring and facilitating nursing practice (ie, making better outcomes possible for patients). The nurses also explained that the registry has caused them and the nurse assistants to abandon old routines and start using more evidence-based methods.<sup>31</sup> The Senior Alert registry, stroke care pathway, and standard care plans, as well as the ward being a comprehensive stroke unit, made a significant difference to improve the quality of nutritional care in that population.<sup>32</sup>

The use of the best preventive action available is also an important effect of working with Senior Alert. The 100 suggested preventive actions listed in the registry are ranked according to the degree of evidence, giving health care professionals and the elderly the possibility to undertake the most appropriate action. From 2010 to 2014, the action plans connected to a risk assessment increased from 56% to 74%.

Previously, a *large* study of 4507 people from 12 countries showed that the prevalence of malnutrition in the elderly averaged 22%, 38.7% in hospitals, and 13.7% in nursing homes.<sup>14</sup> Last year alone (2014), 240 000 risk assessments were conducted and a total of more than 1 million risk assessments have been recorded in the Senior Alert registry. In 2014, 8% of nursing home residents had a Mini-Nutritional Assessment score of less than 7, indicating that they are malnourished, with 61% of the elderly in nursing homes identified as at risk for malnutrition. It is interesting to note the number of people included; the aforementioned study<sup>14</sup> covers 4507 people, whereas last year alone more than 323 500 elderly people were evaluated in the quality registry. This sizable number of assessments enables Senior Alert to be a powerful tool for monitoring and reaching out on a population-based scale.

## FROM LOCAL MEASUREMENTS TO NATIONAL COMPARISONS

Senior Alert was launched in April 2008 and received a major boost when the Swedish government in 2010 decided on a national strategy “Better life for most sick elderly” in a nationwide effort of a large-scale change of the health and social care system for older adults with complex health conditions. The evidence for complex health conditions was perceived as lacking, and the government decided to use and develop the disease registries. To succeed, the government initiative needed robust data. Senior Alert met this need and became a part of the national spread of preventive care in health—and social care settings around Sweden.<sup>33</sup> This effort spread to the local policy makers in municipalities and county councils. In Sweden, the national government collects data and publishes an annual report called “Open Comparison” to stimulate comparisons between different regions.<sup>34</sup> Because of the possibility to measure and compare, politicians can be very pre-

cise in the setting aims for elderly care. Senior Alert provides data from the preventive care processes such as the risk assessments, team-based analysis, and preventive action plans. At the end of 2014, a total of 287 municipalities of 290 were using Senior Alert and the collected data were automatically provided for the Open Comparison report. This virtuous cycle of robust measurement, with a possibility to compare across municipalities and regions, has led to a large-scale introduction of care informed by evidence and large-scale data. The use of quality registers and connecting the data to inform policy form a promising way to tackle societal problems. The large amount of data available in the registry provides researchers a data set for better future studies for risk assessment and prevention to improve health care for the elderly.

## FURTHER DEVELOPMENT AND NEW AREAS

On the basis of the user requests for different kinds of data reports, the report portal is continuously being improved. One example of this is that aggregated data are displayed publicly on the Internet. In 2014, a fifth area, incontinence, was included, and in 2015, there are plans to expand the quality registers to include 2 new areas, rehabilitation and mental illness.

## LIMITATIONS

There are 2 limitations to the use of these data. First, health care providers or facilities can solely enter data in the registry and not use them to support improvements of their preventive care processes. It is not known to which degree each of the different health care providers has adapted its way of working for accommodating Senior Alert in its routine care. Second, the registry also relies on the use of self-reported measurements incidents, that is, falls, that could result in over- or under-reporting of such events.

## CONCLUSION

The Senior Alert quality registry supports users to fulfill critical and standardized steps of the preventive care process. The elderly are evaluated according to validated risk assessment instruments for malnutrition, falls, pressure ulcers, and oral health. For the person at risk, a care plan with interventions is planned, executed, and evaluated. In addition, the registry provides feedback to the health care service providers on their preventive care processes. The use of Senior Alert has induced health care facilities to alter their preventive care processes; furthermore, the data suggest that clinical outcomes in some of the facilities have improved. The total number of risk assessments completed from 2009 to 2014 exceeded 1000 000. The registry is used in 90% of the municipalities and county councils throughout the country.

The use of the registry can enable better patient outcomes, as well as better system performance, and better professional development. It helps the caregivers fulfill the different process steps according to the

best available clinical knowledge and practice. The use of registry has also provided the government with data to help drive an initiative for older adults with complex health conditions. With the possibility to measure and compare, politicians can set better aims for the elderly care. This way of using quality registers and connecting it to the policy level is a promising way to tackle societal challenges. The large amount of data available in the registry provides researcher set the stage for better future studies for prevention of health for the elderly.

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