

How Can Drug Consumption among the Elderly be Improved?

A Systematic Review

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Summary and Conclusions of the SBU Report:

How Can Drug Consumption among the Elderly be Improved?

A Systematic Review

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Report: How Can Drug Consumption among the Elderly be Improved?

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The report summarises the results of SBU's systematic review of the literature concerning potential improvements to drug consumption among the elderly (from the patient's perspective). The report does not address specific diseases or groups of drugs, nor does it compare the merits of different drug distribution systems.

SBU's Conclusions

Drug therapy is an important medical intervention that improves health and quality of life into old age. Nevertheless, such therapy among elderly patients calls for considerable improvement. As things stand today, drug-related problems cause many elderly to suffer unnecessarily and cost the community hundreds of millions of euros a year.

- While the elderly do not necessarily consume an excessive number of drugs, too many of them are prescribed unsuitable medications. Evidence shows that improved education and information, first and foremost for doctors, reduces prescription of unsuitable drugs for the elderly.
- More thorough medical evaluations and better diagnostic methods for frail, elderly patients with a number of concomitant diseases are needed if various drug-related problems are to be minimised. The symptoms experienced by such patients are treated too often on an acute, short-term basis without taking a holistic approach or planning for active follow-up. The result may be unnecessary suffering, as well as interference with, or delay of, functional and medical recovery – not to mention longer periods of hospitalisation.

- ❑ Individual dosage procedures and regular reviews of prescriptions can minimise the drug-related problems of frail, elderly patients with a number of concurrent diseases. Organ system function is frequently impaired to one extent or another in ageing patients. Given that the benefits and harms of drugs change with age, any drug therapy that has been prescribed must be continually re-examined. There is evidence that a number of drugs (such as non-steroidal anti-inflammatory drugs, drugs with anticholinergic effect and benzodiazepines) pose greater risks. Such drugs should be regarded as risky for the elderly.
- ❑ Routines for regularly monitoring the effects of drug therapy during consultations with elderly patients who have multiple health problems and are taking a number of different drugs would significantly improve the situation. That current clinical practice so often lacks such routines is ethically indefensible.
- ❑ No single measure, such as medication reviews, can solve the problems associated with drug consumption among elderly patients. A series of simultaneous changes are needed when it comes to information handling, drug distribution and education, as well as prescription and follow-up routines and tools. Moreover, organisational structures and allocation of responsibility within the healthcare system should be modernised and made more transparent. A number of different actors must cooperate for the good of individual patients. Organisational collaboration is also required among regions, county councils, local authorities, administrators, pharmaceutical experts, trade associations, patient advocates and other stakeholders. These actors should promptly be requested to develop a joint action plan that takes a holistic approach characterised by a series of simultaneous measures at various levels.

Fact Sheet 1 Study Quality and Relevance, Evidence Grade.

Study quality and relevance refers to the scientific quality of a particular study and its ability to reliably address a specific question.

Evidence Grade refers to the total scientific evidence for conclusion.

Evidence Grade 1 – Strong Scientific Evidence

A conclusion assigned Evidence Grade 1 is supported by at least two studies with high quality and relevance among the total scientific evidence. If some studies are at variance with the conclusion, the Evidence Grade may be lower.

Evidence Grade 2 – Moderately Strong Scientific Evidence

A conclusion assigned Evidence Grade 2 is supported by at least one study with high quality and relevance, as well as two studies with medium study quality and relevance, among the total scientific evidence. If some studies are at variance with the conclusion, the Evidence Grade may be lower.

Evidence Grade 3 – Limited Scientific Evidence

A conclusion assigned Evidence Grade 3 is supported by at least two studies with medium quality and relevance among the total scientific evidence. If some studies are at variance with the conclusion, the Evidence Grade may be insufficient or contradictory.

Insufficient Scientific Evidence

If no studies meet the study quality and relevance criteria, the scientific evidence is rated as insufficient to draw any conclusions.

Contradictory Scientific Evidence

If different studies are characterized by equal study quality and relevance but generate conflicting results, the scientific evidence is rated as contradictory and no conclusions can be drawn.

SBU's Summary

Background and Purpose of the Report

In year 2003 SBU published the report “Geriatric Care and Treatment” (no 163), which identified the evidence-based data for prioritising treatment assessment projects. Among the conclusions of the report was that inpatient care statistics were misleading when it comes to ill-health in the elderly, that indexing of studies that include people over 65 years was incomplete and unclear, and that research data on treating many major groups of diseases among the elderly were inadequate.

Based partly on that report, SBU was asked to assess methods designed to improve drug consumption among elderly patients.

Approximately 1.6 million Swedes are currently older than 65 years. Half of them are over 75 years and they consume an average of 5–6 different drugs, twice as many as two decades ago. Approximately 15% of Swedes age 80 years and older consume at least 10 drugs.

Drug therapy is a successful intervention that improves health and increases life expectancy. However, the risk of adverse effects rises with age.

Important to emphasise is that the number of drugs a patient consumes does not pose a problem in itself as long as a need and benefit exist. The focus should be on avoiding the consumption of drugs, alone or in combination, that are unsuitable.

SBU's Assignment

SBU's assignment for this report was to identify evidence-based data on methods to improve drug consumption among frail patients older than 65 years who have a number of concurrent diseases. These patients, whose numbers are growing within the healthcare system, offer a complex clinical picture that frequently includes deviant symptoms and impaired function in many vital organs. Our project sought to shed light on general questions associated with drugs and how they are handled from the patient's perspective.

The assignment did not include examining the treatment of specific diseases other than to illustrate general problems. Nor did we review studies about undertreatment or drugs that do not provide sufficient patient benefit.

Main Question

- Are there inadequacies in drug consumption among the elderly that affect health and quality of life and, if so, are methods available to remedy these inadequacies?

Specific Question

- Drug-related problems
 - Are any drugs particularly risky for treating the elderly?
 - Are adverse effects from drug consumption more common among the elderly than the rest of the population and, if so, why?

- Methods to improve drug therapy for the elderly:
 - Can compliance be improved and, if so, what are the implications for patients?
 - How can the frequency of drug-related problems be minimised?
 - Does a dose dispensing system make drug consumption among the elderly safer?
- Health economic assessment of factors that affect drug consumption among the elderly.
- Ethical and social aspects of drug consumption among the elderly.

Methodology

The systematic review of the literature examined all relevant articles in available databases through 2007. Because the included variables could not always be quantified and RCTs were not consistently available, observational studies were looked at as well. The assessment emphasised primary outcomes (quality of life, ill-health, healthcare consumption and mortality), as well as some surrogate outcomes (number of drugs, risky drugs, compliance).

The quality of each included study was graded in accordance with the SBU system. The review of the literature consisted of several different stages: identification, selection and grading of the individual studies, and a synthesis and total assessment of the evidence. The purpose was to objectively present the state of current research. The report was compiled by a group of nine experts from various specialties. Seven external experts, as well as the SBU Scientific Advisory Committee, examined the final version.

Synthesis and Grading the Strength of Conclusions

The studies were reviewed in terms of quality and relevance – in other words, the degree to which they addressed the question under consideration, how well they were conducted and how reliable their results were deemed to be. Each study was assigned high, medium or low quality and relevance.

For each question, the results of the studies that met the baseline quality and relevance criteria were compiled. The strength of the total quality and relevance of the evidence was then assessed as a basis for determining the grade of evidence. The grade of evidence reflects the total evidence for a conclusion – how many studies of high or medium quality and relevance support the conclusion.

The grade of evidence appears in parentheses after each conclusion. The fact sheet defines quality and relevance, as well as grade of evidence.

Results of the Systematic Review of the Literature

Drugs that Pose Special Risks for the Elderly

- Incontinence drugs, some psychotropics and other medications that have anticholinergic and adverse effects can cause cognitive disturbances in the elderly (Evidence Grade 1).
- Benzodiazepines (certain sedatives) increase the risk of falls and hip fractures in the elderly (Evidence Grade 3). However, the evidence is contradictory when it comes to the question of whether long-acting or short-acting benzodiazepines are associated with greater risks.
- Non-steroidal anti-inflammatory drugs can cause gastric ulcers and haemorrhage in the elderly (Evidence Grade 1).

- Non-steroidal anti-inflammatory drugs increase the risk of heart failure in the elderly and can further impair cardiac function in elderly with known heart failure (Evidence Grade 3).
- Combining drugs that are deemed capable of producing clinically significant interactions can strengthen the cumulative effect and thereby cause adverse events (Evidence Grade 3).

Risk Factors and Adverse Effects

- Adverse effects from drug therapy are common among the elderly, regardless of clinical setting (Evidence Grade 3).
- An estimated 30–50% of these adverse effects are avoidable (Evidence Grade 3).
- Typical reasons for errors in drug therapy:
 - Wrong prescription (Evidence Grade 3)
 - Lack of follow-up, either routine or in response to warning signs (Evidence Grade 3)
 - Excessive number of drugs, leading to multiple adverse effects (Evidence Grade 3)
- Improper distribution and dispensing are much less common than other types of errors (Evidence Grade 3).

Compliance with Prescribed Treatment

- Combining multiple methods – such as educating patients and providing them with regular information, simplifying lists of drugs, and monitoring the ability of patients to keep track of their drug consumption – improves compliance with prescribed treatment (Evidence Grade 3).

- No studies have found that a single method decisively affects compliance in patients receiving drug therapy.
- No studies have shed light on the long-term impact of methods designed to improve compliance. The observation periods in the studies conducted so far have not exceeded 6 months.
- Studies are lacking to shed light on whether methods designed to improve compliance affect mortality, ill-health or quality of life.

Education, Information and Follow-up

- Education and information for doctors and other caregivers can reduce prescription of medications deemed to increase the risk that elderly will develop drug-related problems (Evidence Grade 3).
- Monitoring drug therapy by means of special methods that involve elderly patients and various types of caregivers can minimise drug-related problems (Evidence Grade 3).
- No scientific studies have yet definitively determined whether various methods designed to reduce drug-related problems in the elderly affect mortality, ill-health, quality of life or health-care consumption.

Dose Dispensing System

- No studies have generated evidence that would enable an assessment of whether ApoDos or other dose dispensing systems improve compliance or patient safety.

Health Economic Aspects

- Adverse effects of drugs increase healthcare costs (Evidence Grade 1).
- The evidence is contradictory and is insufficient to determine whether costs associated with drug adverse effects rise with the age of the patient.
- The evidence is contradictory and is insufficient to determine the extent to which compliance with prescribed drug therapy affects healthcare costs.
- The evidence is contradictory and is insufficient to determine whether personal finances affect drug purchases or health among the elderly.
- The evidence is insufficient to determine whether various methods designed to minimise drug-related problems in the elderly affect healthcare costs.

Discussion and Conclusions

Drugs save and extend lives while enabling many people to remain active far into old age. Life expectancies are continuing to rise.

Thanks to new, more effective and gentler therapies, the elderly increasingly survive acute conditions and can keep chronic diseases under control for longer. Although the significance of the risk factors faced by the elderly has not always been established, they are also treated nowadays.

Sweden has one of the highest life expectancies in the world. Almost 18% of Swedes are 65 years or older, and the projection

is an increase to 21% by 2020. The oldest segment of the population is growing fastest – close to half a million Swedes have passed the age of 80 years.

Longer life expectancies increase the risk of developing diabetes and dementia, as well as cardiovascular, musculoskeletal and other diseases – all of which require medical treatment, often drug therapy. People 65 years and older account for more than 40% of all prescriptions.

Patients age 80 years and older consume an average of 5–6 drugs. Approximately 15% consume at least 10 drugs.

The number of prescriptions for people 75 years and older has doubled in the past 20 years. These patients currently consume an average of more than five drugs each. According to the Prescribed Drug Register, the number varies between 1 and 42 drugs per patient. Gender differences also exist, not to mention discrepancies among regions, county councils and local authorities, given that the age breakdowns of their populations are not uniform.

- ❑ It should be stressed that the elderly neither can nor should be viewed as a homogeneous group – there are large functional differences among individuals, and chronological age is often misleading. A 90-year-old may be more vital than a 50-year-old.

Because the ageing process changes symptoms and signs of disease, the underlying condition may not be recognised or detected. For instance, elderly patients do not always experience the symptom of angina pectoris traditionally associated with myocardial infarction.



Elderly patients are more sensitive to drugs and experience different types of adverse effects; confusional states are rare among younger patients but common among the elderly.

Adverse Effects of Drugs are Avoidable

The risk of drug adverse effects is made up of many factors. Among them are physiological age-related changes, concurrent diseases, the cumulative effect of different medications, drug-drug interactions and the number of drugs consumed. Not surprisingly, the oldest and sickest patients – who consume the most drugs – experience the most severe adverse effects and complications.

According to our systematic review of the literature, approximately one fifth of the elderly patients who seek health care are experiencing adverse effects of drug therapy. Such adverse effects are most commonly due to erroneous or outdated prescriptions and insufficient follow-up.

As many as half of the adverse effects are foreseeable and thereby avoidable. Below are a few examples.

- Cognitive disturbances and confusion, one of the most common reasons that elderly seek acute health care, may be adverse effects of medications (incontinence drugs and some psychotropics) that have anticholinergic effects.
- Falls and hip fractures may be the indirect result of benzodiazepines (certain sedatives). A correlation appears to exist between the risk of fall injuries and the dose of benzodiazepines consumed. The results of studies are contradictory with respect to any differences between the risks associated with long-acting and short-acting benzodiazepines.

- Gastric haemorrhage, as well as increased risk of development or progression of heart failure, in the elderly is clearly correlated with consumption of non-steroidal anti-inflammatory drugs. Thus, such drugs should be prescribed to elderly patients on a long-term basis under extraordinary circumstances only.
- Although many studies have found that drug combinations can cause clinically significant interactions, few have examined the impact on patient health and well-being. But the available studies suggest that combining drugs deemed to produce clinically significant interactions can strengthen the cumulative effect and thereby cause adverse events.

The overall evidence strongly suggests that a number of the medications (such as drugs that have anticholinergic and adverse effects, benzodiazepines and unsuitable combinations) identified by the Swedish National Board of Health and Welfare as indicators of therapeutic quality point to an increased risk of adverse effects in the elderly. However, not all quality indicators are equally reliable or wholly adapted to clinical practice.

- One problem with studies of adverse effects is that their symptoms and signs vary among individuals and drugs. Distinguishing between adverse effects and symptoms of disease or ageing is often difficult. A second problem is that the frequency of adverse effects is not particularly amenable to examination on the basis of experimental methods or RCTs. All of the studies reviewed by this report were observational.
- The review of the literature found that adverse effects are a common reason that elderly seek health care, but studies that examine the extent of the problem are lacking.

- An estimated 30–50% of these adverse effects are avoidable.
- Impaired general condition, concurrent diseases and changing the patient's caregiver increase the risk of drug adverse effects.
- Many adverse effects are caused by erroneous drug therapy, lack of follow-up or poor follow-up.
- Simultaneous consumption of five or more drugs (polypharmacy) increases the risk of adverse effects and complications.

Even after treatment has been individualised and simplified, elderly patients who are frail and have concurrent diseases run a greater risk of developing drug adverse effects than others their age.

Changing the patient's caregiver or place of treatment may heighten the risk of drug adverse effects. That danger should be taken into consideration when elderly patients, particularly those who are consuming several new drugs and have impaired cognitive ability, are discharged from hospital.

Education and more Thorough Follow-up Make a Difference

The systematic review of the literature focused on educational initiatives, particularly those that involve patients and various types of caregivers. Drug-related problems in that connection were defined as healthcare consumption, ill-health and mortality, as well as surrogate outcomes such as unsuitable medications, number of drugs and compliance.

- Education and information for doctors and other caregivers, as well as interdisciplinary collaboration on treatment, can minimise prescription of unsuitable and risky drugs.

- Monitoring drug therapy in way that includes elderly patients and special interventions by various types of caregivers reduces the frequency of drug-related problems in the elderly.
- Methods, such as information for patients, designed to improve drug consumption among the elderly must be well adapted to the target group and pinpoint multiple factors if they are to affect compliance with prescribed treatment. Such interventions should not uncritically insist on strict compliance, given that patients might have good reasons for not taking their medication: lack of symptom relief or a sense that the prescription is unimportant or even wrong.

Dose Dispensing – Evidence for an Assessment is Lacking

Since the late 1980s, Sweden has used the mechanical ApoDos system for centrally dispensing multiple drugs in the same package. The system was designed first and foremost for patients who cannot manage their own medication. Approximately 140 000 Swedes currently rely on the ApoDos system.

Given the widespread use of ApoDos, the project group thought it vital to carry out a systematic review of the literature to seek evidence about whether such systems improve drug therapy and consumption. However, studies conducted thus far have been small, poorly defined, and of low quality and relevance.

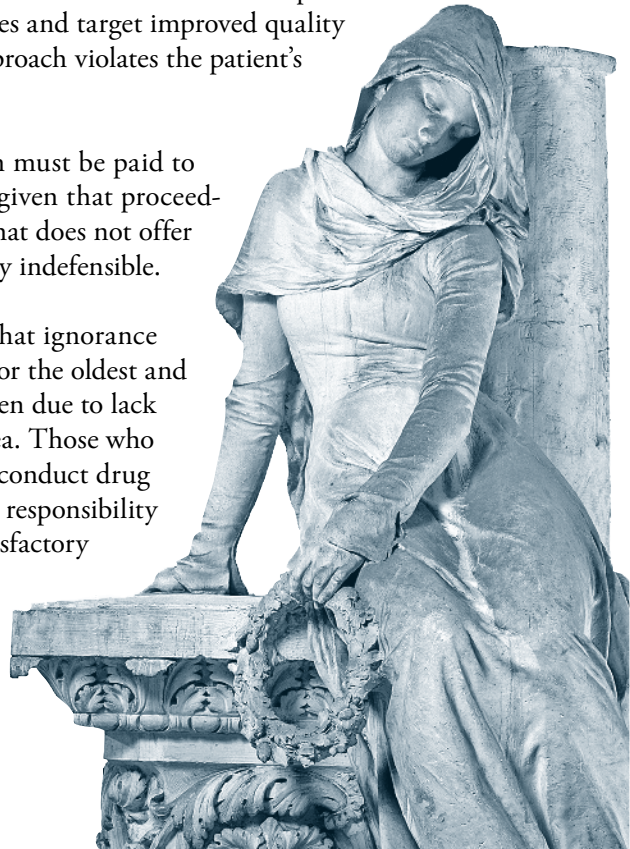
- Evidence is currently lacking to determine whether ApoDos or other dose dispensing systems are cost-effective, or whether they improve compliance, patient safety, health or quality of life.

Health Economic Aspects

- Drug adverse effects, particularly those that are foreseeable and avoidable, increase healthcare costs – mostly for hospital care.
- Too few studies have been conducted to permit a determination of how inadequate compliance affects healthcare costs.
- Whether revised discount rules influence the extent to which patients fill their prescriptions has been a topic of discussion in recent years. No Swedish study has looked at the question, and other evidence is too sparse to draw any conclusions about how the personal finances of the elderly affect their drug consumption.

Ethical and Social Aspects

- All treatment should involve consultation with patients or their representatives and target improved quality of life. Any other approach violates the patient's autonomy.
- Special consideration must be paid to severely ill patients, given that proceeding with treatment that does not offer relief may be ethically indefensible.
- Studies have found that ignorance about drug therapy for the oldest and sickest patients is often due to lack of research in the area. Those who design, approve and conduct drug trials have an ethical responsibility to correct this unsatisfactory state of affairs.



- Inadequacies in drug therapy for the elderly that are due to organisational problems in the healthcare system are ethically unacceptable and violate the Principle of Goodness (strive to benefit everybody and harm nobody).
- From a social point of view, improved drug therapy for the elderly would reduce costs while favourably affecting the quality of life of patients and their families.

Impact Analysis

The systematic review of the literature found that no single method affects drug consumption among the elderly such that health, quality of life or cost-effectiveness improves. Benefits have been demonstrated only with respect to certain surrogate outcomes, such as unsuitable drugs, number of drugs or compliance with prescribed treatment.

All treatment of the elderly must be based on knowledge about the biological, psychological and social components of ageing. Thorough evaluations and diagnostic methods are crucial to assessing the response of individual elderly patients to disease and medications. Focusing on the immediate condition or symptoms, as is often the case during acute phases of a disease, is insufficient.

The effect of each new medication must be assessed in relation to the patient's diseases, present state of health, functional status and consumption of other drugs. The older the patient, the more important such an overall assessment becomes.

Proper drug consumption is dependent on information, patient participation, documentation and continual follow-up.

Drug therapy for the elderly should be regarded as a chain of equally necessary measures (Figure 1). Interventions must concentrate on all measures and not simply some of them. The effort must include not only individual doctors and other types of caregivers who work directly with patients, but organisational and resource allocation issues in the healthcare system as a whole.

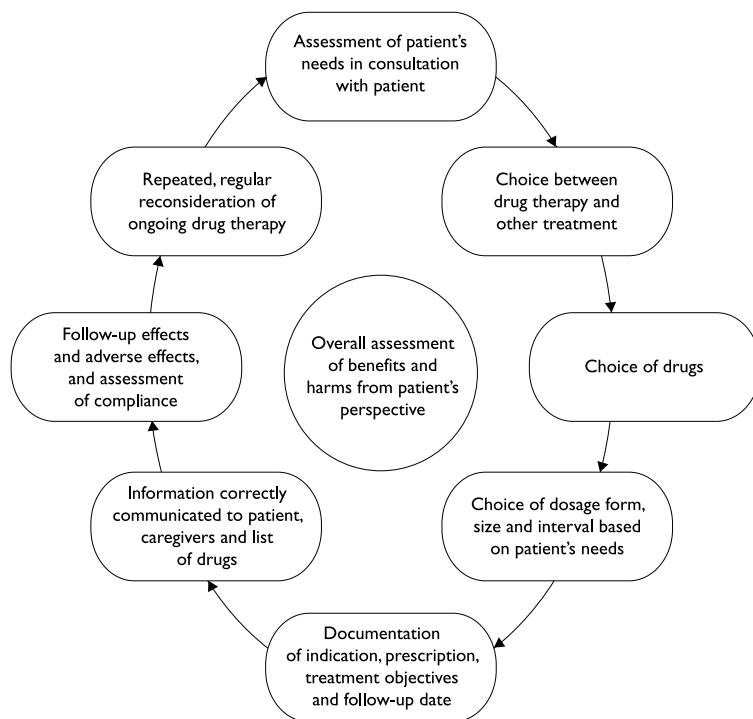


Figure 1 Drug therapy for the elderly – flowchart for an overall assessment.

Knowledge Gaps and Research Needs

The review of the scientific literature identified a major need for additional studies of good quality that examine methods designed to improve the safety of drug consumption by the elderly.

The frequent lack of treatment studies for the oldest patients increases uncertainty about the age-related benefits and harms associated with drug therapy. It is often taken for granted that research findings for younger patients – especially when it comes to preventive treatment and the long-term impact on ill-health and mortality – can automatically be applied to the elderly as well.

Given the knowledge gaps identified above, studies are particularly urgent in the following areas.

- *Education, information and follow-up.* Education and information for doctors and other caregivers, collaboration when treating patients, and active planning and follow-up that focus on drug therapy can reduce the frequency of prescribing unsuitable and risky drugs. Additional studies are required in order to determine the extent to which such interventions affect survival, ill-health, quality of life and healthcare consumption.
- *Risk factors for adverse effects.* Comparative epidemiological studies are needed to establish the frequency of adverse effects in a population. Sweden is fertile territory for that type of research.
- *Compliance with prescribed treatment.* Not enough studies have been conducted about the extent to which better compliance with prescribed treatment improves health and quality of life.

- *Dose dispensing.* Studies of good scientific quality and relevance are needed to determine how ApoDos and other dose dispensing systems affect the safety of drug consumption, as well as quality of life, health and cost-effectiveness. No controlled comparative studies have yet examined the various systems that Sweden uses.

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SBU Evaluates Health Care Technology

Below is a brief summary of the mission assigned to SBU by the Swedish Government:

- SBU shall assess healthcare methods by systematically and critically reviewing the underlying scientific evidence.
- SBU shall assess new methods as well as those that are already part of established clinical practice.
- SBU's assessments shall include medical, ethical, social and economic aspects, as well as a description of the potential impact of disseminating the assessed health technologies in clinical practice.
- SBU shall compile, present and disseminate its assessment results such that all parties concerned have the opportunity to take part of them.
- SBU shall conduct informational and educational efforts to promote the application of its assessments to the rational use of available resources in clinical practice, including dental care.
- SBU shall contribute to the development of international co-operation in the field of health technology assessment and serve as a national knowledge centre for the assessment of health technologies.

How Can Drug Consumption among the Elderly be Improved?

SBU's report on how drug consumption among the elderly can be improved builds on a systematic, critical review of the scientific literature in the field.

The report is one in a series of reports published by SBU (Swedish Council on Technology Assessment in Health Care).

This document presents the summary and conclusions of the full report, which has been approved by SBU's Board of Directors and Scientific Advisory Council.