Healthcare Atlas for the Elderly in Norway

An overview and analysis of publicly funded somatic health services for the population 75 years and older for the periode 2013–2015

Helseatlas | SKDE

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Foreword

The help society gives to people who suffer health problems, illness or injury takes place in the health service's contact with individual patients. From one perspective, this is the moment of truth in which our ability to be there when we are needed is tested. The regional health authorities are charged with ensuring, on behalf of the Norwegian parliament and government, that the population have access to good, adequate and equitable specialist health services. We rarely think about the fact that, if we want to know whether or not we fulfil our social mission, then we need to know how the population's use of the health service breaks down. It is not good enough to base our dimensioning and planning of services on waiting times and other indirect and uncertain indications of needs.

Previous healthcare atlases have given us insight into the services offered to neonates, child health services and the use of day surgery procedures. The knowledge gained has proved valuable, and we can see that it is being put into use. There has been a significant reduction in the use of day surgery in areas where medical justification is missing or weak.

With the Healthcare Atlas for the Elderly in Norway, the Centre for Clinical Documentation and Evaluation (SKDE) is taking another leap on behalf of us all towards improving our ability to fulfil our social mission. As people grow older, they become big users of hospital services. We know that many factors influence use and distribution, including distance and local practice. The regional health authorities must use the information that is now available to ensure equitable access to services for those who need it most. The Healthcare Atlas for the Elderly will contribute to the mosaic required to provide better services for our biggest patient groups. The challenge we are now facing is to develop better and more effective methods for cooperation with the specialist communities to make use of this knowledge.

Bodø, 15 June 2017

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Managing Director
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Chapter 1

Summary

The purpose of this healthcare atlas is to map important publicly funded somatic health services provided in the period 2013–-2015 for the elderly population, defined as people aged 75 and older. By important health services, we mean services that are important to the elderly; services where the elderly account for a large proportion of the use of services and resource-intensive services. The Norwegian Patient Registry (NPR) is the principal data source. No good and reliable basic data exist for the vast amount of health and care services provided at the municipal level, except for contacts with the general practitioner services. This is a weakness of the atlas. Some readers would probably have liked us to include a description of patients with complex health problems and significant functional impairment, a situation that is typical for the sickest of the elderly. However, the atlas concept, which primarily aims to compare services between geographical areas, is best suited for patient samples based on unambiguous diagnoses or demographic variables.

Variation

It is an overriding goal in Norway's health policy that health services should be equitably distributed, and the primary objective of the healthcare atlases is to present analyses of geographical variation in the use of specialist health services. In this atlas, we find the greatest variation in the elderly's use of outpatient assessment, treatment and follow-up. For several of the services studied, the variation is unwarranted and far too high.

Table 1.1: Overview of selected outpatient consultations and assessments, patients aged 75 years and older. Average number of consultations per year (n), ratio between the highest and lowest rates in the hospital referral areas (FT), and the hospital referral areas with the lowest and highest rates, respectively.

			Hospital referral area	
Outpatient services	n	FT	lowest	highest
Heart failure	8,202	4.9	Førde	Inner Oslo
Parkinson's disease	4,941	2.3	St. Olavs	Vestfold
Dementia	4,483	11.1	Telemark	Inner Oslo
Exercise ECG	19,600	4.1	Helgeland	Akershus
Echocardiography	31,813	2.8	Østfold	Finnmark
Long-term ECG	9,040	4.7	St. Olavs	Fonna
All outpatient services ≥ 75	1,117,183	1.7	Finnmark	OUS

Differences in the division of labour between the general practitioner service and the specialist health service in the different hospital referral areas could explain some of the variation. However, there was also great variation in services where the specialist health service is more or less the sole provider, such as heart examinations and assessments. That more than four times as many elderly residents of Akershus hospital referral area have exercise ECGs than residents of the Helgeland area is an undesirable and unwarranted practice. This shows a clear failure to achieve the goal of equitable services and a need for harmonisation of medical indications and guidelines. For several of these areas and other health services described in this report, national medical quality registers exist or are in the process of being established. Data from these registers will probably be capable of shedding further light on variations and quality in these services.

Unwarranted variation was also found for other important procedures for the elderly in areas such as cardiac medicine, orthopaedics and oncology – though not on the same scale.

Table 1.2: Overview of selected procedures for patients aged 75 years and older. Average number of procedures or patients who receive the service per year (n), ratio between the highest and lowest rates in the hospital referral areas (FT), and the hospital referral areas with the lowest and highest rates, respectively.

			Hospital referral area	
Procedures	n	FT	lowest	highest
Coronary revascularisation	3,403	2.1	M. og Romsdal	Finnmark
Pacemaker	1,982	2.3	Stavanger	Helgeland
Hip replacement	2,330	1.7	UNN	Stavanger
Knee replacement	1,481	1.6	Telemark	N.−Trøndelag
Pharmacological cancer treatment, pat	3,252	1.9	Finnmark	Vestfold
Radiotherapy, pat	3,056	2.0	Telemark	Sørlandet
Cataract surgery	20,876	2.0	Vestfold	Stavanger
Eye injection, pat	6,334	2.2	Førde	UNN
Hearing aid, pat	17,162	4.0	St. Olavs	Finnmark
Biological drugs, pat	1,019	2.0	Østfold	Telemark

For several of the above-mentioned procedures, all of which are demanding in terms of resources, services to the elderly account for a large proportion of the total national service provision. Variation will therefore not just be important to the patients and the services available to them, but also to the internal allocation of resources in the institutions providing the services. For example, when more than twice as many elderly residents in the Helgeland area as in the Stavanger area have pacemakers implanted, that is significant both for the patients and for resource allocation in the health trusts. These analyses say nothing about what the correct level is. The national average is not necessarily the optimal level.

The least variation was found in emergency admissions of different groups of elderly patients.

The relatively modest variation for most such admissions could indicate that they are deemed necessary. There is therefore little disagreement in the medical community about them, and they are little influenced by the availability of hospital beds. The length of stays varies somewhat more, but long stays, high readmission rates and poor prognoses are highly typical for these groups of elderly patients. Most patients who are admitted as emergency patients are clearly seriously ill, and many will have complex health problems. When, for example, 22% of elderly patients die within 30 days of an emergency admission for pneumonia, this indicates that pneumonia is a 'label' rather than the reason for the poor prognosis. As a group, older patients who are discharged from hospital following admission for heart failure, pneumonia, COPD, hip fracture or a stroke have poor prognoses and represent a professional challenge during treatment, in connection with discharge and to the municipal medical reception system.

Table 1.3: Overview of admissions for selected conditions, patients aged 75 years and older. Average number of admissions per year (n), ratio between the highest and lowest rates in the hospital referral areas (FT), average length of stay per admission, 30-day readmission rate following discharge, 30-day and 365-day mortality proportion following admission.

Condition	n	FT	Av. length of stay	Readm. rate	Mortality (%) <30 days	Mortality (%) <1 year
Heart failure	6,761	1.5	6.3	26	15	37
Pneumonia	12,477	1.7	7.0	22	22	42
COPD	8,180	1.6	6.1	29	21	43
Hip fracture	6,922	1.3	6.6	15	11	29
Stroke	5,329	1.4	9.4	13	20	33
All admissions ≥ 75 years	178,571	1.3	5.4	17	17	28
Mortality proportion per year in the total population ≥ 75 years						8

The elderly boom

While the number of elderly people has been growing slowly for some years, the population aged 75 years and older is now expected to double by 2040 (from 360,000 people today to approx. 740,000). The proportion of the population made up by elderly people is expected to increase from 7% at present to approx. 12% in 2040. The report shows that this demographic trend will have different effects in different hospital referral areas (Figure 5.7 page 35), and that the extent to which it will represent a challenge depends on the service in question (Figure 5.4 page 32 and Figure 8.2 page 122). The challenges are expected to be particularly great for services where the elderly use a high percentage of the total services provided. This applies especially to emergency admissions for various reasons, where the elderly currently use between 47% and 76% of the available resources. These patient groups will probably need more bed resources in future. This analysis should be an important contribution to and basis for the necessary planning of service provision that the health services must carry out in order to meet the challenges resulting from the elderly boom.

Age as a criterion for priority setting

Age should not in itself constitute a criterion for priority setting, but it may nevertheless have a bearing on prioritisation at group level. In order to shed light on this, we have compared the age group 75 years and older with the group between 50 and 74 years for four relevant services: revascularisation, pharmacological cancer treatment, radiotherapy and treatment with biological drugs. These analyses do not support the conclusion that the elderly are given lower priority as such. However, when the number of heart attacks in the age group 75 years and older is the same as in the age group between 50 and 74 years, and three times as many patients in the younger group receive revascularisation treatment, that warrants taking a closer look at this difference. The same can be said of treatment with biological drugs, for which the treatment rate for elderly patients is only one third of that for the younger age group.

Chapter 2

Introduction

2.1 Why an atlas of health services for the elderly?

It is an overriding goal in Norway's health policy that health services should be equitably distributed. The main objective of the healthcare atlases is to provide analyses of geographical variations in the use of specialist health services. As a rule, services with low priority and areas where there is disagreement in the medical community have greater variation than high-priority services characterised by a high degree of severity and acute conditions.

The three healthcare atlases that have been published so far — for day surgery, health services for children and neonatal healthcare — have found significant, and sometimes unwarranted, variation. The reason why we have chosen to focus on specialist health services for the elderly in this atlas is primarily that we want to draw attention to services for the older age groups now that we have examined services for children and neonates, but also that prioritisation is an issue that has been more closely associated with services for the elderly than for the youngest patients.

To the extent that the establishment and provision of services require resourceful pressure groups, own initiative and a focus on rights, one might expect to see greater geographical variation in services for the elderly on the basis of individual resources, culture and distances. The elderly today are not seen as a homogeneous group of resourceful people with a strong focus on their rights.

However, the most important reason for producing a healthcare atlas for the elderly is perhaps the challenge that the coming demographic changes will present for the specialist health service. As is well known, morbidity, and thus also the need for health services, increases with age. Combined with the steep increase in the number of elderly people, this means that preparations and adaptations of services for this group are necessary. One important reason for making the healthcare atlases is that they will be a useful tool in the specialist health service's planning work. A presentation of the services that individual health trusts provide for their elderly users compared with other health trusts, together with a presentation of the proportion of the total services provided that is used by this age group, should form a good basis for the required planning of the future delivery of specialist health services for the elderly.

2.2 Age as a criterion for priority setting

Age has not in itself been used as a separate basis for prioritisation in the Norwegian health service. However, a debate arose in the wake of Official Norwegian Report NOU 2014:12,[1] in which it was proposed to introduce the criterion 'lifetime health loss' to replace 'severity' as a criterion. When applied on the individual level together with the other criteria in the proposal, many interpreted this as clear, age-based discrimination. A new working group[2] was appointed to consider the health loss criterion, which had been heavily criticised during the consultation process. A white paper[3] based on both these reports was presented, and the Norwegian parliament, the Storting, largely endorsed the white paper. The white paper emphasised that age should not in itself be a criterion for priority setting, but that it can be a factor when setting priorities at group level. Reference was made to the following example: 'With regard to chronic conditions, the benefit of an intervention with lasting effect measured as healthy life-years will also increase the younger the patient group is, assuming that all other factors are essentially equal. Severity measured as absolute shortfall will in many cases be greatest for diseases affecting younger age groups. This is not an indication of a deprioritisation of elderly patients. Rather, it implies that society considers diseases depriving patients of many future healthy life years as more severe than diseases depriving patients of fewer future healthy life years.'

In clinical practice at individual level, age is taken into account when considering the risk associated with a surgical procedure or course of treatment seen in relation to its benefit. Nor can we disregard the fact that more elderly than younger patients themselves express a wish to refrain from major surgery or procedures involving risk. This phenomenon, known as patient preferences, will, together with the clinical assessment, result in lower treatment rates for the elderly than for younger patients. Since research has shown that diseases of the elderly has the lowest prestige of all groups of diseases among doctors and other healthcare professionals, the attitudes of individual treatment providers could also play a role (Album and Westin 2008). All these factors make it interesting and relevant to compare the services provided to young and elderly patients and to look at how this relationship varies between health trusts.

2.3 Limitations in the basic data

This atlas shows what somatic specialist health services the elderly population receives, as well as their contacts with the general practitioner service. There are good data available for somatic specialist health services at diagnosis and procedure level. Unfortunately, no such basic data have been available for analysis as regards mental health services. No good basic data exist for the vast amount of health and care services provided at the municipal level. For areas where patients receive services from the municipalities as well as at regular GP surgeries and from the specialist health service, a presentation of their overall use of services would have been expedient in order to determine by comparison whether the population receives equitable health services. This is not possible with the data currently available, however. We cannot remedy these shortcomings in the atlas. However, a description of the specialist health service can nevertheless give rise to

[1] Official Norwegian Report NOU 2014:12 *Åpent og rettferdig – prioriteringer i helsetjenesten* ('Open and fair – priority setting in the health care services' – in Norwegian only)

[2] *På ramme alvor – alvorlighet og prioritering* ('In all seriousness – severity and priority setting' – in Norwegian only). Report from a working group appointed by the Ministry of Health and Care Services, October 2015.

[3] Report No 34 to the Storting (2015-2016) *Verdier i pasientens helsetjeneste – Melding om prioritering* ('Values in the patient's health service – report on priority setting in health care' – in Norwegian only)

meaningful discussion about the way in which health services are organised and the division of labour between levels.

In our presentation of service variation in the atlas, we strive to select patient samples based on unambiguous diagnoses or demographic variables – services that are coded in the same way in the basic data. Using this logic and the available data, it is practically impossible to identify elderly geriatric patients with complex health situations with several different diseases, a high consumption of pharmaceuticals and different forms of functional impairment. This is a weakness of the atlas. Comorbidity in acutely ill elderly patients represents a significant challenge in connection with acute hospital admissions (Buurman et al. 2016). This could influence the length of stay, the procedures performed, the prognosis and the readmission rate. Approaching this patient group on the basis of a single diagnosis can therefore only describe part of a complex health situation. It is well known that a comprehensive interdisciplinary geriatric assessment of multimorbid elderly upon hospital admission has health benefits (Ellis et al. 2011). It would therefore be desirable to compare the services available and provided in the different hospital referral areas in relation to the scope of geriatric specialist health services in the different health trusts. However, this has not been possible as long as the diagnosis system and measurement parameters focus on individual conditions and the prevalence of comprehensive geriatric assessments in hospitals is unknown.

2.4 Why 75 years as the lower age limit for the atlas?

We have chosen to base this healthcare atlas on the age group 75 years and older. This was decided following preliminary analyses and comparisons of samples using 70, 75 and 80 years, respectively, as the lower age limit. We wanted a sample representing the typical elderly population. In our assessment, the youngest sample, from 70 years, displayed a pattern that was too similar to that found for the majority of Norwegian patients. If the sample was limited to 80 years and older, on the other hand, the number of patients was so small that there was not enough data for some of the health services we wanted to analyse. Therefore, we chose the alternative 75 years or older. This coincides with the age limit chosen in a healthcare atlas published by Dartmouth Atlas of Health Care, which also used 75 years as the lower age limit (Bynum et al. 2016).

2.5 The composition and significance of the reference group

Experience from the preparation of the different healthcare atlases has taught us how important it is to seek support for samples, analyses and design among relevant specialist communities by appointing a reference group. Since older patients, unlike children, are spread across most of the specialities in the specialist health service, it was natural to emphasise a broad range of specialities when appointing the reference group, preferably in combination with a special interest in the health of the elderly. We therefore asked the Norwegian Medical Association to appoint three representatives, which the Association obligingly did, and then supplemented the group with specialists in cardiology, internal medicine, orthopaedics and oncology, all of which are specialities with a high percentage of elderly patients, in addition to geriatrics.

The reference groups comprised the following members (in alphabetic order):

Lars Haukaas: holds a law degree, former chair of the board of Ullevål Hospital, retired

Bent Indredavik: specialist in internal medicine and rehabilitation, St. Olavs Hospital, professor at the Norwegian University of Science and Technology (NTNU)

Morten Laudal: specialist in general practice and community medicine, district medical officer of Vestby, and GP in Son

Olav Røise: specialist in surgery and orthopaedics, Oslo University Hospital, professor at the University of Oslo (UiO)

Henrik Schirmer: specialist in cardiology, University Hospital of Northern Norway, professor at UiT Arctic University of Norway

Wenche Frogn Sellæg: specialist in internal medicine and geriatrics, head of the National Council for Senior Citizens, former minister of social affairs, retired

Olav Sletvold: specialist in internal medicine and geriatrics, professor at NTNU, retired

Halfdan Sørbye: specialist in oncology, Haukeland University Hospital, professor at the University of Bergen (UiB)

Gerd Torbjørg Åmdal: specialist in general practice and geriatric and nursing home medicine, nursing home doctor in the City of Bergen

Two meetings of the reference group have been held (on 1 June 2016 and 10 January 2017). The group, and its individual members outside the meetings, have provided very useful input on samples, topics, analyses and interpretations. The members have also made invaluable contributions to this report.

We also needed to bring in professional expertise in some areas where the reference group's expertise was not optimal. We would like to thank the following persons for their valuable contributions:

Haakon Arnesen, specialist in diseases of the ear, nose and throat, St. Olavs Hospital

Wenche Koldingsnes, specialist in rheumatology, University Hospital of Northern Norway, retired

Hebe D. Kvernmo, specialist in hand surgery, University Hospital of Northern Norway, professor at UiT

Niels Christian Stenklev, specialist in diseases of the ear, nose and throat, University Hospital of Northern Norway

Chapter 3

On variation

3.1 Background

In 1938, the English paediatrician James Alison Glover published a study that showed considerable geographical differences in the rate of tonsillectomy among English schoolchildren, and that both variations in the practice of surgeons and socioeconomic circumstances contributed to these differences (Glover 1938).

Research on variation in the use of health services continued, particularly in the milieu around Professor John Wennberg and Dartmouth College in New Hampshire, USA. In the late 1960s, Professor Wennberg was responsible for the introduction of the public health insurance scheme Medicare in Vermont. Together with Alan Gittelsohn he started mapping the resource input and the population's health service coverage based on what have subsequently been called 'hospital referral areas', in Norwegian 'opptaksområder', as defined in this report.

They found unexpectedly big variations between hospital referral areas in the use of almost all kinds of health resources, including personnel and expenses (Wennberg and Gittelsohn 1973). They also found a very high variation between nearby hospital referral areas in the rates of surgical procedures, such as appendectomy (four times), tonsillectomy (twelve times) and several other procedures. The remarkable thing was that there was great variation between neighbouring areas just a few blocks apart, and that it was not possible to explain these differences by differences in morbidity. In the 1990s, the group published The Dartmouth Atlas of Health Care. The atlas describes the variation in the use of health services for all parts of the American health service across several hundred hospital referral areas in the USA, and it has had an impact on the subsequent American health policy debate. Internationally, the atlas has become the prototype for a growing number of national healthcare atlases that find a corresponding variation in the use of health services - regardless of how the health services are organised and funded.

3.2 Variation and responsibility to provide healthcare

The regional health authorities have a responsibility to provide *adequate* and *satisfactory* health services to the population in their respective regions. This 'responsibility to provide' is the primary point of departure for this approach to understanding unwarranted variation in the use of health services. Great variation between the health regions in the use of health services could

indicate that the responsibility to provide adequate and satisfactory health services is not fulfilled in a manner that ensures equitable treatment regardless of where patients live, and the variation can be interpreted as unwarranted.

3.3 What are the mechanisms that create variation?

In order to analyse and describe variation, Wennberg has defined three different categories of care with different degrees of variation (Wennberg (2010), see also Figure 3.1): necessary care, preference-sensitive care, and supply-sensitive care.

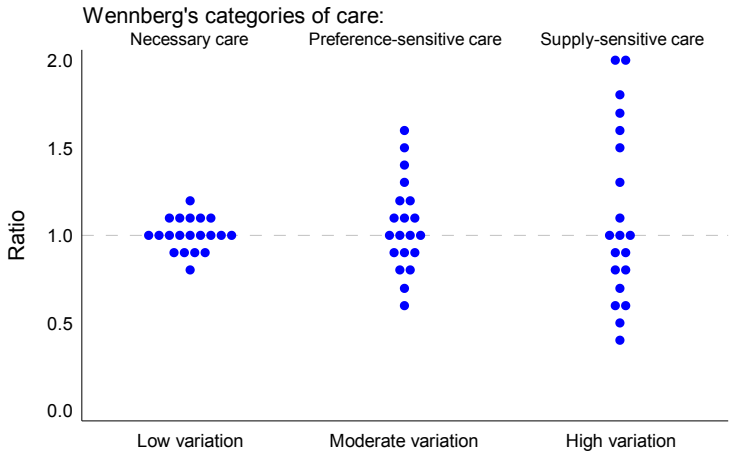


Figure 3.1: Illustration of variation profiles for Wennberg's three categories of care

Necessary care

The first group comprises conditions with clear diagnostic criteria for which patients always seek healthcare, for which hospitalisation is the only treatment option, and for which known effective treatment exists. This group is characterised by the fact that the treatment rate reflects the actual prevalence of these conditions in the population. It was estimated that approx. 10-15% of all treatment provided by the specialist health service concerns patients that fall into this group. Examples include surgery for hip fractures and colon cancer. If major variation between hospital referral areas is found for conditions that fall under the category of necessary care, there is reason to consider whether there are differences in morbidity or whether there is an actual undercapacity. Alternatively, the variation could be due to patients not receiving necessary care or receiving the wrong treatment.

Preference-sensitive care

The second category is often described as preference-sensitive care. This describes care in cases where there are normally several treatment options and where the indications for and health benefit from of a form of treatment may be unclear or controversial in the medical community. It is estimated that approx. 25% of all treatment provided by the specialist health service concerns this category. This is particularly the case in surgical disciplines, where the preferences and subjective judgement of the surgeon or department can influence the choice of treatment, sometimes

even conflicting with good evidence-based practice. There will often be greater variation here than in the first category. Examples are well documented in the healthcare atlas 'Day Surgery in Norway 2011-2013' (Balteskard et al. 2015), which shows examples of considerable variation between hospital referral areas in, e.g., tonsillectomy and surgery for cataracts that cannot be explained by underlying factors such as demographics and morbidity in the population.

Supply-sensitive care

Wennberg's third category of care is called supply-sensitive care, which accounts for 50-60% of the specialist health service's activities. Droopy eyelid correction or phototherapy for skin conditions are examples of such services. Variation in the supply of such services is estimated to be the most important cause of variation in the provision of health services. It is characterised by the availability of health services in the form of hospital beds, ICU capacity, medical specialists and diagnostic imaging capacity influencing demand. When there is an increase in capacity, more patients will be treated until the capacity is filled, without this necessarily being reflected in improved health, neither at individual nor at population level.

3.4 Unwarranted variation

Terminology

The terminology used to refer to variation that is not due to an underlying difference in demographics or morbidity between hospital referral areas differed somewhat in the first two healthcare atlases. In the Child Healthcare Atlas, such variation was referred to as *undesirable*. The day surgery atlas referred to it as high or moderate. Both atlases indicated that such variation could be due to over- and/or undertreatment. The Ministry of Health and Care Services' 2016 assignment document to the regional health authorities requested 'indicators to measure unwarranted variation', a request which resulted in a report submitted in November that year (SKDE, 2016). Based on the description of the reason for variation in health services and the wording chosen by the Ministry, the term *unwarranted* is used to describe variation that is not due to chance, patient preferences or differences in the composition of the patient group described. It is important to emphasise that, in this context, the term unwarranted is understood as being synonymous with 'undesirable', 'not ordered' and 'unjustified', and it indicates that the service described is not equitably distributed in accordance with the responsibility to provide health services. The term 'unwarranted variation' does not imply a norm for which usage rate can be deemed to represent the 'correct' level, but describes a variation that cannot be explained by differences in the patient composition (what is known as 'case mix') between hospital referral areas.

It is also important to emphasise that some types of variation in health services are desirable, and that such desirable variation can arise due to differences in needs or on the basis of the patients' own preferences. If there are equal treatment options, or if there is uncertainty or insufficient evidence to prove that one alternative is better than the other, strong emphasis shall be given to the patient's own choice. However, patient choice requires that patients are given objective and balanced information about the different options, and health personnel's' personal preferences must not influence the decision. This is the requirement that underlies the measures covered by the term 'shared decision-making', where the patient is empowered to be able to make independent, informed choices regarding his or her own treatment.

What is unwarranted variation?

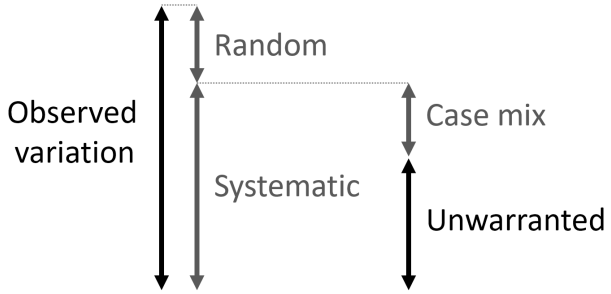


Figure 3.2: Illustration of the components of variation

As shown in Figure 3.2, observed variation is made up of two components, namely *random variation* and *systematic variation*. Random variation can be caused by fluctuations over time and random chance, and this component is most noticeable in connection with small samples. Systematic variation can be explained in whole or in part by differences between hospital referral areas in terms of risk of illness or socioeconomic or demographic variables. Such variation is often referred to as differences in case mix, or as warranted variation.

It is therefore necessary to determine how much chance and case mix contribute to variation in order to form an impression of the extent of unwarranted variation. The importance of random variation must be assessed, particularly in relation to the size of the samples and their stability over time. The element of case mix that is due to differences in gender and age composition between hospital referral areas will be taken into account by adjusting for gender and age. It is also possible to adjust for differences in socioeconomic factors, for example income and education, but such data have not been available for this analysis. Differences between hospital referral areas in terms of risk of illness or morbidity will also influence how much the case mix contributes to variation. It is possible to adjust for differences in morbidity by taking comorbidity into consideration, but this has not been done in this atlas.

In a *population perspective* variation in the use of health services is compared between geographical areas, regardless of where the area's population accessed the services. There are many different methodological and statistical approaches to measuring variation, from calculating variance and confidence intervals as an expression of the variation in the use of health services to more intricate and tailored measurements of variation (Ibáñez et al. 2009). As of today, there is no 'gold standard' for statistical assessment of variation. The analyses in this atlas include the whole population, and there is therefore an argument to be made that statistical testing is unnecessary. The SKDE has used a combination of many measurements in our healthcare atlases (Balteskard et al. 2015; Moen, Olsen, et al. 2015; Moen, Rønnestad, et al. 2016). Our interpretation of variation is based on the following factors taken together:

- Ratios (FT and FT2)
- Treatment volume or size of patient sample (n)
- Stability of internal rates or proportions over time in a hospital referral area
- Clinical assessments of the observed variation
- Assessments of the underlying morbidity
- Overall assessments of the observed variation

Many sources contribute to the observed variation, and it is not practically possible to fully adjust for all of them. Full adjustment for differences in morbidity would require unrestricted access to the records of all patients, and even that would probably not be sufficient. Full adjustment for socioeconomic differences would require access to information not only about the patients' income and education, but also about the income and education of their parents and children. In addition, factors such as social network and day-to-day routines will also play a role. It is therefore not possible or desirable to use a statistical test or a single indisputable answer when interpreting variation.

Variation and prioritisation

Even though the term unwarranted variation is defined as described above, it can also be seen in relation to the objectives and priorities of the public health service. There is broad political consensus in Norway that we shall have a publicly funded health service that ensures equitable healthcare for everyone. Unwarranted variation between hospital referral areas represents a challenge to this objective.

Unwarranted variation in the use of health services represents a lack of equitable distribution of health resources, and thus a failure to prioritise based on severity and needs. The term health resources must be understood to encompass more than money, for example medical technology equipment (MR machines), professional staff (doctors, nurses) and hospital bed capacity with access to intensive care beds.

If variation is due to overuse that does not lead to a health gain, then resources are being used on the wrong patients. This could supplant or delay the treatment of patients that might have benefited more from treatment. Simply increasing the supply of resources in a situation with high unwarranted variation maintains potential overuse at the same time as efforts are being made to increase treatment capacity. The result could be that overtreatment increases because the fundamental reasons underlying the incorrect prioritisation are not being addressed. If variation is also due to underuse, that means that, in practice, patients are not receiving the services they should, objectively speaking, get. If that is the case, reallocation of resources may be a better way of reducing variation, not least because increasing capacity requires long-term investment in expertise.

It is therefore important to map unwarranted variation in the health service in order to be able to make rational and evidence-based prioritisation decisions, both at the micro- and macro-level, and to ensure that the population has equitable access to health services.

Variation, quality of treatment and patient safety

Variation that is caused by over- or underuse of health services represents a threat to the quality of treatment and to patient safety. Any contact with the health service carries with it a certain risk of illness, complications or injuries, regardless of the original reason for the contact. Admission to an intensive care unit entails exposing patients to hospital bacteria that are not part of a normal bacterial flora, and, at worst, this could make the patient sicker than he or she was before being admitted. Hospital admission is also associated with a risk of other patient injuries. If the patient might fare more or less equally well without the treatment in question, that means that undesirable patient injuries could result in a poorer outcome for the group as a whole than if no treatment had been provided.

There is broad debate in the international medical community about whether overdiagnosis and overtreatment in parts of the health sector are reducing the quality of the health services provided, and whether the outcomes are poorer than they would have been with a less aggressive approach. The British Medical Journal has since 2002 published a number of research articles and editorials under the heading 'Too much medicine'.[4] Medical examinations and treatment will always carry a risk of patient injuries, and this risk increases if too many patients are examined and treated. It may be safer and better to refrain from assessment and treatment if one is uncertain about whether it will result in a significant improvement in the patient's health.

3.5 Assessment of variation in this atlas

Generally speaking, random variation will be smaller the bigger the population, the bigger the number of patients in the patient sample, the fewer hospital referral areas and the smaller the differences between the populations of the different hospital referral areas. In this analysis, we consistently look at the same hospital referral areas, which means that the number of hospital referral areas and the size of the populations are kept constant, while the size of the patient samples varies. The scope of random variation will therefore represent a general challenge when making comparisons between hospital referral areas with big and small populations, particularly when looking at samples with a small number of treatments or contacts.

The rate for the number of contacts is influenced both by the number of patients and the contact frequency, and these factors can neutralise each other or work together and reinforce each other. If a hospital referral area has a relatively low number of patients (low patient rate) and each of these patients has relatively infrequent contact with the health service (low contact frequency), then the two reinforce each other and the hospital referral area's health service usage rate will be low. If a hospital referral area has a relatively low number of patients (low patient rate) and each of these patients is in frequent contact with the health service (high contact frequency), then the patient rate and the contact frequency neutralise each other. If a hospital referral area has a relatively high number of patients (high patient rate) and each of these patients is in frequent contact with the health service (high contact frequency), then the two reinforce each other and the hospital referral area's usage rate will be high.

This analysis covers elderly patients in Norway over a three-year period. It is challenging to estimate how much variation is natural and expected and how much is unexpected and can be deemed unwarranted. We look at the total service provision, but also at sub-samples comprising a relatively low number of patients. It is not possible, therefore, to define a universal or general rule for how much variation is permitted before it is deemed to be unwarranted. Generally speaking, with a larger patient sample, a lower ratio between high and low rates (less variation) can be accepted as expressing an unwarranted level of variation than for smaller patient samples.

The different figures in the atlas provide different information about the variation. Our interpretation of the observed variation is based on different ratios, treatment volume/size of patient samples, contact frequency, stability over time, underlying morbidity and clinical assessments, taken together.

[4] The BMJ's Too Much Medicine initiative

Chapter 4

Metode

4.1 Data

4.1.1 The Norwegian Patient Registry (NPR)

Data from NPR are used in most of the analyses. SKDE holds a licence from the Norwegian Data Protection Authority and has been granted dispensation from the duty of confidentiality to analyse data unique to individuals on activity in the somatic part of the specialist health service from the Norwegian Patient Registry (NPR). Data have been retrieved from the department stays file. SKDE has sole responsibility for the interpretation and presentation of the disclosed data. NPR has no responsibility for analyses or interpretations based on the disclosed data.

4.1.2 Control and payment of reimbursements to health service providers (KUHR)

Anonymous aggregate data for activity in the general practitioner service (regular GP (RGP) and emergency primary healthcare consultations) have also been obtained from the KUHR database. GPs send reimbursement claims for their patient contacts to the Norwegian Health Economic Administration (HELFO), where the claims are registered in the KUHR register. The Norwegian Directorate of Health is responsible for the KUHR register, but the system is administered by the Norwegian Labour and Welfare Administration (NAV).

4.1.3 The Norwegian Stroke Register

The Norwegian Stroke Register is the national quality register for stroke treatment. It is part of the Norwegian Cardiovascular Disease Registry and falls under the scope of the Regulations on the Cardiovascular Disease Registry that came into force on 1 January 2012. The Regulations require hospitals to report all patients admitted for a stroke to the Norwegian Stroke Register. The Norwegian Stroke Register registers all patients admitted to Norwegian hospitals with an acute stroke (primary diagnosis (ICD10) I61, I63, I64).

4.1.4 Statistics Norway (SSB)

Population figures for municipalities (Table 07459) and city districts (Table 10826) are taken from Statistics Norway's StatBank. In the analyses, the population figures are used as the denominator for the number of persons or events per 1,000 population, and for gender and age standardisation.

Since more people die during the course of a year in the oldest age groups, we have used estimated population figures for different ages in mid-year in some presentations. The number of people of a certain age is then calculated as an average of the number of a certain age one year and the number of people of this age plus one year in the following year. This applies to figures 6.3, 7.5 and 8.2. In the remaining analyses, the population figure as of 1 January the following year has been used as the population figure for the year in question.

4.2 Sample

The analyses in this report concern all contacts with publicly funded specialist health services, as well as GP consultations, for people aged 75 years or older in Norway in the period 2013–2015.

4.2.1 The general practitioner service

The description of activity in the general practitioner service used in this analysis is based on information about payments for RGP and emergency primary healthcare consultations. The number of consultations in the general practitioner service is based on reimbursement claims sent to the Norwegian Health Economic Administration (HELFO) by GPs in the period 2013–2015. RGP or emergency primary healthcare consultations for which at least one of the following tariff codes were included:[5]:

2ad GP consultation, daytime

2ak GP consultation, evening, night or weekend/holiday

2fk Consultation and supplement for call-out to surgery for emergency care while on out-of-hours emergency primary healthcare duty when a means of transport was used, for first patient

11ad Home visit by GP, daytime

11ak Home visit by GP, evening, night or weekend/holiday

4.2.2 Specialist health service

All contacts with the somatic specialist health service in the form of outpatient consultations, day patient treatment and hospital admissions have been counted on the basis of reporting to NPR from public hospitals, private hospitals with public funding and specialists in private practice under a public funding contract.

Contacts with private hospitals or specialists in private practice paid for in full by the patient or, e.g., an insurance company are not reported to NPR and are thus not included in our sample.

[5] The Norwegian Medical Association's normal tariff for RGPs and emergency primary healthcare 2014-2015.

Outpatient consultations carried out by physiotherapists or occupational therapists have been excluded from our analyses.

Our data from NPR do not include date of birth, only year of birth. Ages are therefore calculated as the difference between the year of contact and the year of birth.

For some contacts, information about the patient's sex and/or the municipality number is missing. This applies to a total of 22,007 consultations with specialists in private practice under public funding contracts, 1,445 consultations at public outpatient clinics and 1,159 hospital admissions over the three-year period. This equals 2% of all consultations by specialists in private practice under public funding contracts, while the number of excluded consultations is lower for public outpatient consultations and hospital admissions (fewer than 1 and 2 per thousand, respectively). These contacts have been excluded from the analyses. The number of excluded contacts for patient samples in each analysis is so low that they will have little influence on the results.

4.3 Other definitions

The elderly

In cases where this report uses the term 'elderly' without further specification, it means patients aged 75 years and older. The elderly are defined as patients who reach the age of 75 years or more in the year in which they were in contact with the health service. This means that, when the lower age limit for inclusion in the sample is 75 years, everyone who reached the age of 75 during the year of contact (year of treatment) will be included. This means that patients who turned 75 at the end of the year and were therefore 74 years old at the time of the contact (time of treatment) are also included in the sample.

Outpatient consultation

This analysis consistently uses two levels of contact: admissions and outpatient consultations. In our analyses, outpatient consultations are contacts classified as day patient treatment or admission lasting less than 24 hours, as well as outpatient consultations at hospitals and specialist consultations with specialists in private practice under a public reimbursement contract.

Admission

By admission is meant registrations in NPR coded as admissions with a length of stay of more than zero days. In addition, episodes of care (see definition below) with a length of stay of zero days, and where the patient is discharged as dead, are defined as admissions. Admissions can be planned or emergency admissions, and they are assigned to these categories on the basis of administrative coding.

Episode of care

A patient can be assessed, treated or followed up in several different departments at a hospital or transferred between different hospitals. In addition, NPR reporting practices vary between health

trusts. In order to be able to count patients in a consistent manner regardless of the health trusts' reporting practices and transfers between departments and hospitals, we have defined the term 'episode of care'.

All admissions/consultations where the time of registration for one department stay is less than eight hours before the time of discharge from a previous admission/consultation for the same patient are defined as an episode of care (Hassani et al. 2015; Hansen et al. 2016). This means that all department stays that are less than eight hours apart count as one episode of care, regardless of whether the stays took place in the same or different hospitals. An episode of care can also consist of a single department stay or outpatient consultation.

An episode of care can consist of admissions or outpatient consultations, or a combination of admissions and outpatient consultations with less than eight hours between each admission or consultation. An episode of care comprising both outpatient consultations and admissions is defined as an admission. An episode of care comprising both planned and emergency admissions is defined as an emergency admission.

Examples of an episode of care

- a patient is admitted to one department, transferred to another department at the same hospital and discharged
- a patient is admitted to one department, has an outpatient consultation, is transferred to another department at the same hospital and discharged
- a patient is admitted to a local hospital, transferred to a regional hospital and transferred back to the local hospital without having been discharged or with less than eight hours between discharge and the next contact with the specialist health service
- a patient has several outpatient consultations less than eight hours apart.

Contact

In this context, contacts are a collective term that covers both episodes of care (outpatient consultations and admissions) and RGP and emergency primary healthcare consultations

Length of stay

By length of stay is meant the duration in days of an admission/episode of care. Length of stay is calculated both as rates for the total number of days per hospital referral area and as an average number of days per admission/episode of care.

Hospital referral area

By hospital referral area is meant the geographical area for which the health trusts are responsible for providing services. For definitions of the hospital referral areas, see helseatlas.no. The hospital referral areas are defined based on the municipality or city district where the patient lives. Residents of the referral areas of Lovisenberg Diaconal Hospital and Diakonhjemmet Hospital are merged into one area called 'Inner Oslo'. Shortened forms of the names of the hospital referral areas are used in the report, in the fact sheets and in the cartographic representations in the atlas, see Table 4.1.

Table 4.1: Hospital referral areas and short names.

Hospital referral area for:	Short names of areas
Finnmark Hospital Trust	Finnmark
University Hospital of Northern Norway health trust	UNN
Nordlandsykehuset health trust	Nordland
Helgelandssykehuset health trust	Helgeland
Helse Nord-Trøndelag health trust	Nord-Trøndelag
St. Olavs Hospital health trust	St. Olavs
Helse Møre og Romsdal health trust	Møre og Romsdal
Helse Førde health trust	Førde
Helse Bergen health trust	Bergen
Helse Fonna health trust	Fonna
Helse Stavanger health trust	Stavanger
Østfold health trust	Østfold
Akershus University Hospital health trust	Akershus
Oslo University Hospital health trust	OUS
Lovisenberg Diaconal Hospital Diakonhjemmet Hospital	Inner Oslo
Innlandet Hospital health trust	Innlandet
Vestre Viken health trust	Vestre Viken
Vestfold Hospital health trust	Vestfold
Telemark Hospital health trust	Telemark
Sørlandet Hospital health trust	Sørlandet

Gender-adjusted and age-adjusted rates

Since we want to compare the use of health services in geographical areas with different gender and age compositions, we use rates adjusted for gender and age. All the rates are calculated per 1,000 population aged 75 years and older. An average rate is calculated for the years 2013–2015, in addition to annual rates per hospital referral area.

The unadjusted rate for an event (for example treatment of hip fractures) in a hospital referral area is calculated as follows:

$$\frac{\text{Number of hip fractures treated in people aged 75 and older in the hospital referral area}}{\text{Number of people aged 75 and older in the hospital referral area}}$$

The rates are adjusted for gender and age by means of direct standardisation using the population of Norway in the relevant age group in 2014 as the reference population, broken down by gender and age groups.[6] The gender-adjusted and age-adjusted rates are the rates that the areas would have had if the composition of their elderly population were identical to that of the country as a whole. The gender-adjusted and age-adjusted rate per inhabitant for an event (e.g. hip fracture) in a hospital referral area j is calculated as follows:

$$\text{Rate}_j = \sum_{i=1}^{K} \frac{n_{ij}}{N_{ij}} \times a_i \tag{4.1}$$

with n_{ij} being the number of events (hip fractures) in hospital referral area j and gender and age group i, N_{ij} being the population of hospital referral area j and gender and age group i, and a_i

[6] The age groups are defined in such a way that there are about as many events in each age group. The division into gender and age groups will consequently vary between patient samples.

being the national proportion that gender and age group i makes up of the Norwegian population. j is the number of hospital referral areas and K is the number of gender and age groups.

Gender-adjusted and age-adjusted proportions

Sometimes, it is more expedient to calculate proportions than rates. That is done to look at the proportion of patients in the relevant patient population where a certain event occurs. For example, the unadjusted 30-day mortality proportion following admission for hip fractures in a certain hospital referral area is calculated as follows:

$$\frac{\text{Number of deaths within 30 days of admission for a hip fracture among the elderly in the hospital referral area}}{\text{Number of admissions for a hip fracture among the elderly in the hospital referral area}}$$

The proportions are adjusted using direct standardisation. The gender-adjusted and age-adjusted proportions are the proportions that the hospital referral area would have had if the composition of its patient population were identical to that of the elderly patient population nationally.

The adjusted proportion for a given event (e.g. death within 30 days of admission for hip fracture) in hospital referral area j is calculated as follows:

$$\text{Proportion}_j = \sum_{i=1}^{K} \frac{m_{ij}}{n_{ij}} \times a_i \tag{4.2}$$

with m_{ij} being the number of events (deaths within 30 days of admission for hip fracture) in hospital referral area j and gender and age group i, n_{ij} being the number of observations (admissions for hip fractures) in hospital referral area j and gender and age group i, and a_i being the national proportion that gender and age group i makes up of admissions of hip fracture in Norway. j is the number of hospital referral areas and K is the number of gender and age groups.

Ratios

By ratio is meant the relationship between the highest and lowest rates, i.e.

$$\text{Ratio} = \frac{\text{highest rate or proportion}}{\text{lowest rate or proportion}}$$

The ratio show the total variation, but it is not always enough to only look at the extreme values (highest and lowest rates). The analysis therefore take two ratios into consideration: the ratios between the highest and lowest (FT) and between the second highest and second lowest (FT2). Big differences between these two ratios could suggest a large element of random variation.

The size of the patient sample

Generally speaking, the proportion of the total variation that is due to random variation will be smaller the bigger the population, the bigger the number of patients in the patient sample, the fewer hospital referral areas and the smaller the differences in population between the hospital referral areas. The number of hospital referral areas and the population are constant in the analyses, while the size of the patient samples varies. It will therefore be challenging in general to

estimate the scope of random variation when making comparisons between hospital referral areas with big and small populations, and particularly in the case of small patient samples. With sufficiently big patient samples, the proportion of overall variation caused by random variation will be smaller.

We have made it a general requirement that, on average, there should be at least five events in each gender and age group in each hospital referral area (which means that $n_{ij} \geq K \cdot 5$ in equations 4.1 and 4.2). We use six gender and age categories for adjustments in this atlas (three age groups and two genders), which means that we require a minimum of 30 events in each hospital referral area to show the result for an area.

Private service providers

In this report, private service providers are defined as all private hospitals with activity-based funding and all specialists in private practice under public funding contracts who provide treatment on behalf of regional health authorities. Private non-commercial hospitals, such as Diakonhjemmet Hospital, Haraldsplass Diaconal Hospital and Lovisenberg Diaconal Hospital, are considered public hospitals for the purposes of this atlas.

It is important to note that treatment performed without a contract with the regional health authorities (performed by private hospitals and specialists in private practice and paid for in full by the patient) are not included in the figures we present.

Readmission after an episode of care

The definition of readmission is based on the definition used by the Norwegian Knowledge Centre for the Health Services (Hansen et al. 2016), with a few changes. A readmission is defined as an emergency admission, regardless of reason, between eight hours and 30 days after a hospital discharge (primary admission). Unlike the Knowledge Centre's definition, we define all emergency admissions within 30 days as readmissions, regardless of the primary diagnosis.[7]

30-day and 360-day mortality proportion

By 30-day and 360-day mortality proportion is meant the number of patients in the period 2013–2015 who died within 30 and 365 days, respectively, after their final admission with a given condition, as a proportion of all patients who were admitted for the condition in question during the same period.

The way in which the health service is organised and individual hospitals' admission and discharge practices can have a bearing on the mortality figures. For example, if a hospital has a lower threshold for admitting patients with COPD, that will increase the probability that these patients will have been admitted to hospital within 30 days before dying, which could result in a higher mortality proportion for this health trust's referral area in our calculations. Differences in mortality between hospital referral areas do not necessarily reflect differences in the probability of death after admission or in the quality of treatment. They could instead mean that the health services are organised differently in different hospital referral areas.

[7] The Knowledge Centre does not count emergency admissions as readmissions if the primary diagnosis code is one of the following: C, D00-D09, D37-D48, V0n-Y98, T00-T99 (except T40-T50 and T80-T89), and Z00-99 (except Z03, Z42, Z47-Z48, Z54, Z74-Z75).

Correlation

Correlation was examined using Spearman's correlation coefficient (r_s) (Spearman 1904). We examined the correlation between different pairs of the following variables (see the results chapters): gender-adjusted and age-adjusted averages for rates (number of events per 1,000 elderly), length of stay or proportion for the years 2013–2015 per hospital referral area.

It is a weakness of the correlation analyses in this report that all hospital referral areas are given the same weight in the analysis, even though the number of elderly varies greatly between hospital referral areas. It is also not given that a correlation based on analyses where the observed unit is the average for groups of the population (for example all elderly in a hospital referral area) will also be present if the analyses were based on individuals. A third complicating factor is that correlation between two variables could, in reality, be wholly or partly caused by a third factor associated with the two factors whose correlation we are analysing. These are some of the reasons why the correlation analyses presented here does not provide sufficient basis for concluding that a causal relationship exists. However, they can serve as a point of departure for more detailed analyses based on data at the individual level.

Chapter 5

The population aged 75 years and older, and their use of health services

This report primarily describes the use of specialist health services among the Norwegian population aged 75 or older (hereinafter called the elderly) during the years 2013–2015. In addition to describing the use of specialist health services in different fields, the report also provides overall figures for the general practitioner service and the specialist health service. This chapter provides a brief overview of the composition of the elderly that are included in the analyses and their use of health services.

5.1 The elderly population in Norway

Figure 5.1 shows the average number of elderly per year broken down by gender and two-year age groups.

There are more women than men in all age groups, particularly among the oldest groups. The age group 75–76 years consists of nearly 35,000 women and 30 000 men on average. Naturally, the number of elderly decreases with increasing age, and, on average, the age group 99–100 years consists of 1,000 women and 200 men.

Figure 5.2 shows the number of elderly living in the different hospital referral areas. The number of elderly varies from approx. 5,000 in Finnmark hospital referral area to approx. 35,000 in the Innlandet and Vestre Viken areas. Women are in the majority in all the hospital referral areas. The proportion of women among the elderly is approx. 65%, compared with approx. 50% in the Norwegian population as a whole during the same period. The hospital referral areas OUS and Inner Oslo have the highest proportions of women, at 64% and 63%, respectively.

Figure 5.3 shows the proportion of elderly in the total population, broken down by hospital referral area and age group. The proportion of elderly varies between hospital referral areas, from 4.5% to nearly 9%. Inner Oslo has the lowest proportion of elderly, while Innlandet, Førde and Helgeland hospital referral areas have the highest proportions. We also see that the age composition of the elderly group varies somewhat between hospital referral areas. Finnmark has the lowest proportion of people over 84 years of age (27%), while OUS and Inner Oslo have the highest

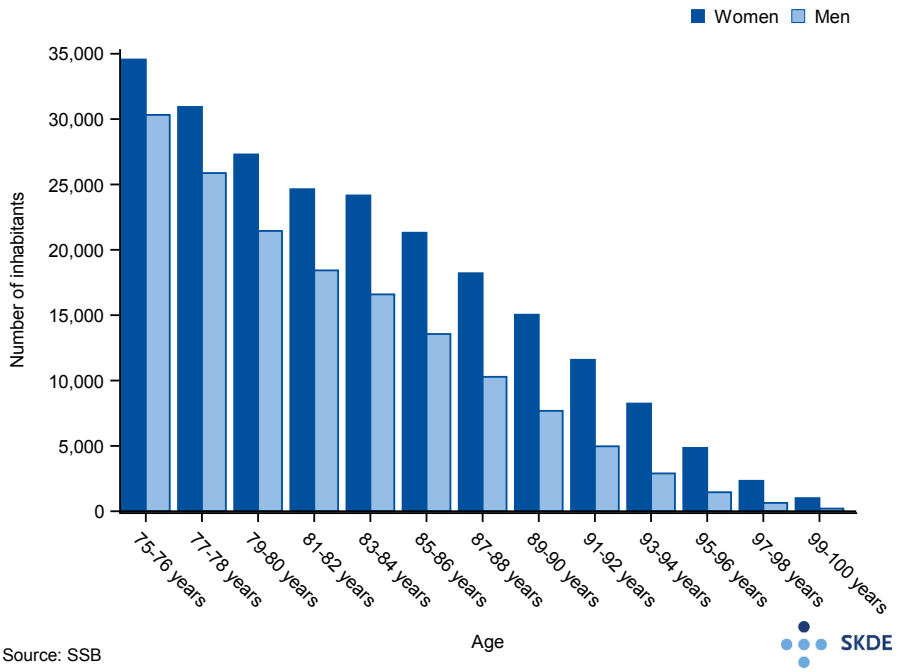


Figure 5.1: Number of persons in the different gender and age groups for the population aged 75 years or older, average per year for the period 2013–2015.

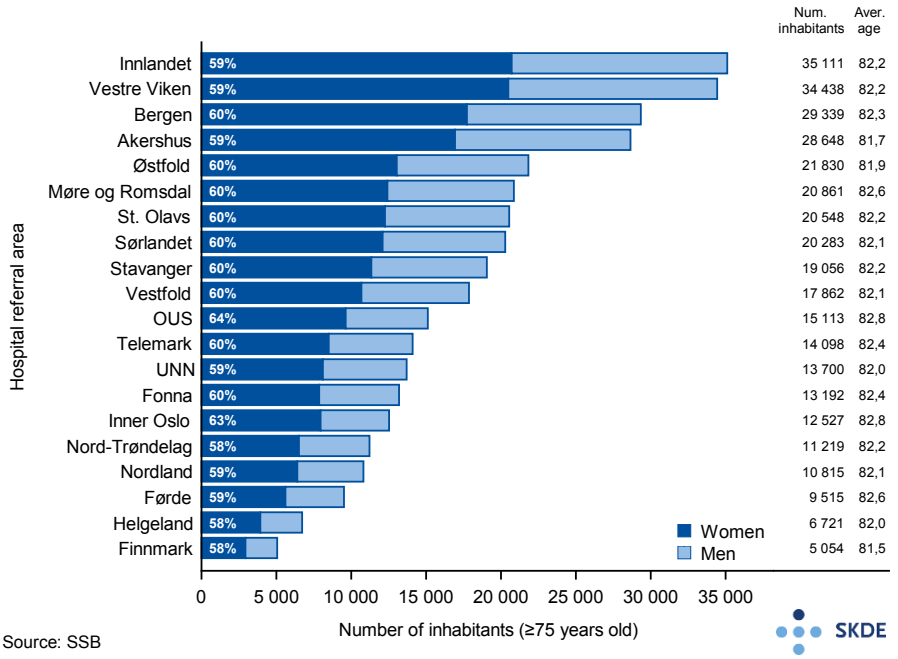


Figure 5.2: Number of persons aged 75 years or older living in the different hospital referral areas, broken down by gender, average per year for 2013–2015. Average population and average age on the right.

(36%). This means that the elderly population is somewhat older in the Oslo region than in Finnmark, and this may explain the slightly higher proportion of women in these hospital referral areas, since we know that there were more women than men in the older age groups (Figure 5.1).

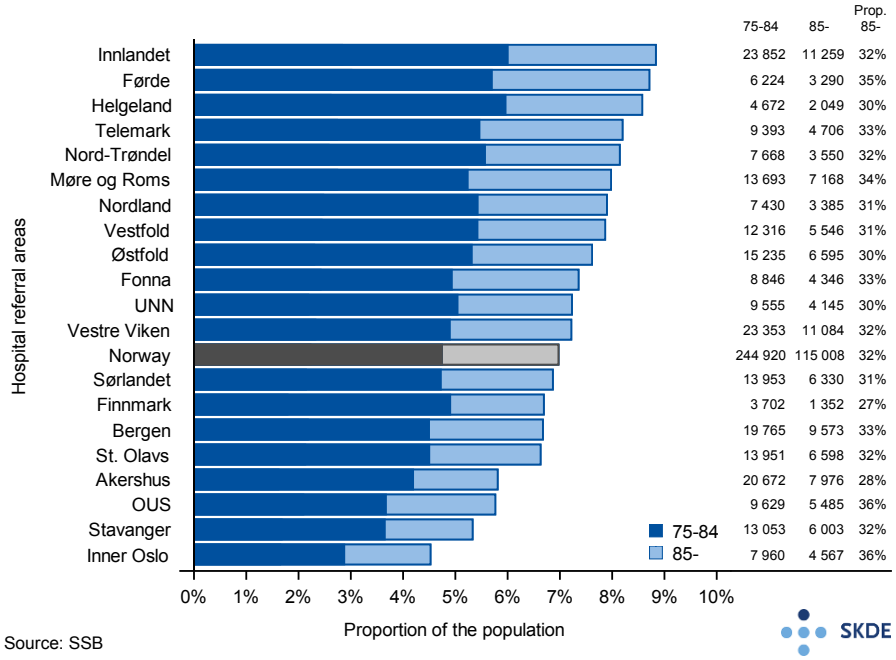


Figure 5.3: Proportion of the population of Norway aged 75–84 and 85 years or older, respectively, broken down by hospital referral area, average per year for the period 2013–2015. Average population in the two age groups on the right.

5.2 The elderly population's use of health services

Table 5.1 provides an overall overview of the distribution of different types of contacts in the general practitioner and specialist health services for the elderly population of Norway.[8] On average, the specialist health service has 1.3 million contacts with elderly patients, and each patient has an average of 4.5 contacts.

Table 5.1: Number of contacts (n), number of patients and contacts per patient broken down by types of contact in the general practitioner and specialist health services, average per year for the period 2013–2015

		n	Patients	Contacts per pat.
Specialist health service	Inpatient admissions	178,571	105,918	1.7
	Outpatient services, public	774,585	197,797	3.9
	Outpatient services, private service providers	342,598	148,217	2.3
	Contacts, total	1,295,754	286,844	4.5
General practitioner service	RGP	1,929,011		
	Emergency primary healthcare	160,471		
	Contacts, total	2,089,869	334,844	6.2

The number of admissions is approx. 178,000 per year, and the average number of admissions per patient is 1.7. Each year, approx. 775,000 consultations take place in public outpatient clinics and approx. 340,000 with specialists in private practice under public funding contracts. The average

[8]Patient numbers in the specialist health service are counted in two different ways: 1) per type of contact (admissions, public outpatient services and specialists in private practice under public funding contracts, respectively), and 2) for the specialist health service in total. Since the same patient can both be admitted and have contact with public outpatient services and specialists in private practice under public funding contracts in the course of a year, the total number of patients in the specialist health service is lower than the number arrived at by adding up the number of admitted patients and the number of patients in contact with public outpatient services/specialists in private practice under public funding contracts.

number of consultations per patient per year is 3.9 for outpatient clinics and 2.3 for specialists in private practice under public funding contracts.

The total number of contacts with elderly patients in the general practitioner service is just over two million per year. Approximately 160,000 of these consultations (7.7%) were emergency primary healthcare contacts. Each patient was seen by a GP 6.2 times a year on average.

Figure 5.4 shows the elderly's proportion of the population's total use of general practitioner services and specialist health services at the overall level. The elderly make up approx. 7% of the population, but account for 14% of all patient contacts in the general practitioner service and approx. 16% of all contacts in the specialist health service. This means that the elderly have more frequent contact with both GPs and the specialist health service than the rest of the population. Approx. 15% of outpatient consultations in the specialist health service are with elderly patients, and an even higher proportion of admissions concern elderly patients. Approx. 23% of all admissions and 26% of emergency admissions involve elderly patients. The elderly also account for 28% of all inpatient hospital days. A total of 34% of readmissions at Norwegian hospitals concern patients aged 75 years or older. As age increases, so does the use of nursing home and specialist health services, while the use of regular GP services decreases (Statistisk sentralbyrå 2013).

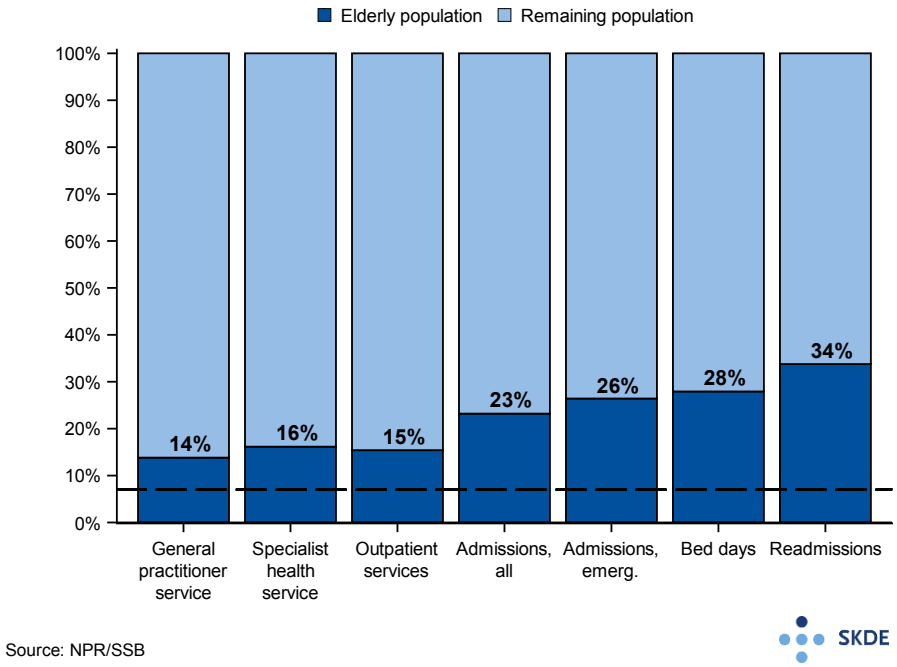


Figure 5.4: The elderly's use of the general practitioner service and the specialist health service (outpatient services, all admissions, emergency admissions, length of stay and readmissions) as a proportion of the use by the population as a whole, average per year for the period 2013–2015. The dotted line indicates the proportion of elderly in the population (7%).

The present breakdown of primary and specialist health services between the elderly and the rest of the population also provides a clear indication of how a constantly increasing number of elderly (Figure 5.5) will affect the need for health services in future.

5.3 Population projections

According to Statistics Norway's population projections, the number of people in Norway aged 75 years or older, and the proportion of the population aged 75 years or older, will increase markedly in the coming years.[9] Figure 5.5 shows the estimated number of people aged 75 years and older in Norway from 2005 to 2040 divided into two age groups.

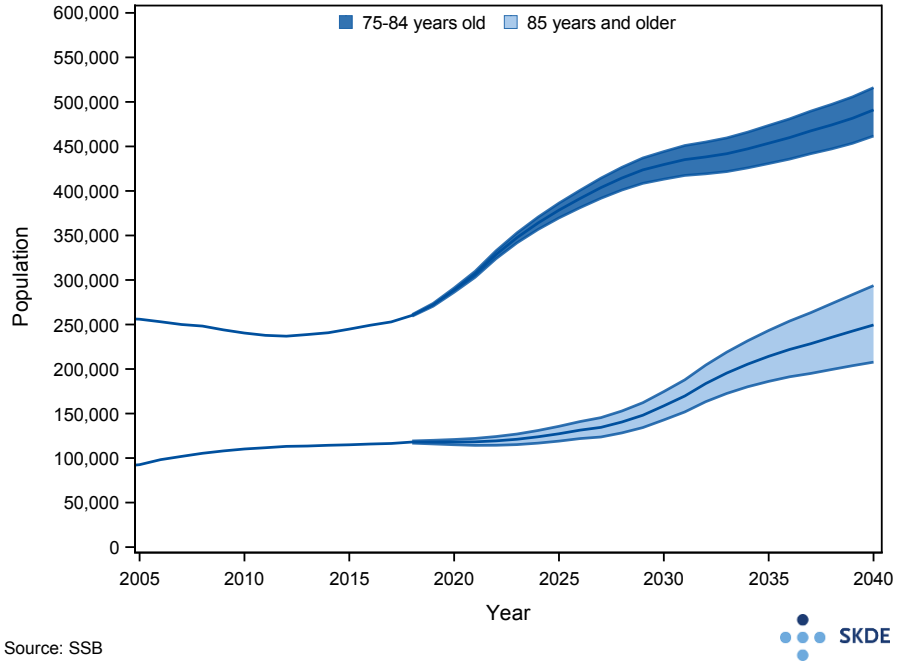


Figure 5.5: Population aged between 75 and 84 years (dark blue) and 85 years and older (light blue) 2005-2017 and from 2017 to 2040 according to different population projection estimates from Statistics Norway. The population projections are divided into three scenarios: 'Strong ageing' (top line), 'weak ageing' (bottom line) and a medium alternative (middle line)[10].

As of 1 January 2017, a total of 369,309 persons aged 75 years and older were resident in Norway. Of these, 252,931 were between 75 and 84 years old, while 116,378 were 85 years or older. According to Statistics Norway's population projection (medium alternative), the number of persons aged 75 years or older will exceed 740,000 by 2040. This means a doubling of the number of elderly people. The number of persons between 75 and 84 years of age will increase by 70% by 2030 and by more than 90% by 2040. The number of persons aged 85 years and older will increase by about 115% by 2040, to nearly 250,000. The steepest increase in the oldest age group will be seen after 2030, while the increase in the number of persons aged between 75 and 84 years will be steepest up until 2030.

Figure 5.6 shows the proportion of the population as a whole that will be 75 years or older up until 2040, divided into the age groups 75 to 84 years and 85 years and older. Today, 7% of the population are 75 years or older. In 2040, this proportion will be nearly 12% if Norway

[9]The population projection figures are taken from Statistics Norway ('Table 11168: Projected population on 1 January, by gender and age, in nine alternatives' and Tønnessen et al. (2016)), where the projections are based on different scenarios as regards fertility rates (Syse, Hart, et al. 2016), life expectancy (Syse, Pham, et al. 2016), and immigration and emigration (Cappelen et al. 2016)

[10]The medium (main) alternative is based on medium development in fertility, life expectancy and immigration. The figures for 'weak ageing' are based on high fertility, a slight increase in life expectancy and high immigration. 'Strong ageing' is based on a considerable increase in life expectancy, low fertility and low net immigration.

experiences medium development in fertility, life expectancy and immigration. The proportion of people aged between 75 and 84 years will increase from 4.8% today to more than 7% in 2030. The proportion aged 85 years and older will not increase until 2025, but will then increase from the present 2.2% to nearly 4% in 2040.

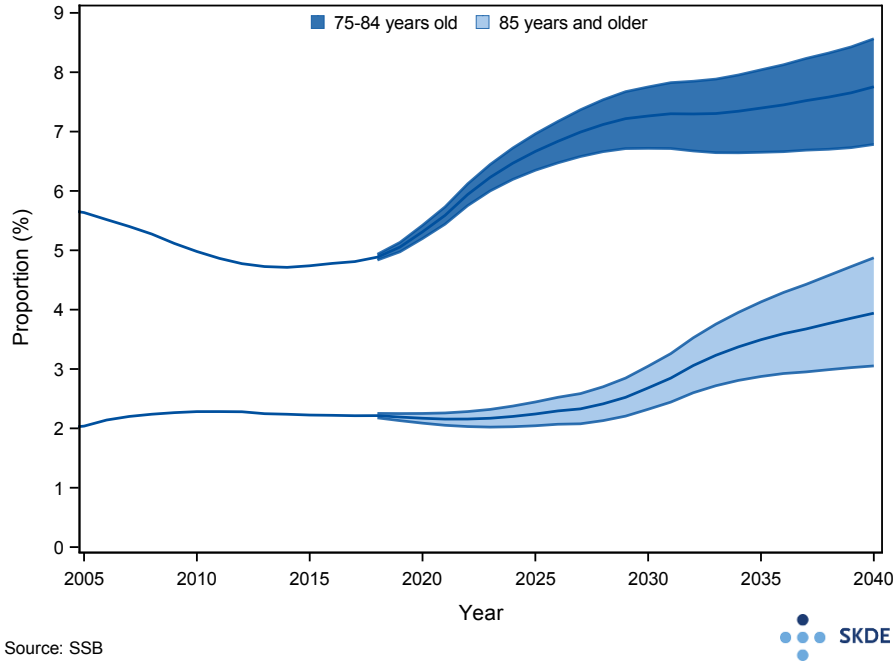


Figure 5.6: Proportion of the population aged between 75 and 85 years (dark blue) and 85 years and older (light blue) 2005-2017 and projected until 2040 according to different population projection estimates from Statistics Norway.

There are considerable regional differences in the proportion of the population aged 75 years or older (Figure 5.7). The hospital referral areas Inner Oslo (4.4%), OUS (5.5%), Stavanger (5.5%) and Akershus (6.0%) stand out because the proportion of their population aged 75 years or older is particularly low. Based on the population projection's medium alternative, the hospital referral areas Inner Oslo, Stavanger and Akershus will experience the strongest increase in the number of elderly up until 2040, with an increase of 133%, 131% and 126%, respectively. Even though these hospital referral areas have a low proportion of elderly today, and will, according to the medium alternative, continue to have a low proportion of elderly compared with other hospital referral areas, these areas will experience the biggest relative increase.

The hospital referral areas Innlandet (8.9%), Helgeland (8.8%) and Førde (8.7%) have the highest proportion of elderly as of 1 January 2017. According to the population projection's medium alternative, these areas will also have the highest proportions of elderly in their population in 2040, at 14.2%, 15.0% and 14.8%, respectively.

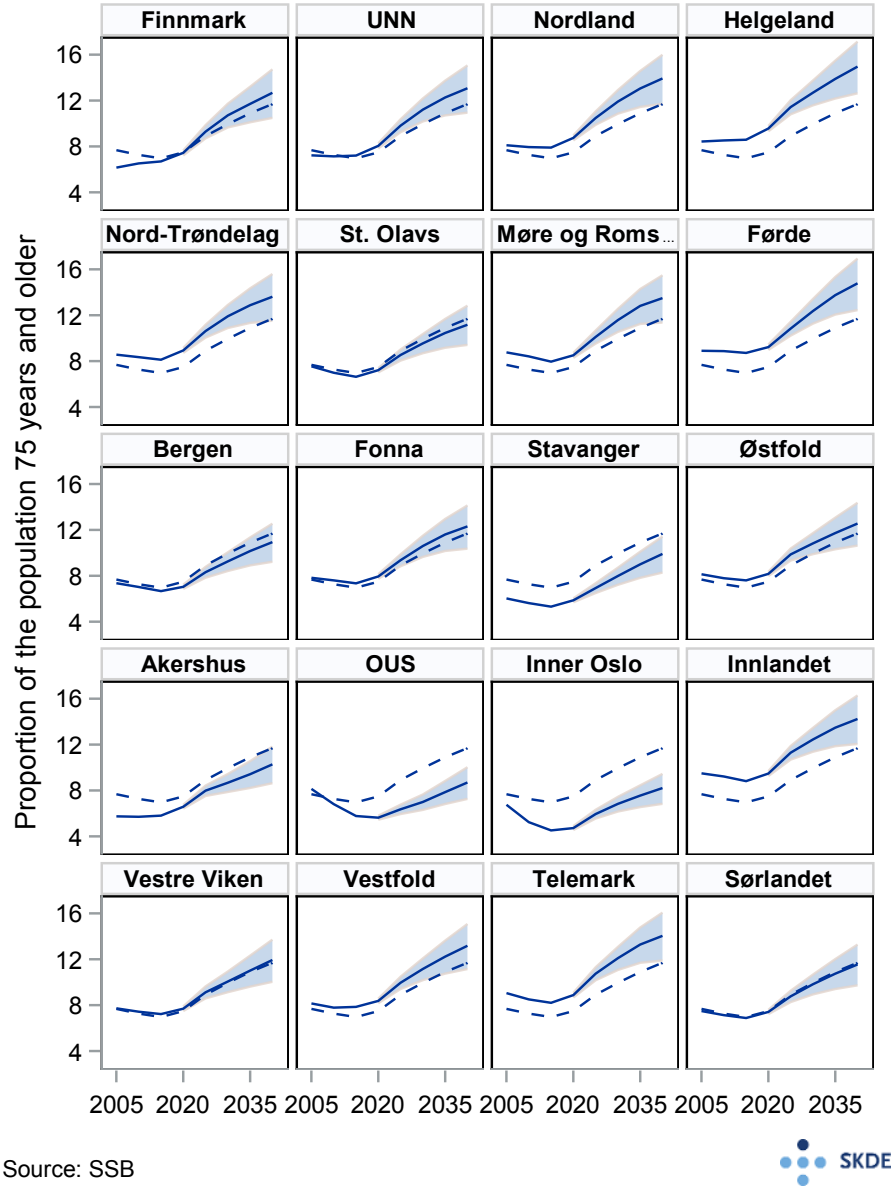


Figure 5.7: The proportion of the population aged 75 years or older for the years from 2005 to 2017 and projected from 2017 to 2040, broken down by hospital referral area. The proportions for the years 2017–2040 are based on Statistics Norway's high, medium and low population projection alternatives. The dotted line shows the medium alternative for the country as a whole.

Chapter 6

Results, the general practitioner service

The primary healthcare service consists of a number of municipal services, such as public health centres and school health services, mental health work, home care services, nursing homes and the general practitioner service (RGPs and emergency primary healthcare).[11] The idea of municipal autonomy is deeply rooted in Norway. It is based on the belief that local control will result in better service quality, more correct prioritisation and more efficient use of resources. The central government therefore has far less control over the content of municipal health and care services and is less able to ensure uniform service provision and performance than in the specialist health service, which is state-owned.

The 2012 Coordination Reform required all municipalities to establish municipal emergency bed units (KAD). The purpose of these units is primarily to assess and treat locally patients with a known illness, thus avoiding hospital admission. By June 2015, 280 out of 428 municipalities had established KAD units with a total of 447 beds, approximately one third of which were in use (Styringsgruppen for forskningsbasert følgeevaluering av samhandlingsreformen 2016). The regular GP (RGP) scheme, which was introduced in 2001, entitles all residents of Norway to be registered with a regular GP. Most regular GPs are self-employed, and municipal control of the operation and content of this service is more or less non-existent.

RGPs send reimbursement claims for their patient contacts to the Norwegian Health Economic Administration (HELFO), where the claims are registered in the KUHR register (control and payment of reimbursements to health service providers). The Norwegian Directorate of Health is responsible for the KUHR register, but the system is administered by the Norwegian Labour and Welfare Administration (NAV). The register contains data about all reported contacts in the general practitioner service broken down by simple demographic variables such as age, gender and place of residence. Diagnoses are also reported, but inaccurate reporting is assumed to be high. The available data regarding other primary healthcare activities are uncertain and not very suitable for analysis.

[11] The Lovdata legal information website. Health and Care Services Act

Sample

For analyses of the general practitioner service, data have been obtained from the KUHR register for daytime RGP consultations defined by the tariff codes 2ad and 11ad (surgery or home visit) or emergency out-of-hours primary healthcare consultations 2ak, 2fk and 11ak on weekdays between 16.00 and 08.00, weekends and public holidays (surgery or home visit), in accordance with the Norwegian Medical Association's normal tariff for RGPs and emergency primary healthcare. A consultation is defined as an instance of direct contact between a doctor and patient in premises suitable for treatment. A consultation must include a medical assessment/conversation.[12] Telephone consultations are therefore not included.

The figure for the number of nursing home places in Norway is taken from Statistics Norway's StatBank, Table 09928, nursing home places. In order to compare the different hospital referral areas, the number of nursing home places is stated per number of inhabitants aged 75 years or older, and not adjusted for age or gender. The hospital referral areas Inner Oslo and OUS are merged into one hospital referral area referred to as Oslo due to a lack of information about which hospital referral area the nursing homes in Oslo belonged to.

Findings

Nearly two million daytime RGP consultations with elderly patients take place each year (Figure 6.1), either in GPs' surgeries or as home visits. The consultation rates in the hospital referral area are mostly very stable over the three-year period. Women are in the majority (58%), and the average age in the sample is 81.6 years (see appendix). Residents in Stavanger hospital referral area used their regular GPs during the daytime 30% (1.3 times) more than residents in the Finnmark area.

Outside ordinary working hours, elderly patients have more than 160,000 consultations at municipal emergency primary healthcare services or as home visits (Figure 6.2). The gender distribution is similar to that for RGP consultations, 59% women, while the average age is nearly two years older, at 83.4 years (see appendix). There is little variation within each hospital referral area over the three-year period. Residents of Finnmark hospital referral area use the emergency primary healthcare services three times more than residents of Inner Oslo (the referral areas of Diakonhjemmet and Lovisenberg hospitals). If we choose to exclude Finnmark due to the unusually high emergency primary healthcare rates, the variation is more moderate, with a difference of 70% between the hospital referral areas UNN and Inner Oslo.

In the age group 75 to 80 years, more than 90% of the population is in contact with the general practitioner service, and the gender distribution is even (Figure 6.3). The proportion of women who are in contact with the general practitioner service decreases with increasing age, while the proportion of men remains reasonably stable until around the age of 95. Among the oldest age group, 99-100 years, 60% (590 patients) of all women have been in contact with the general practitioner service at least once, compared with 77% (160 patients) of all men of the same age.

In total, Norway has just over 40,000 nursing home places for users of all ages. Oslo hospital referral area (OUS and Inner Oslo have been merged due to lack of information about city districts) has the highest nursing home rate, i.e. number of beds per 1,000 population aged 75 years and

[12] The Lovdata legal information website. Regulations concerning benefit to cover expenses relating to examination and treatment by a doctor.

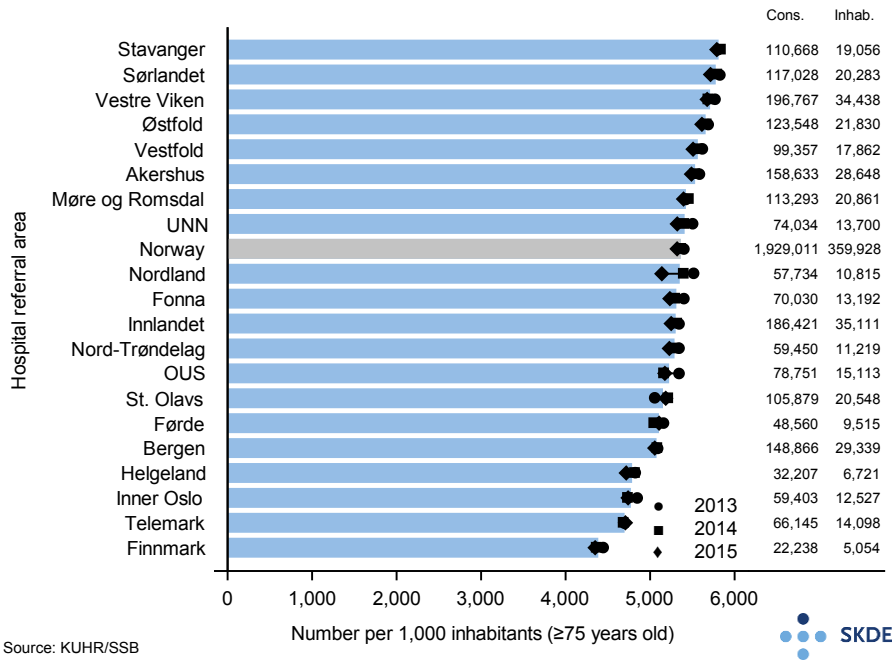


Figure 6.1: Daytime RGP consultations. Number of consultations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Annual rate shown by symbol. Average number of consultations and inhabitants aged 75 years and older on the right.

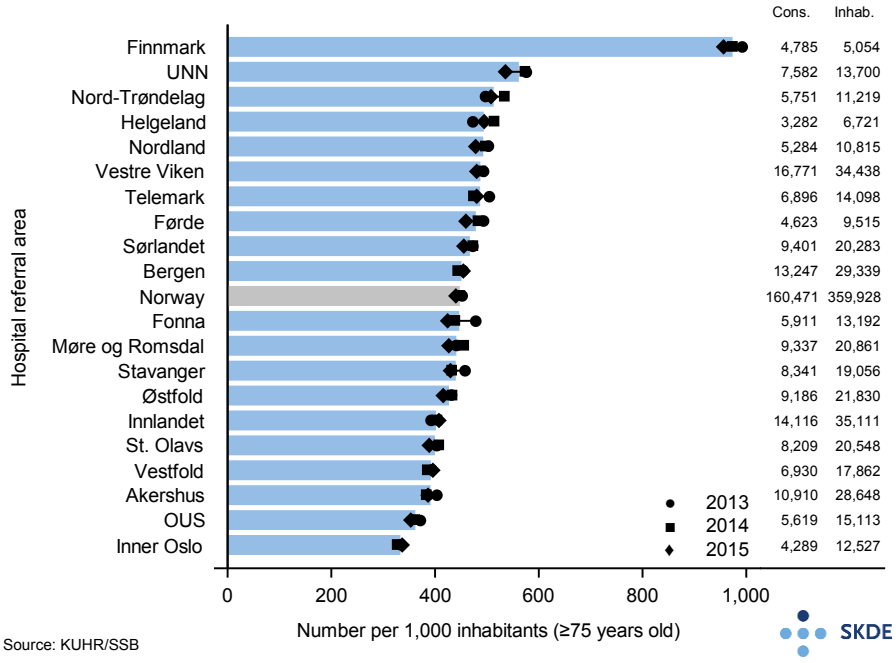


Figure 6.2: Emergency primary healthcare. Number of emergency primary healthcare consultations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of consultations and inhabitants aged 75 years and older on the right.

older (Figure 6.4). The rate for Oslo is 1.5 times (50%) higher than for Vestfold hospital referral area.

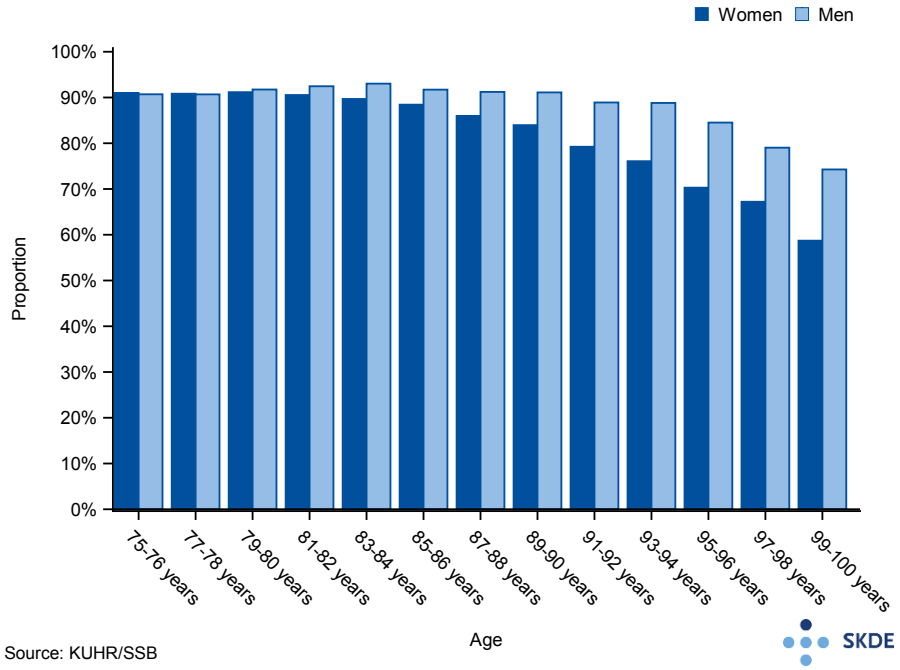


Figure 6.3: Proportion of the population aged 75 years and older who have been in contact with the general practitioner service (RGP and/or emergency primary healthcare) in 2015 divided into two-year age groups.

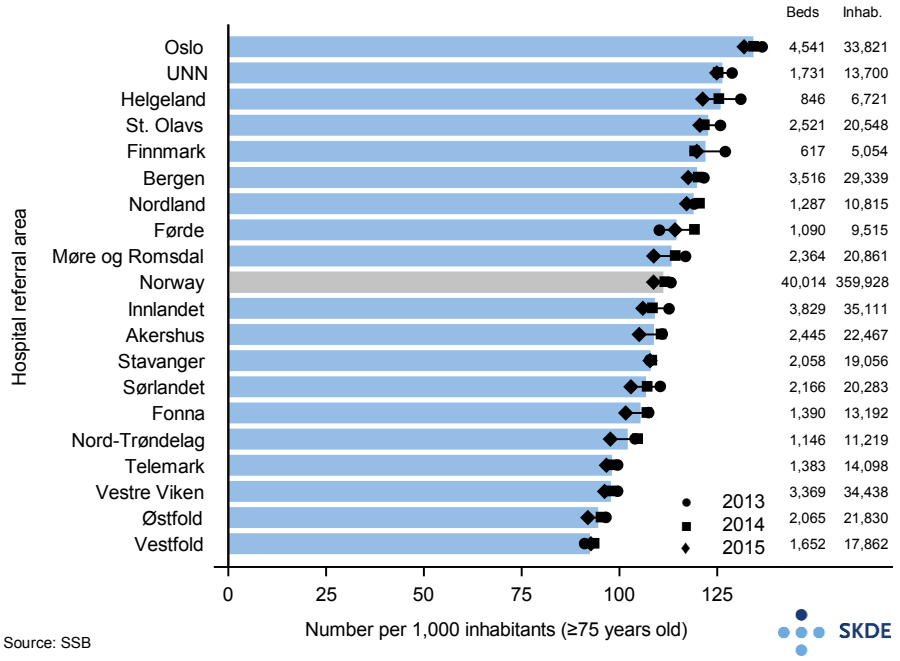


Figure 6.4: Nursing home beds. Number of nursing home beds per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of nursing home beds and inhabitants aged 75 years and older on the right. In this figure, OUS and Inner Oslo hospital referral areas are merged to form Oslo.

Comments

Approx. 360,000 elderly patients have a total of nearly two million RGP consultations each year. The elderly make up approx. 7% of the Norwegian population and account for approx. 14% of all

RGP consultations regardless of age. Since morbidity increases with age, the elderly population's use of RGP services is considered relatively low rather than high. There is no great geographical variation in the elderly's use of their regular GPs, but residents of Finnmark hospital referral area use such services somewhat less than residents of other areas. Conversely, Finnmark's usage rates for emergency primary healthcare are extremely high. Parts of Finnmark are experiencing challenges in terms of stable RGP coverage, and the service is characterised by the use of locum doctors. This probably influences the use of emergency primary healthcare services rather than regular GP appointments in the daytime. If we look at the elderly's overall use of general practitioner services (RGPs and/or emergency primary healthcare), Finnmark has a higher rate than Helgeland, Telemark and Inner Oslo hospital referral areas. There is little variation in the overall use of general practitioner services. The ratio between Inner Oslo, which has the lowest rate, and Stavanger, with the highest rate, is 1.2 (see appendix).

It may appear that the more densely populated parts of Norway tend to have somewhat higher regular GP rates than more sparsely populated areas, but this tendency is not consistent. The proportion who are in contact with the general practitioner service decreases with increasing age, and the proportion of women who use RGP/emergency primary healthcare services is lower than the proportion of men. After the age of 80 years, the proportion of women admitted to nursing homes and other institutions is higher than for men (Statistisk sentralbyrå 2013). This could explain part of the observed gender difference, since nursing home residents are seen by doctors without this being registered as an RGP consultation. Moreover, the possibility that healthier elderly women do not contact their regular GP cannot be disregarded.

Nursing homes for round-the-clock nursing and care are an important part of the primary healthcare service. Municipalities have a statutory duty to provide nursing home stays or similar if that is the only way to guarantee that a patient receives necessary and satisfactory health and care services. Most nursing home places are for long-term residents, but there are also a large number of short-term places with a high turnover. The number of nursing home beds per 1,000 elderly varies to a surprising extent. Oslo hospital referral area has 50% more nursing home beds per 1,000 elderly than the Vestfold area. It must be noted that these nursing home beds are not just for elderly patients, but also for younger people in need of nursing and care. The number of nursing home beds per 1,000 elderly is a factor that can help to explain the variation in use of RGP services, because when residents at nursing homes are seen by a doctor, that is not registered in the KUHR database as an RGP consultation. Nursing home patients are under observation by trained staff and can be treated more quickly when acute illness occurs. This can prevent some hospital admissions. Finnmark hospital referral area has 40 community hospital beds that are funded and reported as part of the specialist health service, and are therefore not included in the analysis for nursing home beds. These 40 beds are divided between 16 different municipalities and partly function as a supplement to the municipal KAD beds (Heiberg 2012).

Chapter 7

Results, the somatic specialist health service

7.1 Somatic specialist health service

The specialist health service includes somatic and mental hospitals, ambulance services, outpatient clinics and treatment centres, training and rehabilitation institutions, institutions for interdisciplinary specialist substance abuse treatment, prehospital services, specialists in private practice, and laboratory and radiology services.[13] Patients are referred to the specialist health service by their regular GP, who can be said to function as a gatekeeper. The function of the specialist health service is to ensure that patients with acute and chronic illness and health problems are assessed and treated and receive sufficient follow-up.

As of 2002, the regional health authorities (RHAs) took over responsibility for the specialist health service from the county authorities. The RHAs have a duty to provide the population with necessary specialist health services. This is primarily done through the health trusts, which are owned by the four regional health authorities.

All patient contacts with the specialist health service must be coded with the condition(s) that occasioned the contact. Procedures, both medical (Norwegian Classification of Medical Procedures, NCMP) and surgical (NOMESCO Classification of Surgical Procedures, NCSP), must also be coded. From 2016, radiological examinations are also coded (Norwegian Classification of Radiological Procedures, NCRP). These codes are reported to the Norwegian Patient Registry (NPR) and form the basis for statistics, but also for parts of the settlement scheme between the Norwegian State and the health trust's somatic activities, what is known as activity-based funding (ISF). Mental health care and substance abuse treatment are mostly funded through basic allocations, not activity-based funding.

Sample

The sample consists of all contacts with the specialist health service in the form of outpatient consultations, day patient treatment and hospital admissions reported to the Norwegian Patient Registry by hospitals and specialists in private practice under public reimbursement contracts.

[13] The Lovdata legal information website. The Act relating to Specialist Health Services etc. (Specialist Health Service Act). https://lovdata.no/dokument/NL/lov/1999-07-02-61

Treatment and procedures performed without a contract with the regional health authorities (performed by private hospitals and specialists in private practice and paid for in full by the patient, an insurance company etc.) are not included in the figures presented.

Outpatient consultations and day patient treatments are considered together as outpatient consultations. An admission includes transfers between hospitals if no more than eight hours elapse between discharge from one hospital and admission to the next. See also the definition of 'episode of care' in the Method chapter (page 23).

Findings

The elderly have a total of approx. 1,117,000 outpatient consultations per year regardless of diagnosis (see appendix). Women are in a slight majority (53%), and the average age among the elderly is 81.6 years. The outpatient consultation rate for OUS hospital referral area is 1.7 times higher than that for the Finnmark area, which has the lowest rate (Figure 7.1).

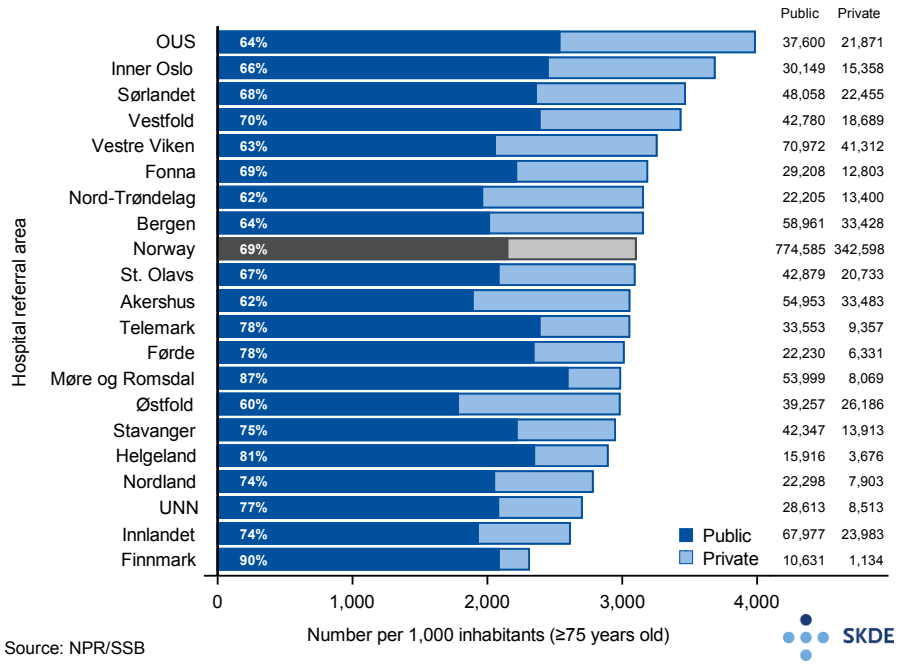


Figure 7.1: All outpatient services. Number of outpatient consultations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and public or private service provider. Average number of contacts with public and private service providers on the right.

Nationwide, about two-thirds of patients are seen at public hospitals and one-third at private hospitals or by specialists in private practice under public funding contracts (Figure 7.1). The use of private service providers in the OUS area (measured as a rate) is nearly six times higher than in Finnmark. The five hospital referral areas with the highest outpatient service use are in South-Eastern Norway RHA, and they have a high proportion of private service providers. Finnmark, Møre og Romsdal and Helgeland hospital referral areas have the greatest preponderance of public services (81-90%) and relatively low total rates. There is clear correlation between outpatient service rates and the proportion of private service providers ($r_s = 0.54$, $p = 0.0143$). There is no correlation between the use of outpatient services in the specialist health service and general practitioner services (RGP and/or emergency primary healthcare) in primary healthcare ($r_s =$

0.08, $p = 0.73$).

There are approx. 179,000 admissions of elderly patients per year, and 80% are emergency admissions, i.e. unplanned hospital admissions (Figure 7.2). There was little variation from year

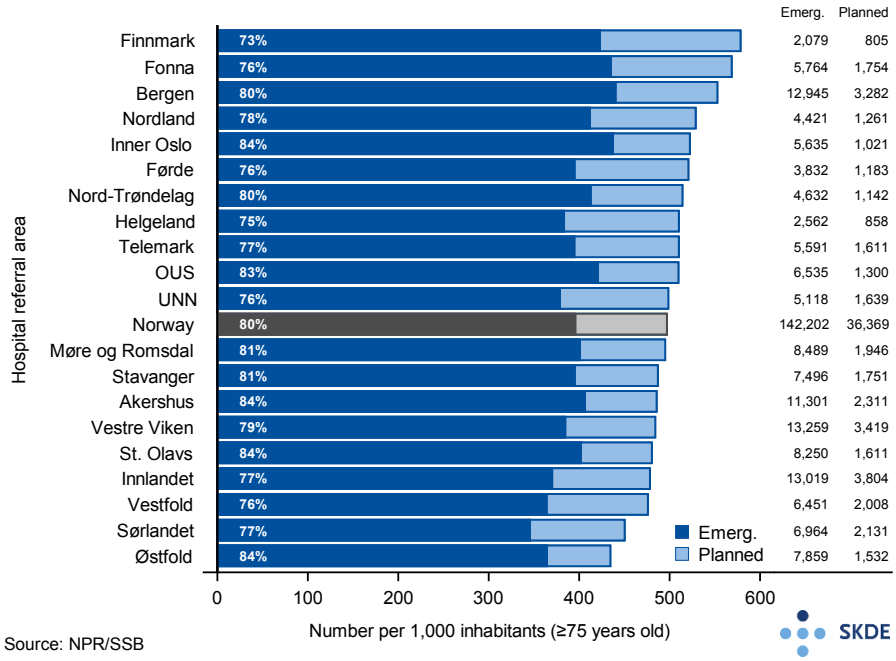


Figure 7.2: All admissions. Number of admissions per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and emergency or planned admission. Average number of emergency and planned admissions on the right.

to year in the three-year period 2013–2015, except for in Finnmark hospital referral area, where the number of admissions decreased during the period (data not shown). Residents of Finnmark are admitted to hospital 1.3 times as often as residents of Østfold. There is relatively high variation in whether admissions are planned or emergencies. For residents of Finnmark, only 73% of admissions of elderly patients were emergency admissions, while the corresponding figure for the Østfold area was 84%, a difference of 11 percentage points. As for outpatient services, there is a small majority of women (55%), and the average age among the elderly is 83.3 years (see appendix).

Among the elderly, approx. 20% of all hospital admissions nationwide per year are planned admissions (Figure 7.3). As for all admissions, there is a small majority of women (56%), and the average age among the elderly is 83.9 years (see appendix). Finnmark hospital referral area's rate for planned admissions is 2.2 times higher than for Østfold, but both hospital referral areas have short average lengths of stay, at 3.6 and 3.8 days, respectively. Nationwide, the average length of stay for planned admissions is about one day shorter than for all types of admissions (4.5 days compared with 5.6 days per admission, Figures 7.3 and 7.4).

The elderly spend a total of nearly one million days in hospital each year, and the average duration of an admission is 5.6 days (Figure 7.4). The bed day rate for OUS hospital referral area is 1.6 times higher than for the Sørlandet area, which has the lowest rate. OUS also has the longest average length of stays (6.5 days per admission), while Sørlandet has the shortest average length of stays (4.7 days).

In the age group 75-76 years, more than 70% of the population were in contact with the specialist health service during the period 2013–2015, and there is little difference between the genders

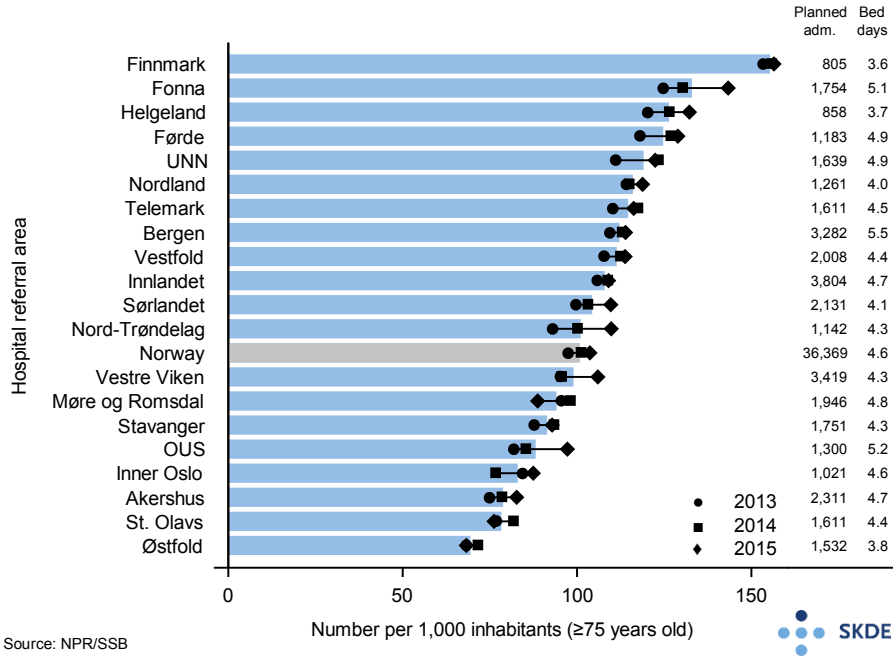


Figure 7.3: Planned admissions. Number of admissions per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of planned admissions and length of stay per admission on the right.

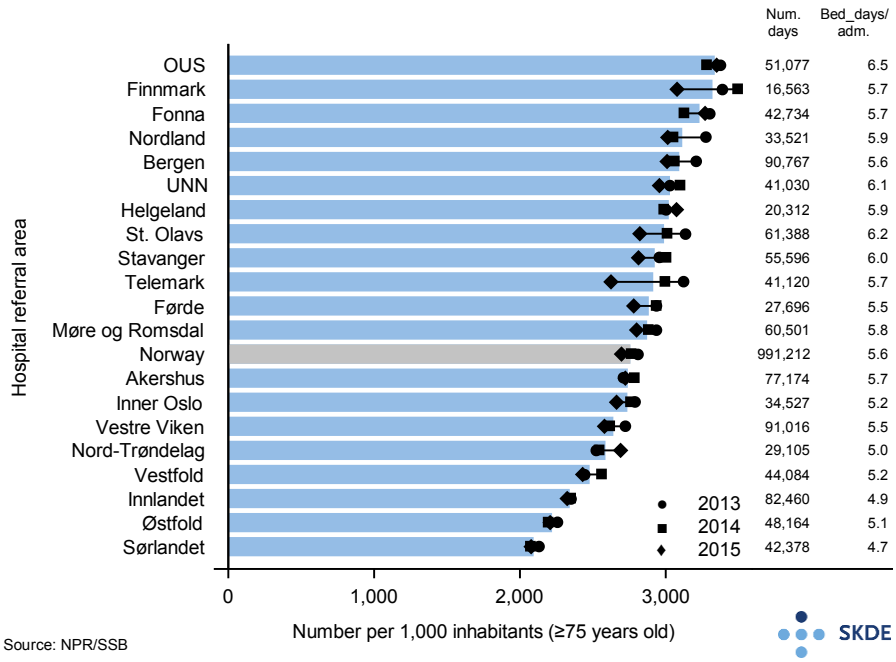


Figure 7.4: Bed days, all admissions. Number of bed days per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of bed days and length of stay per admission on the right.

(Figure 7.5). The proportion of elderly who are in contact with the specialist health service increases somewhat until the age of 85, and then drops. It is particularly older women who have proportionally less contact with the specialist health service. For example, we can mention that, among the oldest, aged 99-100 years, 70% (140 patients) of men have one or more contacts with

the specialist health service, compared to 54% (535 patients) of women.

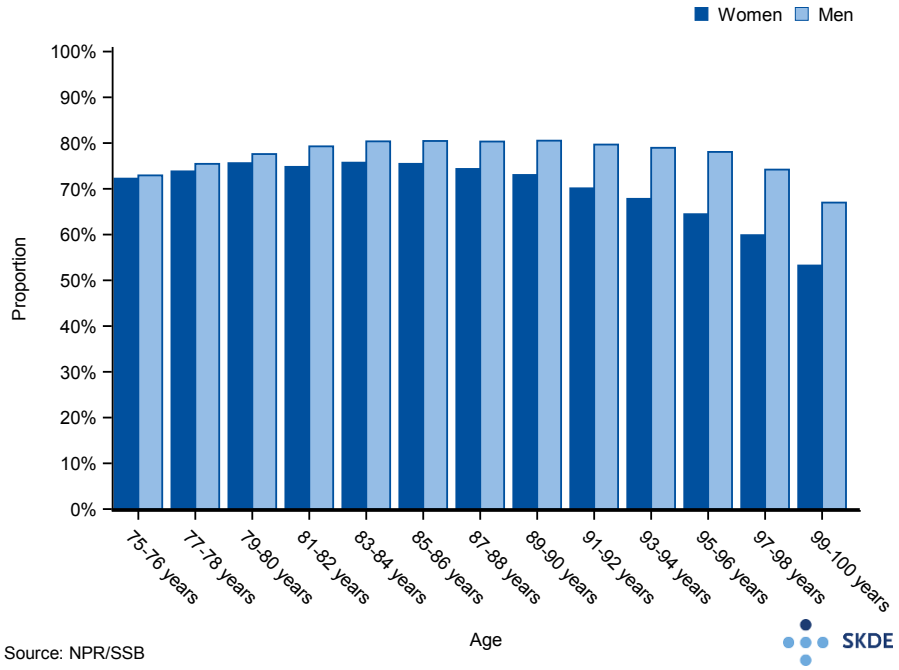


Figure 7.5: Proportion of the population aged 75 years and older who have been in contact with the specialist health service in 2015 divided into two-year age groups.

Comments

The elderly make up approx. 7% of the Norwegian population and account for approx. 16% of all contacts with the specialist health service. The elderly make proportionally greater use of hospital admissions (23%) than of outpatient clinic services (15%). Of all admissions of elderly patients, 80% are emergency admissions, compared with 70% in the patient population under 75 years of age, and the proportion varies between hospital referral areas from 73% (Finnmark) to 84% (Østfold). Emergency admissions are more challenging for hospitals than planned admissions. There is significant variation between hospital referral areas in the rates for outpatient service usage by the elderly. Based on the high number of contacts, it is highly likely that the observed variation is too great to be attributed to random variation. It is particularly the proportion of services performed by specialists in private practice under public funding contracts that varies, and there is clear correlation between a high outpatient service rate and a high proportion of private service providers. Finnmark hospital referral area has the lowest average outpatient service rate and the lowest proportion delivered by private service providers. The elderly in Finnmark hospital referral area also make less use of the general practitioner service than the elderly in most other areas (see Chapter 6). If we add up the rates for use of general practitioner services and outpatient consultations in the specialist health service, Finnmark has the lowest overall rate. Conversely, Finnmark has Norway's highest hospital admission rate. It is especially the area's planned admissions rate that is high. The length of stay for admissions of this type is considerably shorter than for all types of admissions, and it can be speculated that patients are admitted for assessment and treatment that are carried out on an outpatient basis in other parts of the country. Admitting elderly patients for one or two days instead of providing outpatient services could be an organisational adaptation to the local geographical and climate conditions, since Finnmark is unique in terms of the distances to hospitals as well as weather conditions during much of the

year.

There is striking variation in bed day rates, with a difference of nearly two days (28%) between the hospital referral areas with the longest (OUS, 6.5 days) and the shortest length of stay (Sørlandet, 4.7 days). It is a somewhat unexpected finding that the proportion of elderly who are in contact with the specialist health service decreases with age. The decrease is particularly marked for the oldest women. After the age of 80, the proportion of women admitted to nursing homes and other institutions is higher than for men (Statistisk sentralbyrå 2013). Symptoms of a new illness or worsening of chronic conditions are detected earlier and treated sooner among nursing home residents than among the oldest people who are still living at home, which probably reduces the need for contact with the specialist health service. This could explain part of the observed gender difference. We do not know whether better health or less need among the oldest women might be other explanations for this, or whether they have uncovered healthcare needs.

7.2 Cardiac medicine

7.2.1 Myocardial infarction and revascularisation

Myocardial infarction is a condition that arises when the blood supply to part of the heart is interrupted. The resulting lack of oxygen causes damage to or death of heart muscle. Myocardial infarction is a very serious condition that develops rapidly, but most patients who make it to hospital (>90%) survive an acute myocardial infarction (Hansen et al. 2016). Mortality has dropped by nearly 60% since the 1990s. This is partly due to preventive measures and partly to improved treatment. There are no national guidelines for assessment and treatment of myocardial infarctions, but the Norwegian Society of Cardiology bases its recommendations on European guidelines. In 2015, 13,397 admissions for myocardial infarction were reported to the Norwegian Myocardial Infarction Register, and 4,571 (34%) of the patients were 80 years or older.

Myocardial infarctions are divided into several sub-groups, of which STEMI (ST segment elevation myocardial infarction) and NSTEMI (non-ST segment elevation myocardial infarction) are the most acute and life-threatening types. NSTEMI account for approx. 70% of all myocardial infarctions. Patients should be diagnosed before arriving at the hospital, particularly if STEMI is suspected. A plan should be arrived at in cooperation with the ambulance staff, emergency primary healthcare and/or the nearest hospital to quickly determine whether the best option for the patient is thrombolysis (medication to dissolve the blood clot) or to be transported to hospital as soon as possible for assessment by means of an examination of the coronary arteries using a contrast agent (angiography) and, if relevant, treatment to re-establish the blood supply to the heart muscle. PCI (Percutaneous Coronary Intervention, a procedure involving the mechanical widening of the coronary arteries) with or without stenting is the most common treatment. If there is more extensive arteriosclerosis in the coronary arteries, the preferred treatment is often surgery, where new blood vessels from the patient's own body are used to divert blood around the narrow sections (bypass surgery). Revascularisation is a collective term for PCI and bypass surgery. Just over half of all revascularisation procedures are carried out as acute or sub-acute procedures, i.e. on patients with myocardial infarction or unstable angina pectoris, while the rest are planned procedures on patients with stable angina pectoris. There is no recommended upper age limit for treatment of myocardial infarction in the international guidelines that the Norwegian medical community adhere to (Windecker et al. 2014). A recently published Norwegian study shows that patients over 80 years of age benefit from revascularisation for NSTEMI myocardial infarctions and unstable angina compared with pharmacological treatment (Tegn et al. 2016).

Traditionally, exercise ECG (ECG registration carried out while the patient is using an exercise bike) has been part of the standard assessment of patients with coronary heart disease in a stable phase. However, new guidelines mean that a heart CT with contrast can be considered an equally good alternative to an exercise ECG (Agewall 2014).

Sample

Myocardial infarction is defined here as patients admitted with ICD-10 codes I21 or I22 as their primary or secondary diagnosis. In this analysis, patients admitted for myocardial infarction are intended to reflect coronary morbidity in the population, which, in turn, can be used to assess variation in treatment between hospital referral areas.
Revascularisation means either PCI (mechanical widening of the coronary arteries) and/or bypass surgery. PCI is defined as procedure code (NCSP) FNG*.

Bypass surgery s defined by procedure codes (NCSP) FNA*, FNB*, FNC*, FND* and FNE*. *Exercise ECG* is defined by NCMP codes FPFE50 and FPFE55 and tariff codes 129a and 707 from the Norwegian Medical Association's normal tariff for specialists in private practice under public funding contracts.

Findings

Each year, approx. 6,650 elderly patients are admitted to hospital with the diagnosis myocardial infarction (Figure 7.6). Roughly the same number of patients in the age group 50–74 years are admitted with myocardial infarction, approx. 6,600 patients (Figure 7.7). For Norway as a whole, the rates have fallen during the period.

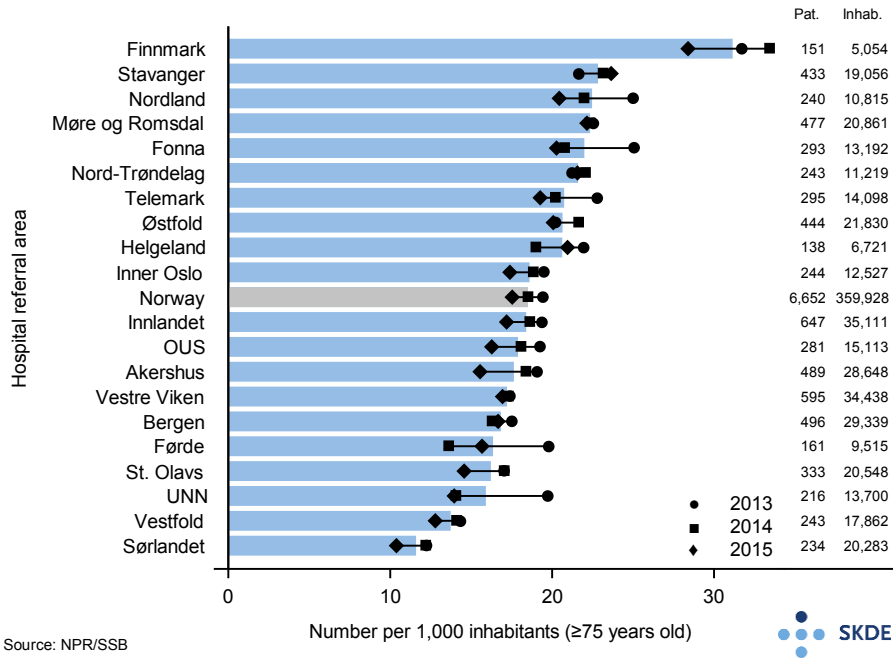


Figure 7.6: Myocardial infarction. Number of patients admitted per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of patients and population on the right.

Nearly three times as many patients are admitted with myocardial infarction in Finnmark hospital referral area as in Sørlandet hospital referral area, which has the lowest rate for the elderly. In the younger age group, the ratio between the highest and lowest rates (Finnmark and Sørlandet for this group as well) is 1.8. Finnmark's rates have decreased markedly during the period. Patients admitted for myocardial infarction can serve as a sort of indicator of coronary (artery) morbidity in the population and of the need for revascularisation. Revascularisation is also performed on patients in a stable phase, for example of angina pectoris. The rates for patients admitted to hospital with myocardial infarction are about four times higher in the older than in the younger age group.

Each year, just over 3,400 revascularisation procedures are performed on elderly patients (Figure 7.8). The rates for Norway as a whole have remained stable during the period, although the rates for several hospital referral areas have increased. The revascularisation rates for Finnmark hospital referral area have dropped markedly during the period. There is no correlation between the patient rate for admission for myocardial infarction and the revascularisation rate of the dif-

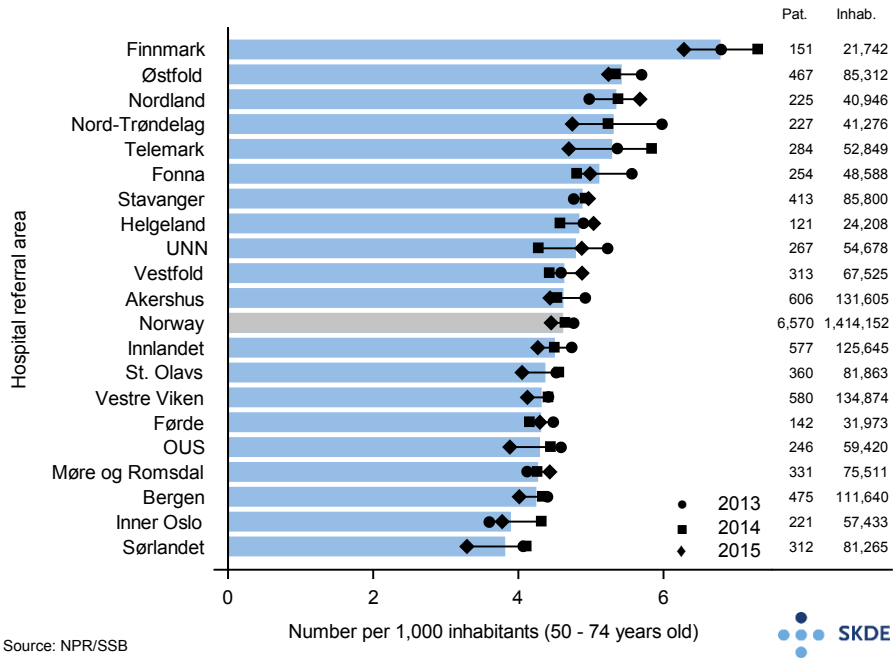


Figure 7.7: Myocardial infarction. Number of patients admitted per 1,000 population, 50–74 years, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of patients and population on the right.

ferent hospital referral areas ($r_s = 0.1$, $p = 0.68$). Bypass surgery accounts for approx. 18%

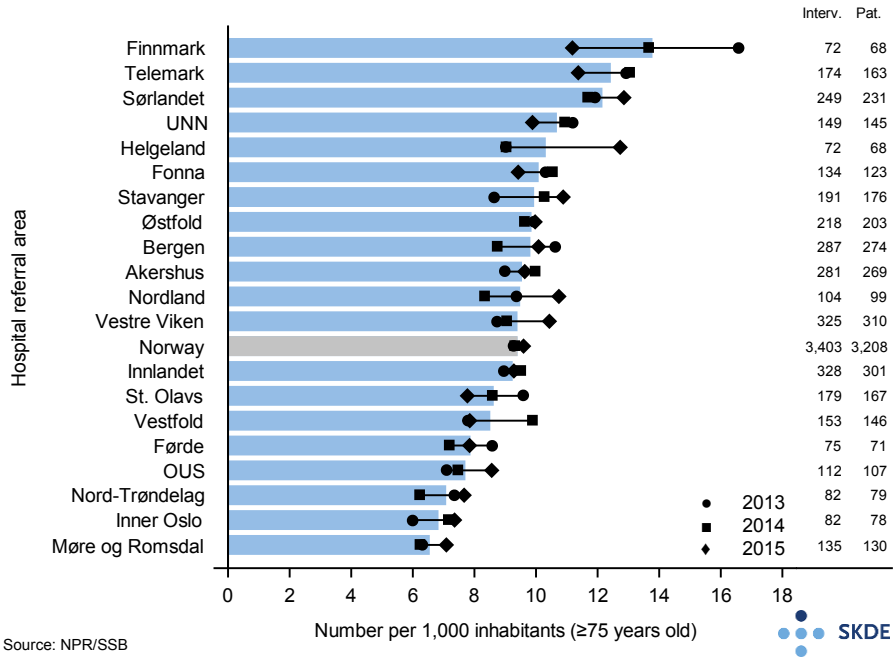


Figure 7.8: Revascularisation (PCI and bypass surgery). Number of procedures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of procedures and patients on the right.

of revascularisation procedures. The proportion of bypass surgery varies considerably between hospital referral areas, from approx. 35% in Møre og Romsdal to approx. 5-6% in Sørlandet (data not shown in figures). Only 34% of patients who undergo revascularisation are women (see

appendix). Although the number of admissions for myocardial infarction is reasonably evenly distributed between the genders, the elderly men are younger than the elderly women, and this could explain why more men undergo revascularisation.

In the age group 50–74 years, 9,600 revascularisation procedures are performed each year (Figure 7.9). Twice as many procedures are performed per population in Finnmark hospital referral area as in the Inner Oslo area. Unlike for the elderly, there is a strong correlation between the admission rate for myocardial infarction and the revascularisation rate in this age group ($r_s = 0.57$, $p = 0.01$).

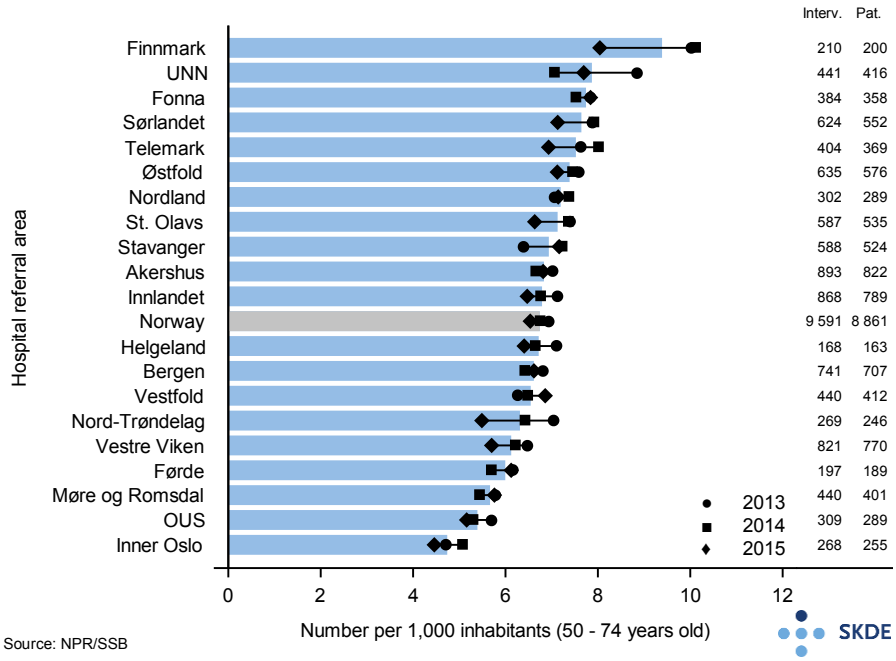


Figure 7.9: Revascularisation (PCI and bypass surgery). Number of procedures per 1,000 population, 50–74 years, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of procedures and patients on the right.

Figure 7.10 shows the use of revascularisation (rates) among the elderly compared with the younger patient group, broken down by hospital referral area ('rate elderly'/'rate younger').

Telemark and Sørlandet hospital referral areas have high revascularisation rates for both age groups, and they are also the areas where we observed the greatest relative difference between the rates for the two age groups – in the elderly's favour. Central Norway RHA's hospital referral areas have relatively low rates for both age groups, but the ratio between the age groups is markedly lower than in other hospital referral areas. The rates for patients admitted with myocardial infarction are four times higher in the oldest age group, while Norway as a whole has a 1.4 times higher revascularisation rate for the oldest group.

Figure 7.11 shows that nearly 20,000 exercise ECG examinations are carried out on elderly patients each year. The exercise ECG assessment rate is more than four times higher for Akershus hospital referral area than for the Helgeland area, which has the lowest rate. There is no correlation between the exercise ECG assessment rate and the admission rate for myocardial infarction ($r_s = -0.05$, $p = 0.82$). However, there is weak correlation between the exercise ECG assessment rate and the revascularisation rate ($r_s = 0.36$, $p = 0.12$).

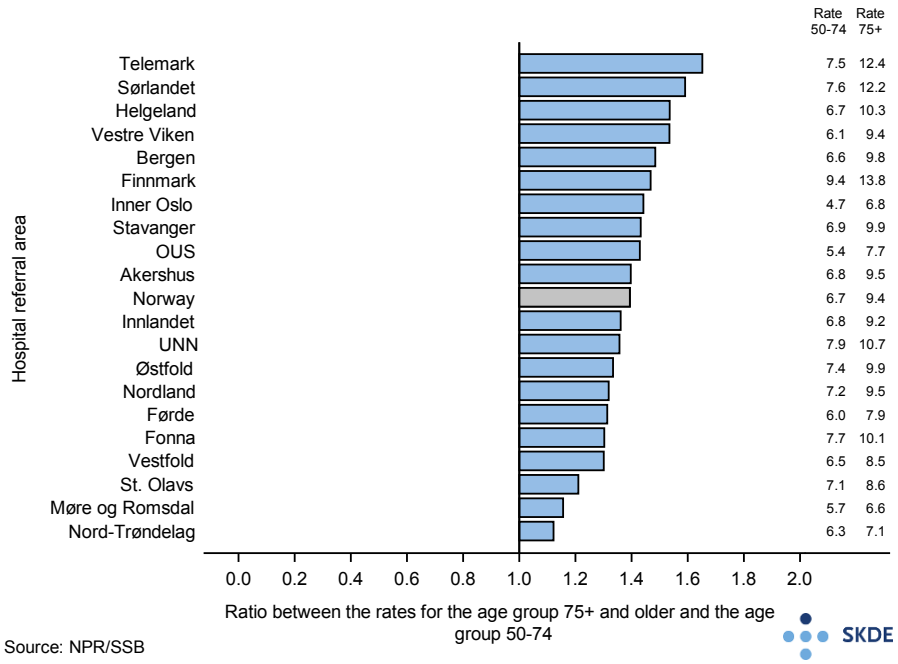


Figure 7.10: Revascularisation, PCI and bypass surgery, ratio between the rates for the age group 75 years and older and the age group 50–75 years. Rates, the number of admissions per 1,000 population adjusted for gender and age, are shown on the right in the figure.

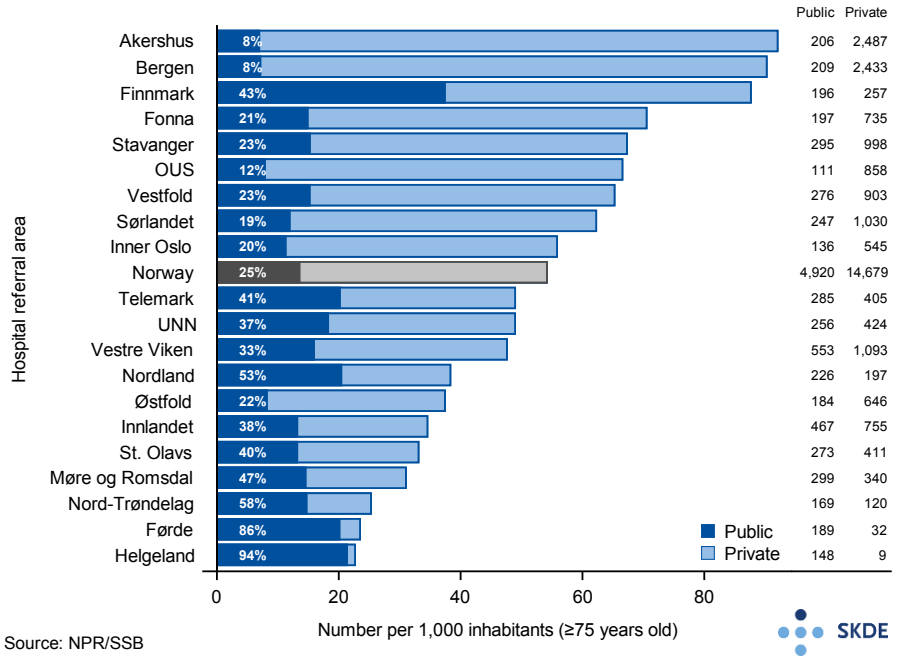


Figure 7.11: Exercise ECG. Number of outpatient examinations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and public or private service provider. Average number of contacts with public and private service providers on the right.

Comments

Admissions with a diagnosis of myocardial infarction vary between hospital referral areas, most for the elderly, with a ratio of 2.7, but also for the age group 50–74 years (ratio 1.8). If we

exclude Finnmark, which has a markedly higher rate, the ratios are 2.0 and 1.6, respectively. Different interpretations of new diagnostic criteria introduced with effect from 2012 may have led to systematic differences in the diagnosis of myocardial infarction. The changes seen from year to year might reflect this rather than an actual change in morbidity. Finnmark is known to have a high prevalence of cardiovascular disease, but part of the markedly high myocardial infarction rate must be considered in relation to the possibility of differences in diagnostic practice for myocardial infarction.[14]

There is moderate variation between hospital referral areas in the use of revascularisation as a treatment method for the elderly, and it does not correlate with morbidity in the population, here defined as patients admitted for myocardial infarction. It is striking that Møre og Romsdal and Nord-Trøndelag hospital referral areas have a high myocardial infarction rate and low revascularisation rate among the elderly. Conversely, residents of the Sørlandet area have a low myocardial infarction rate and a high revascularisation rate. The number of patients who suffer myocardial infarctions is about the same in the age group 50–74 years as in the age group ≥75 years. Nearly three times as many revascularisation procedures are performed on patients in the age group 50–74 years as in the age group ≥75 years.

The Norwegian treatment guidelines are based on European guidelines, but assessments of patients' suitability for and the risks that treatment entails will always contain an element of discretionary judgment. Patients over 75 years of age are rarely included in the randomised studies on which the recommendations are based, but, as mentioned above, a recent Norwegian study shows that patients over 80 years of age do benefit from PCI. Possible explanations for the observed variation include differences in practice, but also differences in the availability of services, and priorities.

The use of exercise ECG as an assessment method varies greatly between hospital referral areas. There is weak correlation between the use of exercise ECG and revascularisation treatment in hospital referral areas. Central Norway RHA's hospital referral areas as well as the Førde area have low assessment rates and revascularisation rates that are also below the national average. It would have been interesting to map the use of coronary CT angiography (CT examination of the heart) in areas where exercise ECG is not used much, since there is a possibility that CT examination of the heart is replacing traditional exercise ECG examinations. However, national data for radiology have not been available during the work on the Healthcare Atlas for the Elderly. One possible explanation for the variation is that there could be differing opinions about whether exercise ECG is a necessary and useful part of the standard assessment of coronary disease, another is that differences in capacity and priority setting may give rise to variation in the services offered.

[14] *Hjerteinfarkt og perkutan koronar intervensjon (PCI). Et likeverdig tilbud? Bør det opprettes et PCI-tilbud ved Nordlandssykehuset?* ('Myocardial infarction and percutaneous coronary intervention (PCI). Equitable services? Should PCI be made available at Nordlandssykehuset hospital?' – in Norwegian only), consultation paper from Northern Norway RHA, 11 November 2016, section 6.1.2

7.2.2 Heart failure

Heart failure is a condition where the pumping action of the heart is weakened, so that the blood does not transport enough oxygen through the body. Symptoms include general fatigue and shortness of breath, particularly during activity, but, with time, also when at rest. Fluid builds up in the body as a result of the impaired pumping action, resulting in swelling (oedema) of the feet and calves. As the condition develops, it can cause fluid to build up in the lungs and, at worst, frothy pink sputum, which is a sign of a condition that can be life-threatening and requires immediate treatment (pulmonary oedema). The symptoms can be mistaken for general signs of aging. Chronic heart failure reduces both quality of life and the patient's life expectancy. Heart failure can be identified by means of a blood test (proBNP), and it is often assessed using ECG (heart rhythm test) and echocardiography (ultrasound of the heart), and in many cases also an examination of the coronary arteries (angiography). A patient's regular GP can perform an ECG, while echocardiography examinations must be carried out by a specialist in diseases of the heart. Assessment for heart failure is one of the most important indications for echocardiography. For this reason, many heart failure patients are in contact with the specialist health service. There are many possible reasons for this condition, but the most common ones are a previous myocardial infarction, hypertension and valvular heart disease. Norway follows the European and American guidelines for treatment. Heart failure is mainly treated with medication to reduce the load on the heart and control the heart rhythm. Valvular heart disease may also require surgery. Pacemakers are also used in heart failure treatment to synchronise heart beats. Patients' regular GPs and specialists often cooperate on the treatment of heart failure.

The number of people suffering from heart failure could increase in the years ahead, as the number of elderly increases and more people survive myocardial infarctions. It is assumed that 10% of the elderly aged 74 years or older have experienced an episode of heart failure or suffer from chronic heart failure (Gullestad and Madsen 2004). If this estimate is correct, there are approx. 35,000 elderly with heart failure.

Sample

The sample is defined as patients aged 75 years and older in the somatic specialist health service, including specialists in private practice under public funding contracts, with a primary diagnosis of heart failure defined by the ICD10 codes I11.0, I13.0, I13.2, I50.0, I50.1 and I50.9. Both emergency and planned admissions are included.

All emergency admissions within 30 days of discharge following admission for heart failure are defined as readmissions. The average length of stay for primary admissions includes any transfers to other hospitals. Mortality within 30 days or one year in or outside hospital following the last admission for heart failure is stated as a proportion of all patients admitted with heart failure during the period 2013–2015. See also the definitions in the Method chapter of length of stay, readmissions and mortality (page 27)

Echocardiography of the heart is defined by the procedure codes (NCMP) FYDE31, FYDE32 and FYDE33 and the tariff codes 129e, 129d, 129i from the Norwegian Medical Association's normal tariff for specialists in private practice under public funding contracts.

Findings

Approx. 4,000 patients with heart failure as their primary diagnosis have a total of approx. 8,200 outpatient consultations per year (Figure 7.12). Women are in the minority (34%), and the average age in the sample is 81.6 years (see appendix). People resident in Inner Oslo hospital referral area use nearly five times as many outpatient services as people in the Førde area. The rate of outpatient services increased during the period.

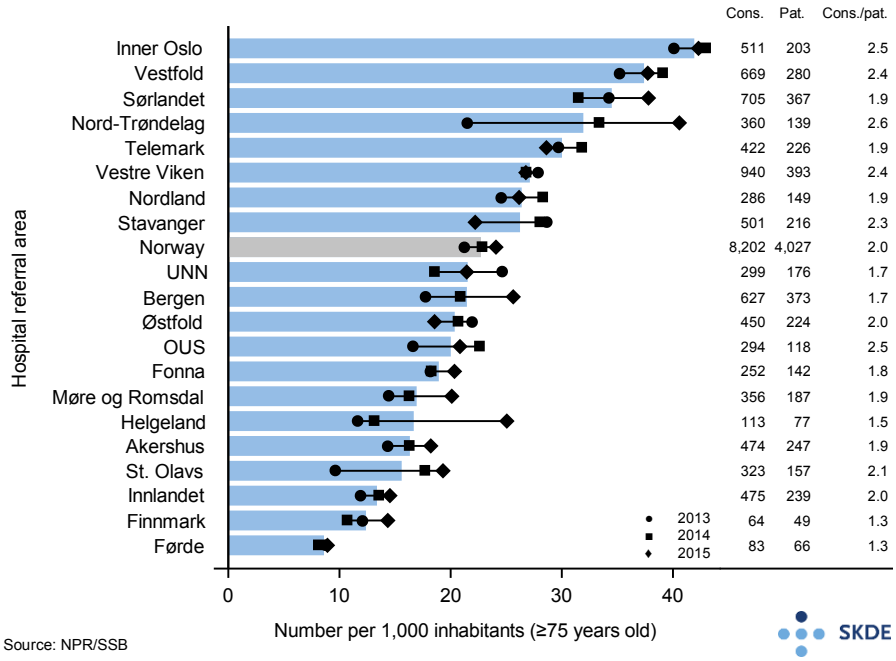


Figure 7.12: Heart failure. Number of outpatient consultations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of consultations, patients and consultations per patient shown on the right.

Approx. 6,800 admissions of elderly patients per year are due to heart failure as the primary diagnosis (Figure 7.13). Unlike for outpatient services, the gender distribution for admissions is even, with 49% women, and the average age among the elderly is 85.0 years (see appendix). There is significantly less variation between hospital referral areas than for outpatient services. The admission rate for OUS hospital referral area is 1.5 times higher than for the Stavanger area. There is no correlation between the use of outpatient services and admissions ($r_s = 0.05$, $p = 0.83$).

The 30-day readmission rate for patients admitted for heart failure is 26% (Figure 7.14).

The proportion of readmissions in Nord-Trøndelag hospital referral area (31%) is 1.6 times higher than in Telemark (20%), which has Norway's lowest proportion. Sørlandet, Nord-Trøndelag and Helgeland hospital referral areas account for a relatively high proportion (16-23%) of admissions coded for intravenous drug treatment. Nationally, the average length of stay is 6.3 days. Sørlandet hospital referral area has by far the shortest length of stay, with an average of 3.5 days, while the Nordland area has the longest with an average of 8.6 days. There is no correlation between the length of stay for primary admissions and the proportion of patients who are readmitted ($r_s = -0,07$, $p = 0,76$).

For Norway as a whole, 15% of elderly patients admitted for heart failure die within 30 days of

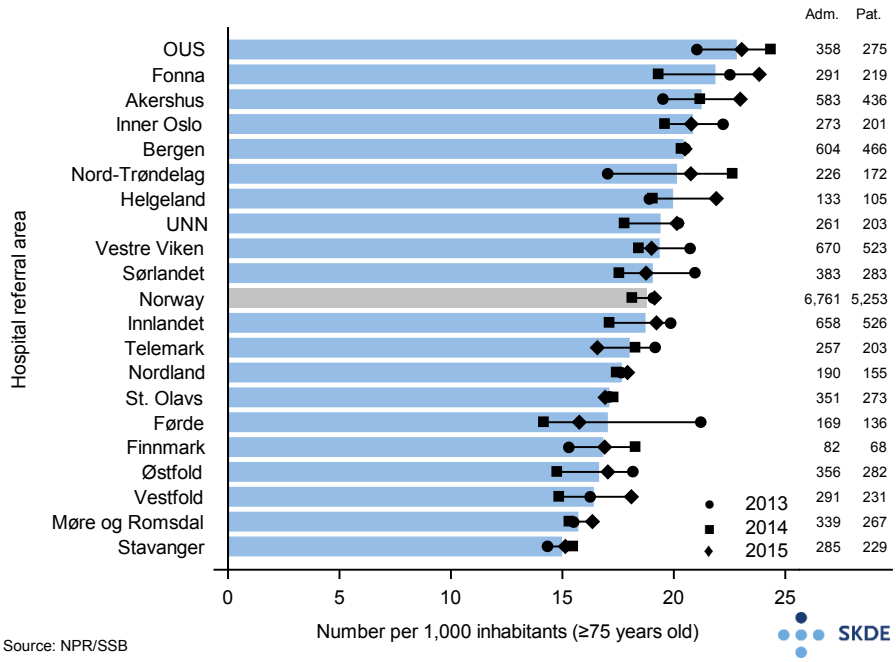


Figure 7.13: Heart failure. Number of admissions per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of admissions and patients shown on the right.

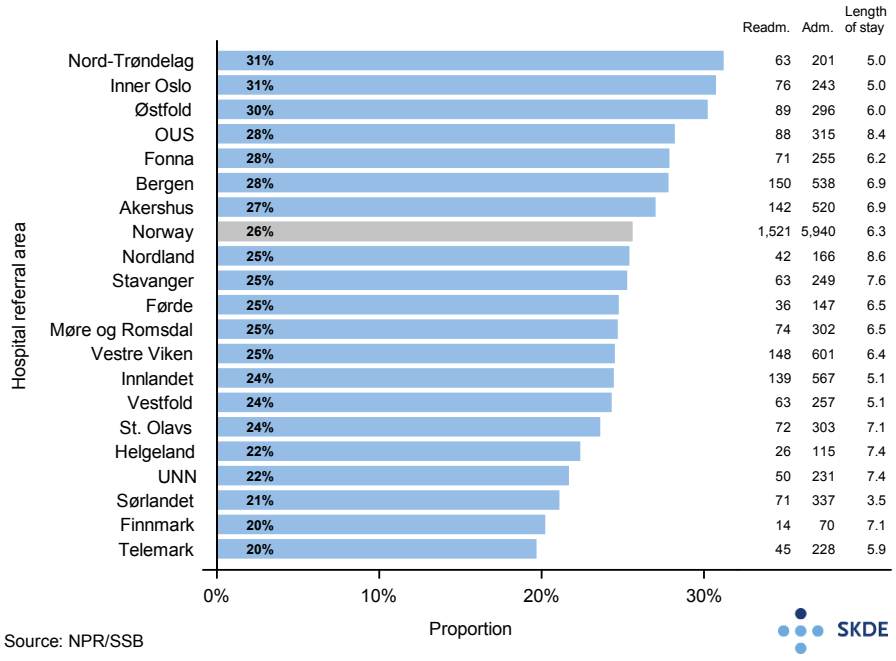


Figure 7.14: Heart failure. Readmissions as a proportion of primary admissions for heart failure, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of readmissions, primary admissions and average length of stay for primary admissions on the right.

their last admission (Figure 7.15). The 30-day mortality is highest in Østfold hospital referral area (20%) and lowest in Vestfold (12%). For Norway as a whole, 37% of patients die within one year of their last admission for heart failure. The 365-day mortality is highest in the Innlandet area (43%) and lowest in Telemark and Stavanger (both 30%).

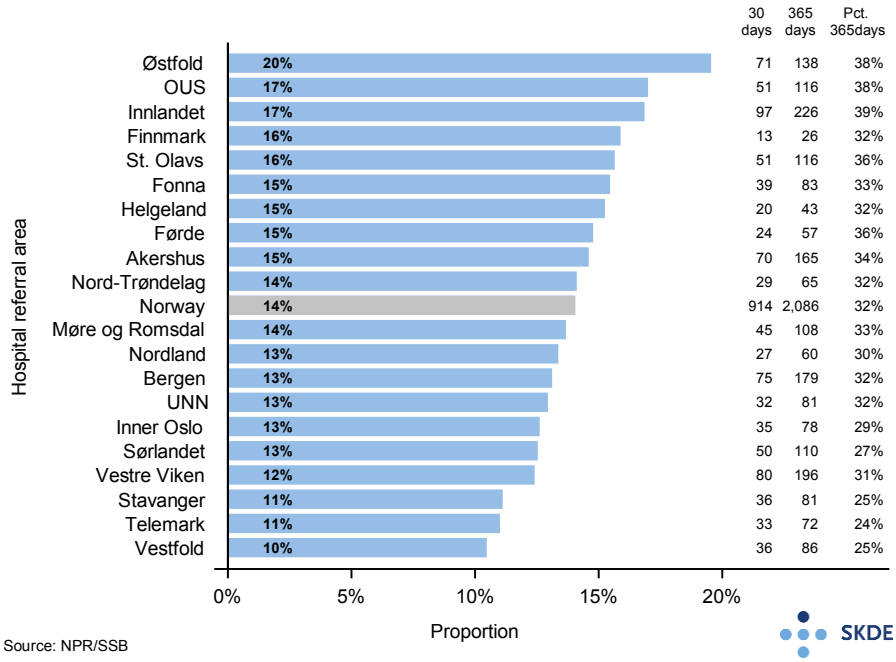


Figure 7.15: Heart failure. 30-day mortality proportion following the last admission for heart failure in the period 2013–2015, 75 years and older, adjusted for gender and age, broken down by hospital referral area. Average number of deaths within 30 days and one year and 365-day mortality proportion following admission on the right.

Each year, nearly 32,000 outpatient echocardiography examinations are carried out of almost the same number of elderly patients. Two-thirds of these examinations are carried out at public hospitals and one-third by private service providers (Figure 7.16). In relation to population size, very many residents of Finnmark are assessed using echocardiography, nearly three times as many as in Østfold hospital referral area. Private enterprises account for 25% of examinations in the Finnmark area, which is less than the national average. There is no correlation between the admission rates for heart failure and the number of echocardiography examinations carried out in the hospital referral areas ($r_s = 0,13$, $p = 0.56$).

Comments

The variation between hospital referral areas in the use of outpatient services by elderly patients with a primary diagnosis of heart failure is particularly striking. Admission rates do vary relatively little between areas, while the average length of stay varies by several days. The absence of correlation between the number of outpatient consultations and admissions can be interpreted as an indication that frequent use of outpatient services does not appear to prevent admissions.

More than one in four patients are readmitted within 30 days of being discharged following admission for heart failure, and there is only moderate geographical variation. In Telemark, 20% of patients are readmitted, and in Nord-Trøndelag 31%. The clinical significance of readmission is somewhat unclear. Patients with heart failure are often very seriously ill patients that it can be difficult to care for at home or in their home municipality even though they were taken good care of during their primary admission. The high 30-day and 365-day mortality following the last admission shows that this is a serious condition that is probably accompanied by other illness.

There seems to be no obvious connection between the assumed morbidity in the population and

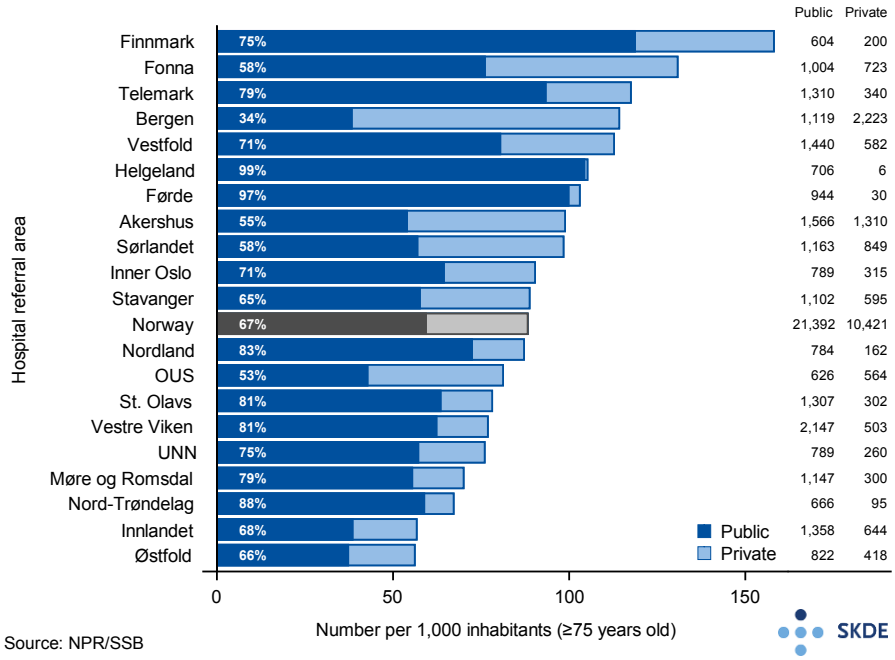


Figure 7.16: Echocardiography. Number of outpatient examinations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and public or private service provider. Average number of contacts with public and private service providers on the right.

the use of heart failure-related services. The Finnmark area, which is known to have a high prevalence of cardiovascular diseases,[15] has low usage rates for both outpatient services and admissions. The readmission rate is also low in Finnmark. Inner Oslo (the hospital referral area for Diakonhjemmet and Lovisenberg hospitals) has high usage rates for both outpatient services and admissions, and it also has a high readmission rate.

The great variation in echocardiography examinations can hardly be explained by morbidity, since there is no correlation between examination rates and admissions for heart failure. Unclear referral indications can result in differences in practice, and other reasons, such as differences in capacity or priorities, could also play a role.

The availability and quality of primary healthcare are important to heart failure patients. Primary healthcare data would have provided a more complete picture of the health services available to heart failure patients, but such data were not available during the work on this atlas.

[15]The Norwegian Institute of Public Health's statistics bank norgeshelsa.no

7.2.3 Permanent pacemaker implantation

A pacemaker is an electronic device that emits electrical impulses to the heart muscle and makes the heart beat faster if, for some reason, it is beating too slowly. The pacemaker only activates when necessary. Temporary pacemakers can be fitted in an emergency, but only permanent pacemakers are discussed in this atlas. A pacemaker contains a battery and a pulse generator. It is implanted under the skin at the front of the chest. Low pulse, dizziness, fainting and near-fainting are the most common symptoms experienced by patients before they have a pacemaker fitted. In 90% of cases, the cause is unknown. The common causes of arrhythmia include age-related changes in the heart and conditions that impair or block the blood supply to part of the heart muscle (myocardial infarction or angina pectoris).[16].

Certain arrhythmias identified through ECG examination are clear indications for fitting a pacemaker. However, there are also arrhythmias where there is room for discretionary judgement when making the decision. For such conditions, it is a requirement for a patient being fitted with a pacemaker that the patient experiences clear symptoms caused by the arrhythmia. Long pauses between heartbeats are one example. This is a common cause of fainting in the elderly.

Pacemakers are also an option in cases of heart failure where the contractions of the heart muscle are out of sync. This is called cardiac resynchronisation therapy (CRT). In technical terms, this form of heart failure treatment also uses an implantable cardioverter-defibrillator (ICD), which is implanted into the chest wall like a pacemaker. In order for a pacemaker or ICD to be used in the treatment of heart failure, the patient must experience clear symptoms of heart failure and the pump function the heart must be poor (EF < 35%).

Some patients who need a pacemaker are admitted as emergencies, but most undergo a planned assessment in order to determine whether a pacemaker is indicated. This assessment often takes the form of one or several days of heart rate monitoring at home, known as long-term ECG. In long-term ECG, electrodes are attached to the chest and connected to a recorder. Patients are asked to carry out their normal activities or be somewhat more active than usual, so that any heart rhythm abnormalities can be triggered and recorded. There are no clear indications for initiating long-term ECG assessment, but there are three common main reasons for carrying out such assessments:

1. Loss of consciousness not caused by epilepsy or postural hypotension or other forms of explicable drop in blood pressure
2. Palpitations (attacks of fast, slow or irregular heart action) that affect the ability to function. Examination of irregular heart action that gives reason to suspect atrial fibrillation is only indicated in cases of heightened risk of stroke or pronounced symptoms.
3. Assessment of patients with known cardiac diseases or of the effect of treatment on such patients.

Sample

Pacemaker implantation is defined by the following procedure codes (NCSP): FPE00, FPE10, FPE20, FPE26, FPG30, FPG33, FPG36. Procedure codes FPE26 and FPG36 specify heart fail-

[16]Norwegian medical encyclopaedia *Store medisinske leksikon* https://sml.snl.no/pacemaker, written by Harald Arnesen

ure treatment using a pacemaker and cardioverter-defibrillator (denoted CRT in the figures), respectively.

Replacing and removal of pacemakers, batteries or electrodes are not included in this analysis.

Long-term ECG is identified by the NCMP codes FPFE15 (Holter monitoring), FPFE30 (R test) and tariff codes 129c and 129g from the Norwegian Medical Association's normal tariff for specialists in private practice under public funding contracts. Only outpatient long-term ECG examinations are included.

Findings

Figure 7.17 shows that nearly 2,000 permanent pacemakers are implanted into elderly patients each year, and that the rate increased during the period. The proportion of women among the patients is 45%, and the average age is 83.4 years (see appendix). The rate for Helgeland hospital referral area is 2.3 times higher than for Stavanger, which is the area with the lowest rate. The rate for Norway as a whole, and for most of the hospital referral areas, increased during the period.

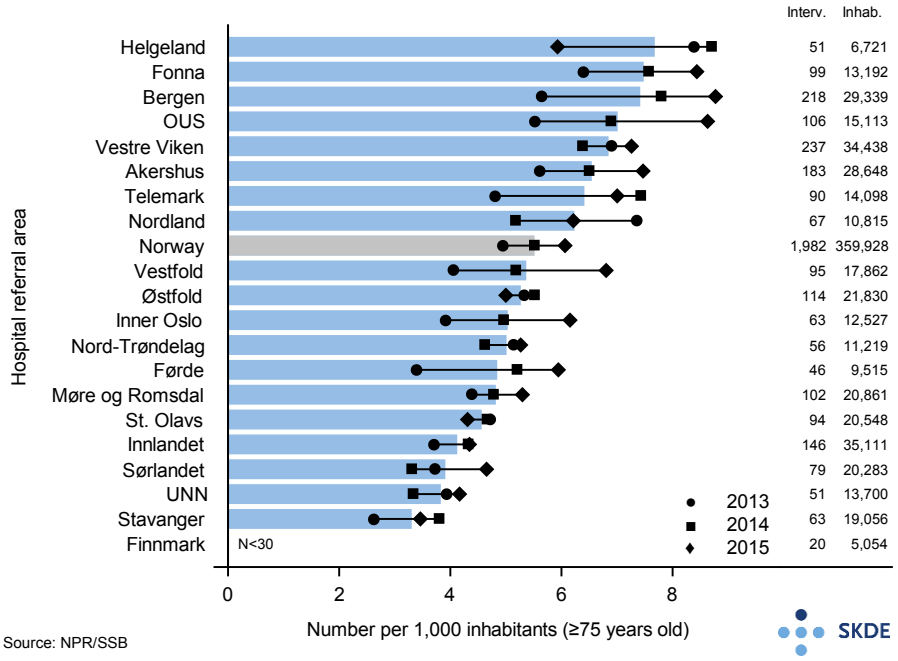


Figure 7.17: Permanent pacemaker implantation. Number of procedures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of procedures and patients on the right. Finnmark hospital referral area has too few procedures for a rate to be calculated.

Most pacemakers correct arrhythmias. Approx. 130 new pacemakers a year also have an additional function (CRT) for treating heart failure. CRT is not used much for the elderly (Figure 7.18). Residents of Bergen, Førde and Sørlandet hospital referral areas have a somewhat higher proportion of CRT use than other areas.

Figure 7.19 shows that nearly 9,000 outpatient long-term ECGs are carried out on elderly patients each year. Of these, 72% are done under the auspices of public hospitals, while the rest are carried out by specialists in private practice under public funding contracts and private hospitals with activity-based funding. The use of ECG has increased during the three-year period in most

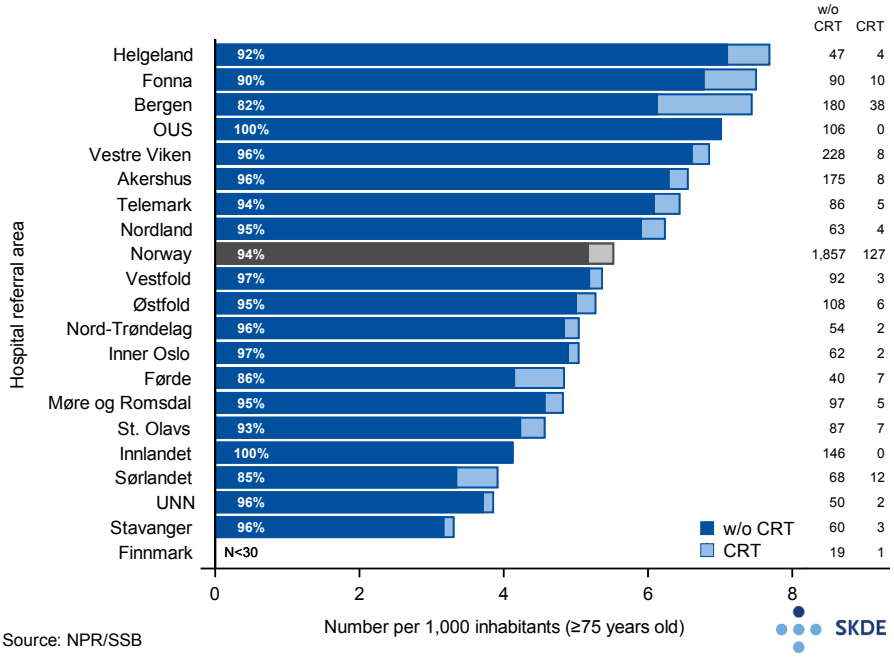


Figure 7.18: Permanent pacemaker implantation. Number of procedures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and ordinary pacemaker versus pacemaker with CRT (cardiac resynchronisation therapy). Average number of procedures for conventional pacemakers and for pacemakers with CRT on the right.

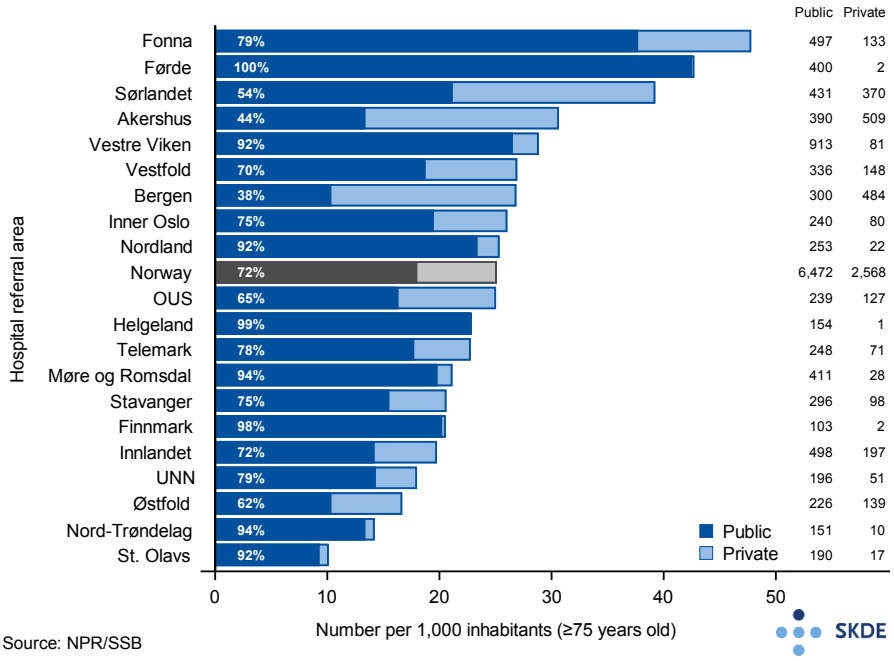


Figure 7.19: Long-term ECG. Number of outpatient procedures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and public or private service provider. Average number of contacts with public and private service providers on the right.

hospital referral areas (data not shown). St. Olavs hospital referral area stands out with a low and stable rate. There is considerable variation between hospital referral areas in the use of long-term ECG. Fonna hospital referral area has an assessment rate that is nearly five times higher than that of St. Olavs. In the Fonna area, the ratio between the assessment rate and the pacemaker

implantation rate is 6 to 1, while the ratio for St. Olavs is approximately 2 to 1. There is a clear correlation between the rates for pacemaker implantation and long-term ECG ($r_s = 0.45$, $p = 0.04$).

Comments

According to the Norwegian Pacemaker and ICD Registry, a total of approx. 32,000 new pacemakers were implanted in 2015, which means that just over 60% of all patients fitted with pacemakers are elderly. The implantation rate is growing. Pacemaker implantation is a service that will probably be in demand in the time ahead, and it will be important to choose the right patients for this treatment option.

Considering the low number of procedures and large variation between years, the variation between hospital referral areas in permanent pacemaker implantation is deemed to be moderate. The variation in long-term ECG assessment, on the other hand, appears to be strikingly high. Despite clear correlation between assessment of arrhythmia (long-term ECG) and pacemaker treatment, it seems that the indications for long-term ECG are not sufficiently well known or are not being practised.

It is relatively clear which conditions and symptoms make pacemaker implantation a necessary and beneficial treatment measure. It is possible, but unlikely, that some of the variation can be explained by differences in morbidity in the population. There will always be an element of random variation, but in this case, it is likely that differences in culture, practice and the behaviour of patients and healthcare professionals contribute to the variation described. It is possible that there is both over- and underuse, and the variation between hospital referral areas should therefore be seen as giving grounds for debate in the specialist community, for example relating to more precise indications for assessment and pacemaker implantation.

7.3 Pulmonary medicine

7.3.1 Pneumonia

Pneumonia is an inflammation of the lung tissue caused by bacteria, viruses or fungi. Upper respiratory tract infections (colds and flu) will more often develop into pneumonia in the elderly than in younger people. Vaccination against flu is relatively widespread in the oldest age group, but there is some uncertainty as to whether this can prevent pneumonia (Vist et al. 2013; Jefferson et al. 2010). Pneumonia can be a serious condition, and it is most common in children and the elderly. Symptoms of pneumonia are a reduced general state of health, fever, coughing and shortness of breath. The infection often develops slowly in elderly patients, and it can be difficult to diagnose because the symptoms are less pronounced. The patients may not experience fever and coughing, so that a reduced general state of health could be the only symptom. The more inflamed the lung tissue is, the harder it becomes to breathe. Sometimes, the oxygen uptake is impaired, which gives rise to a very dangerous condition. The patient becoming confused could be a sign of low oxygen uptake, which could also lead to falls and fainting. Some experience chest pain when they inhale or exhale. One potential reason for this is inflammation between the pleura, which will rub against each other when the patient breathes (pleurisy).

The elderly have a weakened immune system, and bacterial pneumonia must be treated with antibiotics as soon as possible. Most pneumonia cases are treated by the patient's regular GP, but some are so ill that they must be admitted for treatment and have antibiotics administered directly into a vein (intravenously) and receive other treatment, such as intravenous fluids and nutrition. If the diagnosis is certain and the patient is stable, admission to a municipal emergency bed unit (KAD) may be considered where such beds are available. Elderly patients more often need to be admitted to hospital because their infection may have developed further before they are diagnosed and because they are often more frail than younger patients. Pneumonia increases the risk of other organs failing, in which case the patient could need intensive care and nursing in a hospital setting. The prognosis is worse with increasing age, comorbidity or if mental confusion arises. It must be considered on a case-to-case basis to what extent it is appropriate to initiate intensive hospital treatment of elderly patients with many other illnesses and significant functional impairment. It can be useful to involve health personnel who know the patient, for example the patient's regular GP or nursing home doctor, in decisions about the level and intensity of treatment if such matters have not been clarified in advance (Helsedirektoratet 2009).

Sample

Pneumonia is defined here as emergency admissions to hospital with the ICD-10 codes J12-J18 as the primary diagnosis. COPD-related pneumonia has been eliminated from this analysis by excluding admissions with pneumonia as the primary diagnosis and COPD (J40-J44) as a secondary diagnosis. Readmissions, length of stay and 30-day mortality are defined in Chapter 4.3.

Findings

Approx. 10,600 patients with pneumonia as their primary diagnosis have a total of approx. 12,500 emergency admissions per year (Figure 7.20). The gender distribution is quite even (48% women), and the average age for the patient group 75 years and older is 84.5 years (see appendix). The admission rate for Stavanger hospital referral area is 1.7 times higher than for the UNN area.

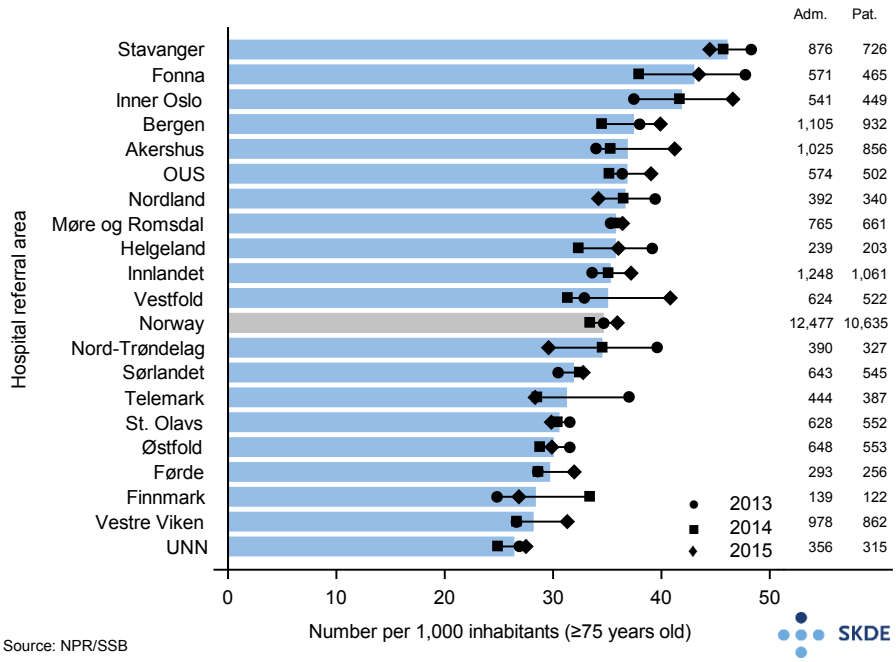


Figure 7.20: Pneumonia. Number of emergency admissions for pneumonia per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of admissions and patients shown on the right.

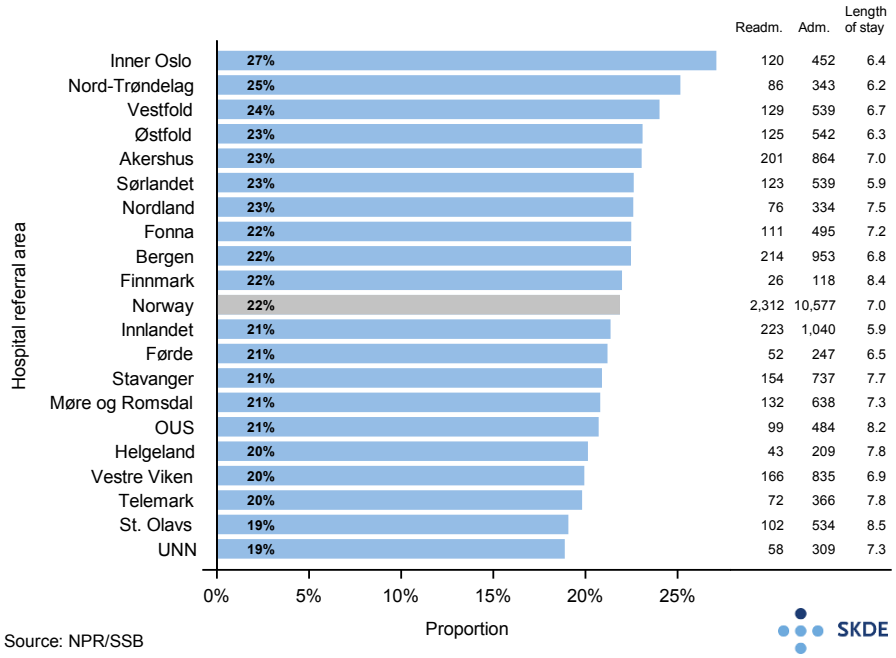


Figure 7.21: Pneumonia. Readmissions as a proportion of primary admissions for pneumonia, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of readmissions, primary admissions and average length of stay for primary admissions on the right.

The average 30-day readmission rate after discharge following admission for pneumonia is 22% for Norway as a whole (Figure 7.21). The readmission rate in Inner Oslo hospital referral area (27%) is 1.4 times higher than in the UNN area (19%), which has Norway's lowest readmission rate. Nationally, the average length of stay is 7.0%. St. Olavs hospital referral area has the longest

average length of stay (8.5 days). Two hospital referral areas have an average length of stay of less than 6 days – Innlandet (5.9 days) and Sørlandet (5.9 days). There is a strong correlation between the length of stay for primary admissions and the 30-day readmission rate ($r_s = -0.63$, $p = 0.02$). Long stays appear to reduce the number of readmissions.

For Norway as a whole, 22% of elderly patients admitted for pneumonia die within 30 days of their last admission (Figure 7.22). The 30-day mortality is highest in Innlandet hospital referral area (24%) and lowest in the UNN area (18%). For Norway as a whole, 42% of patients die within one year of their last admission for pneumonia. The proportion is highest in the Inner Oslo area (45%) and lowest in Helgeland (38%).

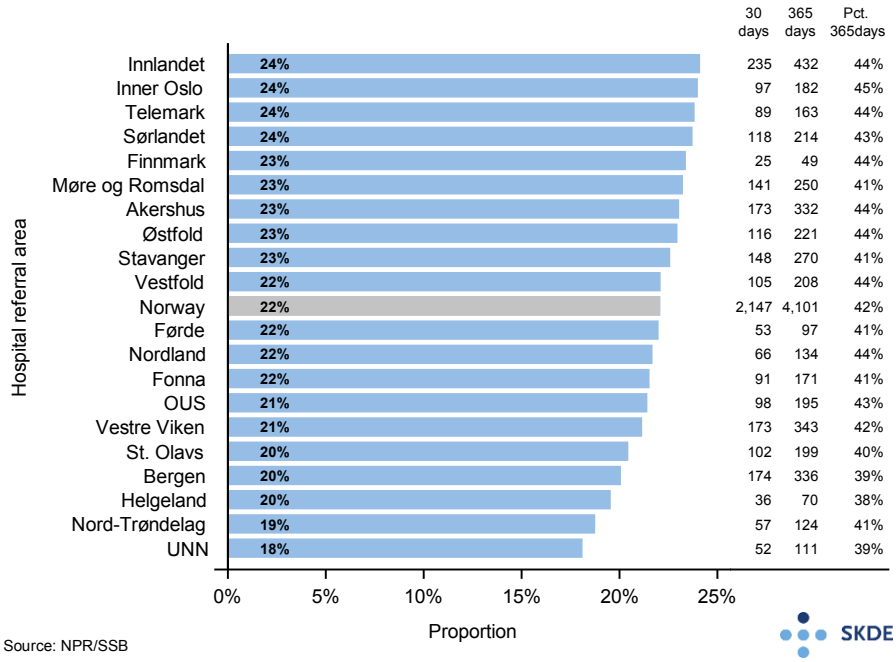


Figure 7.22: Pneumonia. 30-day mortality proportion following the last emergency admission for pneumonia in the period 2013–2015, 75 years and older, adjusted for gender and age, broken down by hospital referral area. Average number of deaths within 30 days and one year and 365-day mortality proportion following admission on the right.

Comments

The emergency admission rates vary between hospital referral areas by a factor of 1.7, which is deemed to be moderate considering the high number of patients. Elderly patients admitted to hospital with pneumonia appear to be a group of seriously ill patients with high readmission rates and high 30-day and 365-day mortality. The Office of the Auditor General of Norway has recently published a report on its investigation of medical coding practice for pneumonia, among other conditions, at ten Norwegian hospitals (Riksrevisjonen 2017). In 16% of cases, the primary diagnosis was changed following a review of the patient records. Incorrect coding makes the results uncertain. However, the results are based on a high number of patients and an average over a three-year period. Coding errors are assumed to be spread out without having systematic geographic consequences.

For patients admitted with pneumonia as their primary diagnosis, we find a strong correlation between the length of stay and the readmission rate. It is difficult to see any correlations with

the 30-day mortality results. As mentioned in the introduction above, elderly patients with pneumonia are often seriously ill, and many of them also have other serious conditions. The hospital referral areas UNN and Nord-Trøndelag both have low 30-day mortality for patients with pneumonia as their primary diagnosis. The readmission rate is lowest for patients in the UNN area, while Nord-Trøndelag has the second highest proportion in Norway. The UNN area's length of stay is well above the national average, while Nord-Trøndelag's is well below average. This could be coincidental, or it could reflect differences in how the services are organised. For example, the combination of short length of stay and many readmissions could be due to good cooperation with the primary healthcare services, with shorter stays in hospital and a low threshold for readmission. Alternatively, longer stays where the treatment of the patient's condition is 'completed' to a greater extent can explain the combination of long length of stay and a low readmission rate. In other words, these relationships are complex, and no obvious consistent logic has been observed.

Lengths of stay and readmissions do not necessarily tell us anything about the quality of the services provided. The primary healthcare services play an important role in this interaction, but no data for primary healthcare have been available to us. It is possible that preventive measures for patients in institutions could have an effect, while early diagnosis and correct initial treatment could prevent hospital admissions. How much emphasis municipal institutions place on clarifying treatment and care with patients and their next of kin before emergencies occur could also have a bearing on the scope of hospital admissions (Gjerberg et al. 2017). Municipal emergency bed units or community hospital beds also influence the need for hospital admissions. Good cooperation between the specialist health service and primary healthcare services, for example patient-centred/mobile teams, is probably important for these patients.

It is difficult to say whether the variations observed as regards admissions, readmissions and deaths following pneumonia can be ascribed to characteristics of the patients, the specialist health service, the primary healthcare services or unknown factors, or whether they are random.

7.3.2 Chronic obstructive pulmonary disease, COPD

Chronic obstructive pulmonary disease, or COPD, is a collective term for diseases of the lungs and airways with persistent narrowing and inflammation of the small airways that limit the flow of air when the patient breathes. Chronic bronchitis and emphysema are included under the term COPD. Emphysema is a term that denotes the destruction of lung tissue. COPD is a serious pulmonary disease characterised by permanently reduced lung function and breathlessness when exercising, chronic coughing and increased production of phlegm. The severity of COPD varies from uncomplicated to more serious stages with significant functional impairment and disability. In very severe cases of COPD, low oxygen levels can cause heart failure.

The most important cause of COPD is smoking, but exposure to harmful particles in dust and fumes from industry or other types of air pollution can also cause COPD. The lung damage is permanent, but it is possible to treat the symptoms and slow down the development of the disease. The most important treatment measure for COPD patients is to avoid exposure to harmful substances. If the patient is a smoker, the most important measure is to stop smoking. Physical activity and a healthy, nutritious diet are also important parts of the treatment. Several types of medication are used to treat COPD. The most important ones are drugs that dilate the small airways and make breathing easier, but steroid inhalers that reduce the chronic inflammation and drugs that reduce the production of phlegm are also used in the treatment of COPD. It is important to avoid respiratory tract infections, and many COPD patients therefore have annual

flu vaccinations.

COPD exacerbation, or flare-ups, is a serious condition that many COPD patients experience. The main symptoms of exacerbation of the underlying condition are increased coughing and shortness of breath and generally reduced level of functioning. The airways contract, phlegm production increases and the phlegm changes colour, and the patient finds it difficult to move air in and out of the lungs. Exacerbations are often triggered by viral or bacterial infections or exposure to irritating gas or smoke. A COPD exacerbation will normally require treatment, which will often start outside hospital by adjusting the dosage of the medication that the patient is already on or starting treatment with antibiotics or steroids in tablet form. Hospital admission will often be necessary during serious COPD exacerbations, since the patient will often experience respiratory failure and require breathing support. Patients with COPD often have other medical conditions that can increase their need for hospital admission for serious COPD exacerbations. Many COPD patients die from heart disease, but mortality in connection with COPD exacerbations is also high.

Sample

COPD is defined as emergency hospital admissions with one of the ICD-10 codes J40*, J41*, J42*, J43*, J44* as a primary or secondary diagnosis. When J40*, J41*, J42*, J43* or J44* is a secondary diagnosis, the primary diagnosis is required to be one of the following ICD-10 codes: R06.0, J09*-J11*, J12*-J18*, J20*, J22*, J46* or J96*. Readmissions, length of stay and 30-day mortality are defined in Chapter 4.3.

Findings

Approx. 5,000 patients with a COPD diagnosis have a total of approx. 8,000 emergency admissions per year (Figure 7.23). The gender distribution is even (49% women), and the average age in the patient group 75 years and older is 82 years (see appendix). The admission rate for OUS hospital referral area is 1.6 times higher than for the Førde area.

The average 30-day readmission rate after discharge following admission for COPD is 29% for Norway as a whole (Figure 7.24). The readmission rate in Inner Oslo hospital referral area (38%) is 1.5 times higher than in the Finnmark area (25%), which has the lowest readmission rate. The national average length of stay for primary admissions is 6.1 days. The OUS hospital referral area has the longest length of stay (7.3 days), while residents of the areas Innlandet and Sørlandet have the shortest stays (5.1 days). There is no correlation between the length of stay for primary admissions and the proportion of patients readmitted ($r_s = 0.11$, $p = 0.6$).

For Norway as a whole, 21% of elderly patients admitted for COPD die within 30 days of their last admission (Figure 7.25). The 30-day mortality is highest in Vestfold hospital referral area (26%) and lowest in the Helgeland area (17%). For Norway as a whole, 43% of patients die within one year of their last admission for COPD. The proportion is highest in the Telemark area (48%) and lowest in Helgeland (34%).

Comments

Emergency admissions of COPD patients are often triggered by exacerbations. The emergency admission rates vary between hospital referral areas by a factor of 1.6, which is regarded as relatively low.

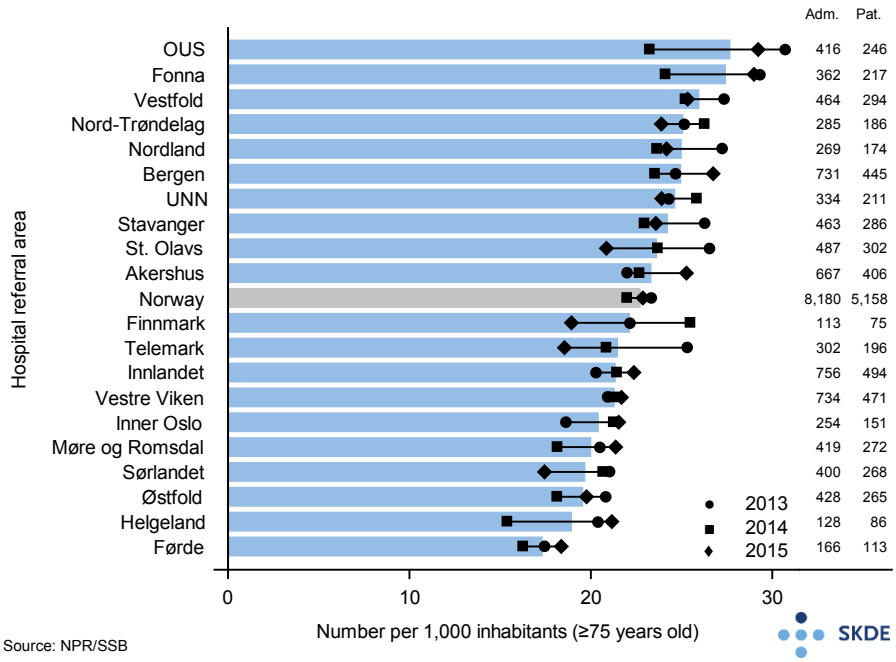


Figure 7.23: COPD. Number of emergency admissions for COPD per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of admissions and patients shown on the right.

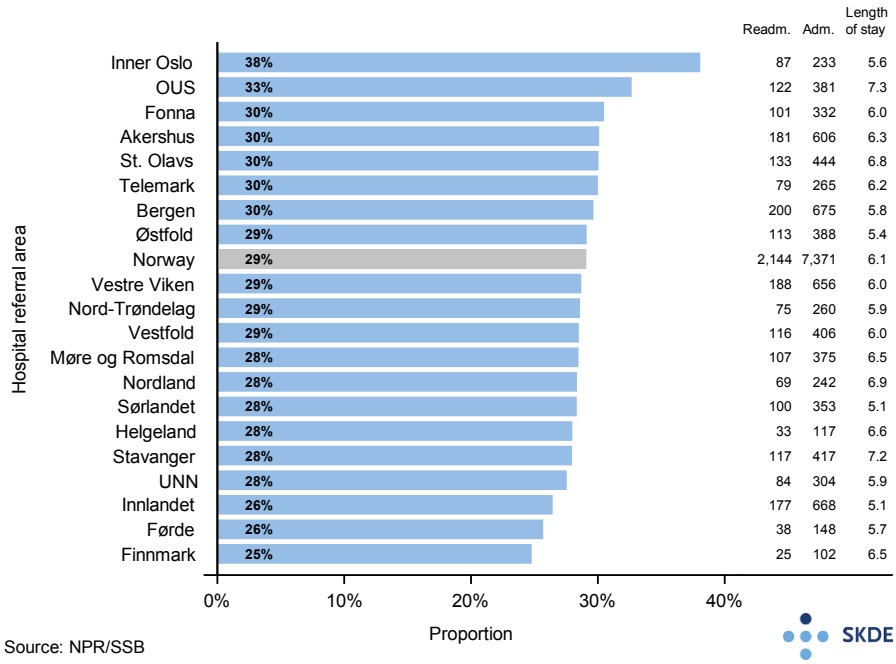


Figure 7.24: COPD. Readmissions as a proportion of primary admissions for COPD, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of readmissions, primary admissions and average length of stay for primary admissions on the right.

The prevalence of lung cancer varies in Norway (Cancer Registry of Norway 2016), and since COPD and lung cancer share some of the same risk factors, it is not unlikely that morbidity varies for COPD as well. No attempt has been made to adjust for this, and some of the variation described could thus be caused by differences in morbidity in the population. Nevertheless, we

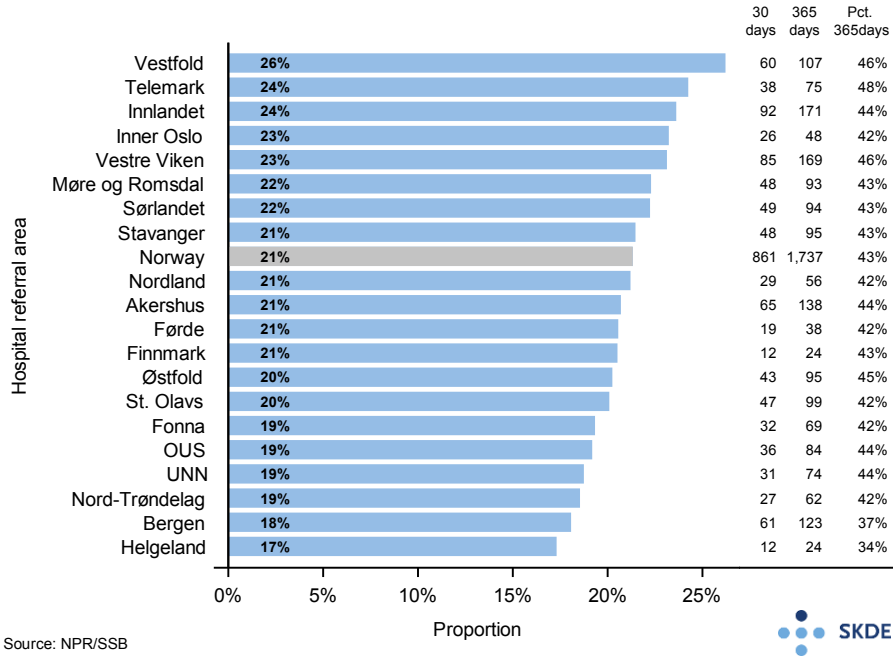


Figure 7.25: COPD. 30-day mortality proportion following the last emergency admission for COPD in the period 2013–2015, 75 years and older, adjusted for gender and age, broken down by hospital referral area. Average number of deaths within 30 days and one year and 365-day mortality proportion following admission on the right.

see that the OUS hospital referral area has a high admission rate for COPD, while Oslo has a low prevalence of lung cancer. Finnmark's admission rate equals the national average, but the area has Norway's highest prevalence of lung cancer. Therefore, there are probably other factors in addition to morbidity, such as different indications for admission and the possibility of caring for patients in the primary healthcare services, that have a bearing on admission rates. Finnmark has 40 community hospital beds funded by the specialist health service, but they are reported separately to the Norwegian Patient Registry (NPR) and therefore cannot be retrieved in our data source. COPD is a common condition among patients admitted to the community hospital beds (Heiberg 2012). The community hospital admission rates for Finnmark do not influence the variation in emergency admissions between hospital referral areas in our analysis, since Finnmark has neither a high nor a low rate.

The high readmission rate after being discharged following admission for COPD, which is higher than for patients with pneumonia (22%), and the high 30-day (21%) and 365-day mortality (43%), indicates that elderly patients admitted to hospital with COPD are a group of seriously ill patients. As mentioned above, elderly COPD patients often have other medical conditions. For COPD patients, we find no correlation between length of stay upon primary admission and the readmission rate. It is difficult to say whether the variations observed as regards admissions, readmissions and mortality following pneumonia can be ascribed to characteristics of the services provided or the sick population, or whether they are random.

7.4 Orthopaedics

7.4.1 Primary joint replacement, hip and knee

Each year, approx. 17,000 patients in Norway have an artificial joint (joint prosthesis) implanted or replaced due to wear or disease in the joint. Primary hip replacements are the most common type, with approx. 8,400 procedures a year in Norway, 30% of which are carried out on elderly patients. Approx. 6,100 primary knee replacements are carried out each year, 26% of them on elderly patients (Nasjonal kompetansetjeneste for leddproteser og hoftebrudd 2016). Most patients who have an artificial joint implanted suffer from osteoarthritis. Other reasons for joint replacement include rheumatoid arthritis, infection or sequelae resulting from childhood joint diseases. Fractures, cruciate ligament injuries or meniscus injuries can damage the cartilage.

Joint prostheses are usually considered when conservative treatment is no longer effective. Conservative treatment include strength training, weight loss and analgesic and anti-inflammatory drugs (NSAID). A national exercise programme led by physiotherapists who provide instructions and information has recently been established (ActiveOA - Active living with OsteoArthritis). Conservative treatment measures can postpone joint replacement surgery and spare more patients from joint replacement in future. A prosthesis will not last forever, and it is therefore a point to postpone joint replacement surgery. A hip or knee prosthesis is expected to last for between 10 and 20 years, provided that no complications arise. The loosening of implants is to a certain extent related to body weight and activity level. Replacing a prosthesis is a far more technically complicated procedure than a primary joint replacement, and is not always successful.

Joint replacement surgery is indicated when pain keeps the patient awake at night (pain at rest), when it becomes difficult to walk up or down stairs, or when it becomes difficult to carry out everyday activities. Hip replacement, for example, is expected to make nearly 90% of patients pain-free and give good mobility, even if activities such as running and jumping must be avoided.

The proportion of elderly in the population will grow in the years ahead. It is unclear whether the need for joint replacement surgery will grow correspondingly, as the elderly of the future will probably be healthier, but the need for joint replacement surgery must be expected to increase. Data from the Norwegian Arthroplasty Register for the ten-year period 2005-2015 show that the number of primary hip replacements increased by 27% and primary knee replacements by as much as 87% (Nasjonal kompetansetjeneste for leddproteser og hoftebrudd 2016). According to the Norwegian Arthroplasty Register, the average age of patients undergoing primary hip replacement surgery is 69.9 years for women and 67.1 years for men, and 67.3% of such procedures are performed on women. The average age for primary knee replacement is 69.3 years for women and 67.4 years for men, and 64.1% of such procedures are performed on women (Nasjonal kompetansetjeneste for leddproteser og hoftebrudd 2016).

Sample

Primary hip replacement surgery is defined by procedure codes (NCSP) NFB20, NFB30, NFB40 and NFB99 (total prosthetic replacement). Primary hip replacements which are also coded for hip fracture, defined by ICD-10 codes S72.0, S72.1 and S72.2, have been excluded from this analysis.

Primary knee replacement surgery is defined by procedure codes (NCSP) NGB0*, NGB1*, NGB20, NGB30, NGB40 and NGB99 (partial and total prosthetic replacement).

Findings

Each year, 2,330 primary hip replacements are performed on elderly patients (Figure 7.26). In our sample, women are in the majority (71%) and the average age is 80.3 years (see appendix). Stavanger hospital referral area has a rate that is 1.7 times higher than for the UNN area, which has the lowest rate. There was no increase for Norway as a whole during the period, but the UNN hospital referral area, which has the lowest rate, experienced a decrease. Finnmark hospital referral area had too few procedures for gender-adjusted and age-adjusted rates to be calculated.

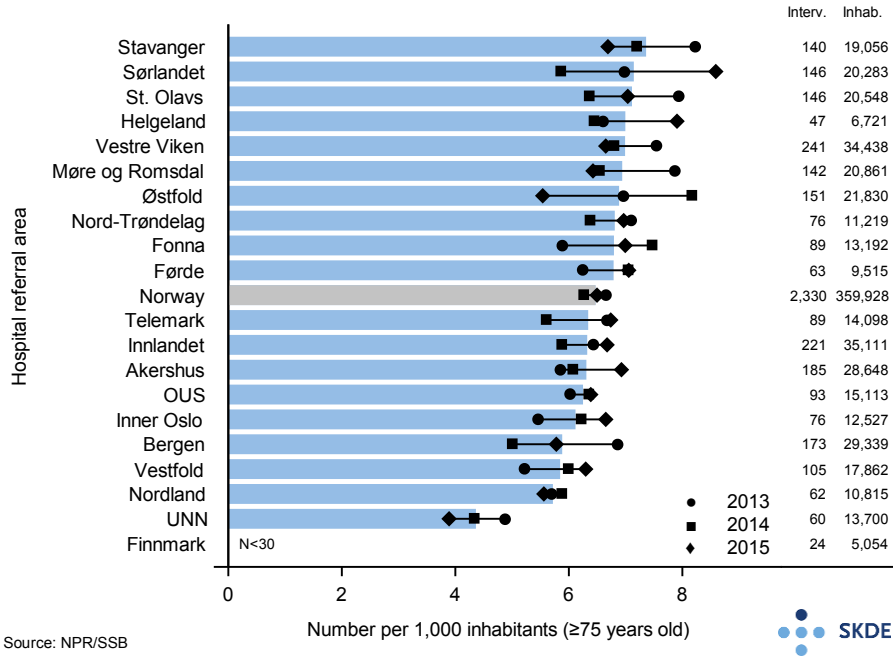


Figure 7.26: Primary hip replacement. Number of primary hip replacement procedures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of procedures and patients on the right. Finnmark hospital referral area had too few procedures for gender-adjusted and age-adjusted rates to be calculated.

Approx. 1,500 primary knee prostheses are implanted in nearly the same number of elderly patients each year (Figure 7.27). In our sample, women are in the majority (65%) and the average age is 79.4 years (see appendix). Nord-Trøndelag hospital referral area has a rate that is 1.6 times higher than for the Telemark area, which has the lowest rate. The rate for Norway as a whole and for most of the hospital referral areas increased markedly during the period. Finnmark and Helgeland hospital referral areas had too few procedures for gender-adjusted and age-adjusted rates to be calculated.

Comments

There is variation between Norwegian hospital referral areas in terms of hip and knee replacement in elderly patients. However, considering the low number of procedures and considerable variation between years, there is reason to believe that much of the observed variation is random, and therefore the variation cannot be characterised as unwarranted. The northern areas have low rates, particularly Nordland, UNN and Finnmark (hip) hospital referral areas. The number of hip replacements in the Finnmark and UNN areas decreased in the years covered by the analysis.

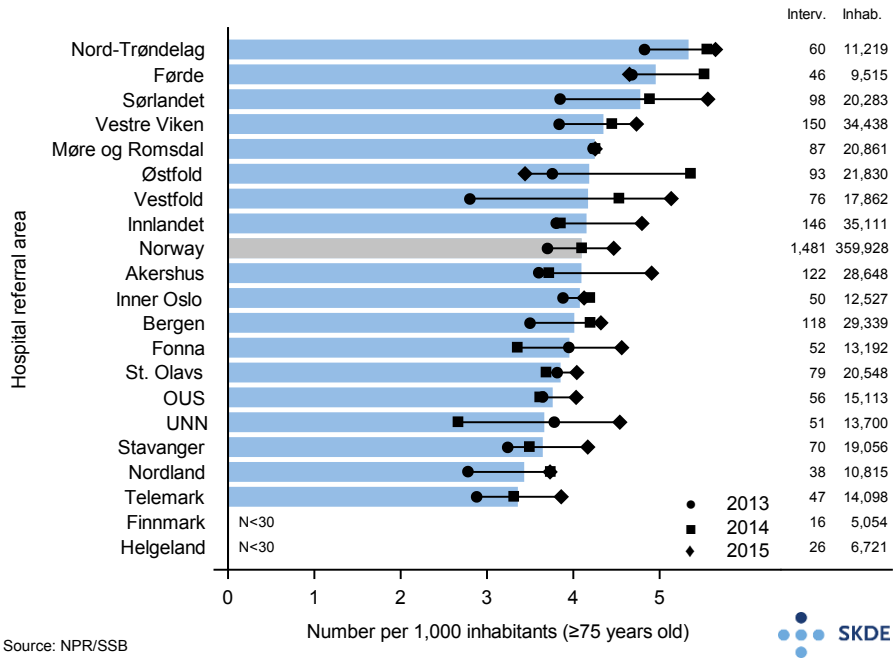


Figure 7.27: Primary knee replacements. Number of primary knee replacement procedures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of procedures and inhabitants on the right. Finnmark and Helgeland hospital referral areas had too few procedures for gender-adjusted and age-adjusted rates to be calculated.

It is worth noting that residents in Stavanger hospital referral area have the highest hip replacement rate, while its knee replacement rate is among the lowest in Norway. There does not seem to be any obvious link between reported waiting times on the Helsenorge.no website and the replacement surgery rates.

Stavanger University Hospital, which performs a high percentage of the hip replacement procedures in Stavanger hospital referral area, which has a high hip replacement rate, report long waiting times (April 2017). The Office of the Auditor General of Norway has recently published a report on its investigation of medical coding practice for hip replacement, among other things, at ten Norwegian hospitals (Riksrevisjonen 2017). In 5% of cases, the primary diagnosis was changed following a review of the patient records. The results are uncertain because of incorrect coding. However, the results in the report are based on a relatively high number of patients and an average over a three-year period. Coding errors are assumed to be spread out without having systematic geographic consequences.

It is difficult to determine what constitutes a correct rate of hip and knee replacement in Norway. In a report recently submitted to the Ministry of Health and Care Services (HOD), the regional health authorities proposed using joint replacement surgery as one of several indicators to measure unwarranted variation (SKDE 2016). The ministry will establish primary hip replacement as a national indicator, and the proposed target for the Norwegian population as a whole (aged 40 years and older) is a rate corresponding to the national average for 2015. As regards primary knee replacement surgery, Norway is assumed to be lagging somewhat behind in an international perspective. The proposed target for the Norwegian population is therefore set at the unweighted average of the rates for the hospital referral areas whose rates were above the national average in 2015.

There is reason to believe that joint replacement surgery is not supply-driven to any great extent, since few patients are willing to undergo such extensive procedures unless they are experiencing considerable pain and discomfort. It is therefore more likely that the observed variation is not due to patient choice, but to the way in which the services are organised. The lack of a standardised assessment of when surgery is indicated could also be a possible explanation. Some hospitals use recognised screening forms as an aid when deciding whether or not to implant a joint prosthesis. These forms help to map the patient's level of pain, discomfort and impairment. Capacity in terms of available hospital beds (these are inpatient procedures) and operating theatres, and, not least, the internal prioritisation of available capacity in each health trust, can all have a bearing on decisions on whether a patient gets a joint prosthesis, even when the medical indications for initiating treatment are clear.

7.4.2 Hip fractures

Fractures in the elderly are a major health problem, and hip fractures are a common reason for hospital admission. Hip fracture is a collective term for all fractures at the top end of the femur, of which femoral neck fractures make up the biggest group. Such fractures have serious consequences in the form of pain and discomfort, but also loss of function, reduced life expectancy, and an increased need for assistance and residential care. Most patients with hip fractures undergo surgery. According to the Norwegian Hip Fracture Register, 8,400 primary (first-time) hip fractures were operated on in Norway in 2015, and 70% of the patients were women. Norway has Europe's highest incidence of hip fractures for both men and women (Støen et al. 2012).

Treatment of fractures take up a lot of the health service's resources as regards operating theatres, wards and institution beds. The healthiest hip fracture patients fare well, but the average age for patients undergoing primary surgery is 80 years, and many of the patients also have other conditions that increase the risk of complications. The 365-day mortality following hip fractures for patients aged 50 years and older is approx. 20% for women and approx. 30% for men. This is a substantial increase compared with the control group without fractures (5-6%) (Diamantopoulos, Hoff, Skoie, et al. n.d.). There is agreement in the medical community that hip fractures should be treated quickly in order to prevent complications and pain and reduce the risk of more bed days and increased mortality.

It is important to closely follow up patients after a hip fracture. A study carried out in Trondheim shows that hip fracture patients over 70 years of age do better if followed up by a geriatrician in addition to the orthopaedic follow-up (Prestmo et al. 2015). Pneumonia is a common and dangerous complication in the acute phase, as are blood clots. In the long term, it is important to monitor the patient's nutritional status and take appropriate action. Osteoporosis can be a contributory cause of the fracture, and, if diagnosed, the condition can be prevented with medication.

Sample

Hip fracture is defined as admissions with ICD-10 codes S72.0, S72.1, S72.2 as the primary or secondary diagnosis combined with relevant surgical procedure codes (NCSP) reduction, primary partial or total prosthetic replacement and fixation: NFB00, NFB02, NFB09, NFB10, NFB12, NFB19, NFB20, NFB30, NFB40, NFB99, NFJ30, NFJ31, NFJ32, NFJ33, NFJ40, NFJ41, NFJ42, NFJ43, NFJ50, NFJ51, NFJ52, NFJ53, NFJ60, NFJ61, NFJ62, NFJ63, NFJ70, NFJ71, NFJ72, NFJ73, NFJ80, NFJ81, NFJ82, NFJ83, NFJ90, NFJ91, NFJ92, NFJ93. Only hip fractures for which surgery is performed are included in this sample.

Readmissions, length of stay and 30-day mortality are defined in Chapter 4.3.

Findings

Hip fractures among the elderly result in nearly 7,000 hospital admissions per year, and the proportion of women is 72% (see appendix). Very few patients are treated for more than one hip fracture in the course of a year, and the figures have remained relatively stable over the period studied (Figure 7.28). The admission rate for Østfold hospital referral area is 1.3 times higher than for the Helgeland area.

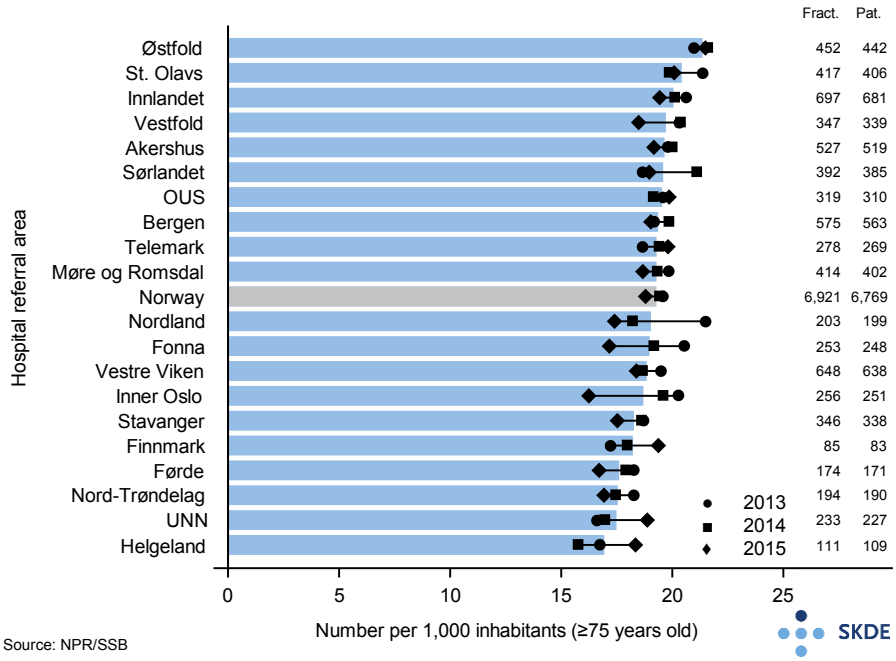


Figure 7.28: Hip fracture. Number of admissions for hip fractures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of admissions for fractures and patients on the right.

The average 30-day readmission rate after discharge following admission for hip fracture is 15% for Norway as a whole (Figure 7.29). The readmission rate for Helgeland hospital referral area (19%) is 1.6 times higher than for the UNN area (11%), which has the lowest readmission rate in Norway. Sørlandet hospital referral area has the shortest length of stay, with an average of 4.9 days, while the St. Olavs area has the longest, with an average of 8.3 days. There is no correlation between the length of stay for primary admissions and the readmission rate ($r_s = 0.17, p = 0.50$).

The average 30-day mortality proportion following admission for hip fracture is 11% for Norway as a whole (Figure 7.30). The mortality proportion for OUS hospital referral area (12%) is 1.3 times higher than for the St. Olavs area (8%), which has the lowest mortality proportion. One year after the hip fracture, the mortality proportion had increased to 29% (the national average). The hospital referral areas Østfold (32%), Sørlandet (32%) and Telemark (32%) have the highest 365-day mortality, while the Førde area (25%) has the lowest.

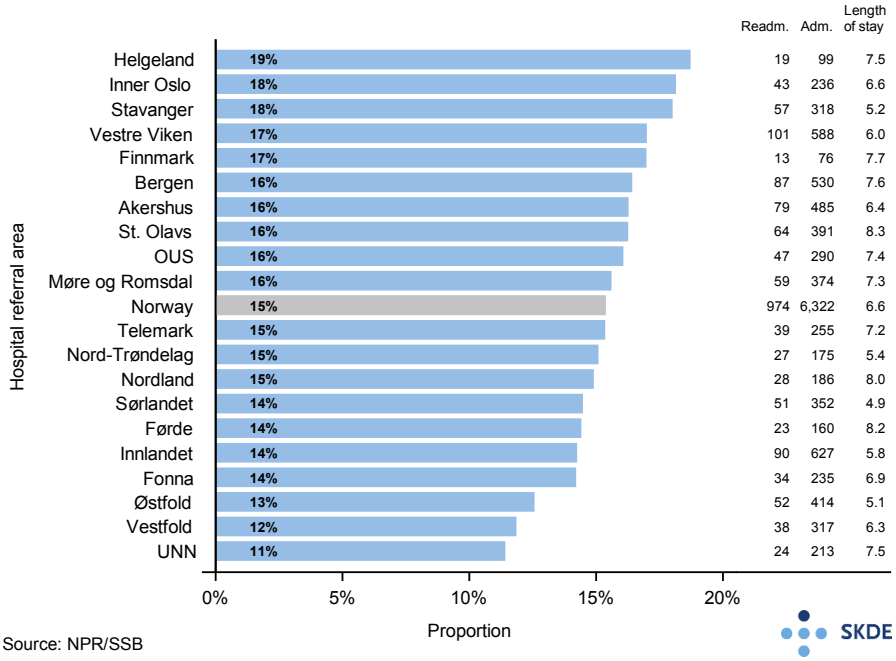


Figure 7.29: Hip fracture. Readmissions as a proportion of primary admissions for hip fractures, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of readmissions, primary admissions and average length of stay for primary admissions on the right.

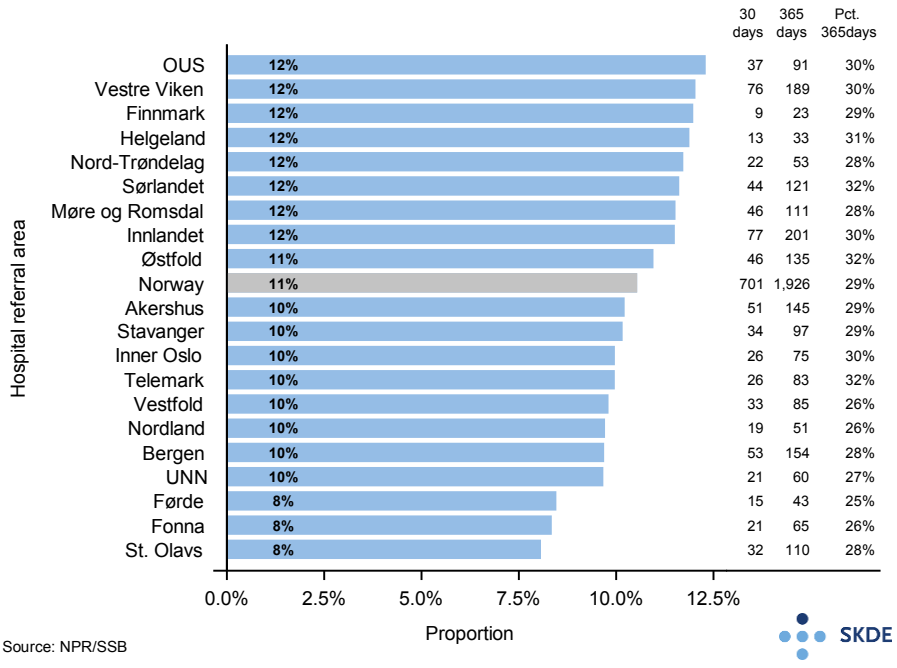


Figure 7.30: Hip fracture. 30-day mortality proportion following the last admission for hip fracture in the period 2013–2015, 75 years and older, adjusted for gender and age, broken down by hospital referral area. Average number of deaths within 30 days and one year and 365-day mortality proportion following admission on the right.

Comments

There is little variation between hospital referral areas in admissions for hip fractures. There appears to be no simple consistent logic to the variations in lengths of stay, the readmission rate

and the 30-day mortality proportion. Two hospital admission areas at opposite ends of the 30-day mortality scale can serve as an example of this: St. Olavs has the lowest mortality in Norway, while OUS has the highest. St. Olavs has Norway's longest length of stay at 8.3 days, while the length of stays at OUS is also long (7.4 days). Both hospital referral areas have a relatively high readmission rate (16%). It might be natural to assume that the long stays and low threshold for readmission result in lower risk of death within 30 days in St. Olavs hospital referral area, but that reasoning cannot explain the high mortality in the OUS area. A high readmission rate can be due to patients being discharged too soon, inadequate follow-up after discharge and postoperative infection. However, readmissions can also indicate that there is a low threshold for returning to hospital, which could contribute to good patient treatment. It can be difficult to interpret readmissions as a measure of quality, since they could be a sign of good or bad quality in a care pathway.

This analysis shows that elderly people resident in the hospital referral areas of Sørlandet, Østfold and Telemark have the highest 365-day mortality following a hip fracture (32%). It was already known that mortality after hip fractures in the Sørlandet area is high, and this was studied in a doctoral degree project. The methods used included reviewing patient records (Diamantopoulos, Hoff, Hochberg, et al. 2013; Diamantopoulos, Hoff, Skoie, et al. n.d.). Other illness with symptoms such as dizziness, confusion, muscle weakness and undernutrition impairs convalescence and can indirectly lead to acute death within a short period (30 days) or be 'the beginning of the end'. This project did not study circumstances relating to the services provided. The national figures of 11% 30-day mortality and 29% 365-day mortality show that an event such as a broken hip, which does not appear very serious in itself, can have major consequences over time.

7.4.3 Treatment techniques for selected fractures, wrist and femoral neck fractures

The elderly have an increased risk of fractures, since they often suffer from osteoporosis. Moreover, many elderly have an increased risk of falling. As the number of elderly in the population increases, treatment of fractures is expected to become a major challenge for the health service in the near future. The techniques used to treat fractures depend on the fracture's location, the position of the fractured bone and circumstances relating to the patients, but discretionary judgement and local practice also have a bearing on the choice of treatment techniques. Below is a description of how the most commonly occurring types of fractures among elderly patients, namely wrist and femoral neck fractures, are treated.

Treatment techniques for wrist fractures

Wrist fractures are the most common type of fracture in Norway, accounting for approx. 20% of all fractures. There are approx. 12,500 such fractures in Norway each year in patients of all ages (Kvernmo et al. n.d.), and the incidence is deemed to be among the highest in the world (Lofthus et al. 2008).

In 2013, the Norwegian Orthopedic Association published evidence-based guidelines for the treatment of wrist fractures in adults (Norsk ortopedisk forening 2014). Once a fracture has been diagnosed, the challenge is to decide how it should be treated. Stable fractures can be reduced and a plaster cast applied (conservative treatment), while unstable fractures require surgery with pins, external fixation or plates (osteosynthesis) to keep the fracture in position. Unstable fractures are defined by a number of (radiological) criteria listed in the guidelines. It is important to choose

the right treatment at the time of the injury, since some fractures that in subsequent X-ray check-ups appear to be healing well can nevertheless end in malalignment. The guidelines strongly recommend surgery for unstable fractures.

No upper age limit has been stipulated for surgical treatment, but the guidelines are clear that restraint should be exercised when it comes to operating on patients with a low level of functioning, i.e. patients who are permanently incapable of carrying out everyday activities independently.

Sample, wrist fractures

Surgical treatment is defined as ICD10-codes S52.5 and S52.6 as a primary or secondary diagnosis in combination with one or more of the procedure codes (NCSP) NCJ25, NCJ27, NCJ35, NCJ37, NCJ45, NCJ47, NCJ55, NCJ57, NCJ65, NCJ67.

Conservative (non-surgical) treatment of wrist fractures is defined as ICD-10 codes S52.5 and S52.6 as a primary or secondary diagnosis in the absence of the above-mentioned surgical procedure codes. A requirement has been stipulated that more than 180 days must elapse between a person's contacts with the health service with codes for wrist fracture in order for a fracture to be counted as a new fracture. This is done to eliminate follow-up appointments from the analyses.

Findings (wrist fractures)

Each year, nearly 2,700 wrist fractures in elderly patients are treated in hospital, and as many as 87% of these fractures are suffered by women (see appendix). Of the 2,700 wrist fractures, 76% are treated conservatively (Figure 7.31). Conservative treatment is used for 90% of residents in OUS hospital referral area compared with 52% in the Vestfold area, which gives a ratio of 1.7 between the two areas. Førde hospital referral area also stands out, with a markedly lower proportion of conservative treatment than the other areas.

Treatment technique for femoral neck fractures

There are nearly 5,000 new cases of femoral neck fractures in Norway each year among patients of all ages (Engesæter et al. 2016). This incidence is very high in the international context (Støen et al. 2012). Femoral neck fractures, which are fractures at the top end of the femur, make up approx. 55% of all hip fractures. It is a relatively common condition among the elderly in Norway, and a frequent cause of hospital admission.

As a rule, femoral neck fractures in elderly patients should be treated surgically. Some of the fractures are correctly aligned, while the more serious fractures are displaced (approx. 70-75%). There is a reasonable degree of agreement in the medical community that undisplaced fractures should be treated by inserting screws or nails (osteosynthesis), while displaced fractures are treated by hip replacement surgery, usually with a partial prosthesis, but sometimes with a total prosthesis.

There is fairly extensive documentation showing that treatment outcomes in elderly patients with displaced fractures are better for patients who have a prosthesis fitted than for patients who have screws or nails inserted (American Academy of Orthopaedic Surgeons 2014).

The risk of complications in connection with hip replacement surgery, for example infection or dislocation of the prosthesis, seems to be so small that the benefits outweigh the risks. Patients

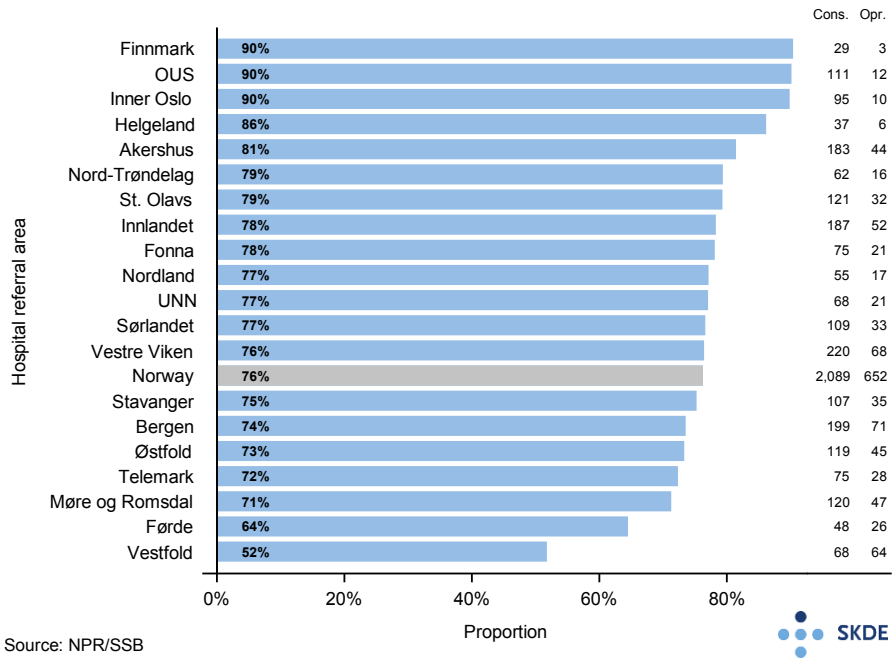


Figure 7.31: Conservatively (non-surgically) treated wrist fractures as a proportion of all wrist fractures, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of wrist fractures treated conservatively and surgically on the right.

who have hip replacement surgery following a fracture are less likely to undergo revision surgery than patients who have screws and nails inserted (American Academy of Orthopaedic Surgeons 2014).

Sample, femoral neck fractures

Femoral neck fracture is defined as ICD-10 code S72.0 as the primary or secondary diagnosis in combination with relevant procedure codes (NCSP) for primary partial or total prosthetic replacement NFB* and for different osteosynthesis techniques: NFJ30, NFJ40, NFJ50, NFJ60, NFJ70, NFJ80. We have not differentiated between fractures with or without displacement (dislocation).

Findings (femoral neck fractures)

Nearly 4,000 femoral neck fractures in elderly patients are treated each year, and 70% of the patients are women (see appendix). For Norway as a whole, approx. 75% of femoral neck fractures are treated with hip replacement (Figure 7.32).

The proportion treated with hip replacement is 1.7 times higher for Østfold hospital referral area (88%) than for the UNN area (53%). The hospital referral areas Nord-Trøndelag, Helgeland, Finnmark and UNN in the north of Norway, together with Førde, stand out with a noticeably low proportion of hip replacement surgery. It is not possible to distinguish between fractures with and without displacement in the NPR data, as it is with data from, e.g., the Norwegian Hip Fracture Register.

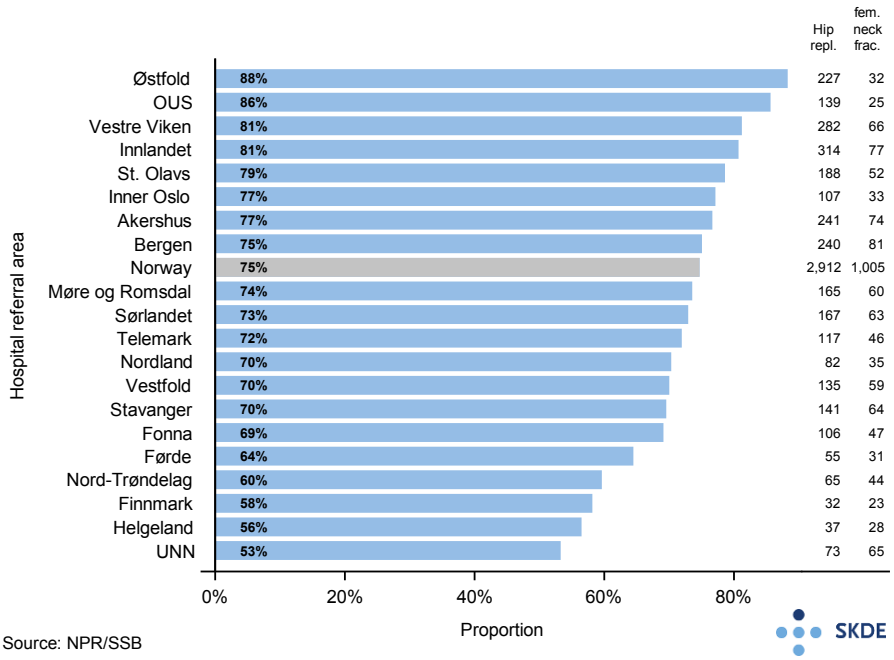


Figure 7.32: Femoral neck fractures treated with hip replacement as a proportion of all femoral neck fractures, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of femoral neck fractures treated with hip replacement and osteosynthesis on the right.

Comments on treatment techniques for wrist and femoral neck fractures

The observed variation between hospital referral areas in the choice of treatment techniques for both wrist and femoral neck fractures must be characterised as relatively low because the low number of cases, particularly for wrist fractures, makes it likely that there is a significant element of random variation.

Although the variation for wrist fracture treatment in Norway is deemed to be low, practices would appear to vary in Norway. This is confirmed if a corresponding analysis is carried out for all patients regardless of age. The volume in this analysis is high and the findings are about the same as for the elderly patients: the proportion of surgical treatment is low for residents of the Oslo area, while it is high for people resident in Vestfold and Førde. National guidelines for wrist fractures were launched in 2013, and it would be natural to expect a reduction in the variation in treatment techniques between hospital referral areas. The variation is about the same in 2015 as in 2013 (data not shown), which indicates that the harmonisation of treatment practices is progressing slowly. The specialist community's treatment preferences, combined with the available surgical capacity, are weighty factors when choosing between treatment methods.

There are no national guidelines for femoral neck fractures, but there is good international documentation that elderly patients with displaced fractures should have hip replacement surgery, which is done in 70-75% of cases, according to the Norwegian Hip Fracture Register. Fractures that are not displaced should primarily be treated with screws and nails. There is no reason to believe that the described variation in treatment techniques can be explained by differences in the proportions of displaced and undisplaced fractures between the geographical areas. Undertreatment is therefore probably occurs in areas where a markedly lower proportion of patients are given hip replacements. As for treatment choices for wrist fractures, the specialist community's

preference in combination with the available surgical capacity probably contributes to the observed variation. Doctors in training can perform femoral neck fracture surgery using screws and nails at any time, while hip replacement is normally performed by orthopaedists during ordinary working hours.

7.5 Neurology

7.5.1 Strokes

Strokes are one of our most serious widespread diseases, and one of the most common causes of death and disability. A stroke involves an interruption of the blood flow to an area of the brain caused either by a blood clot (ischaemic stroke) or by a rupture in a blood vessel (haemorrhagic stroke). About 85% of all strokes are ischaemic, while haemorrhagic strokes account for about 15% of cases. The most common symptoms of stroke are paralysis of one side of the face and/or the arm or leg on one side and/or speech difficulties, and strokes often result in disability. The main purpose of treatment of an acute stroke is to reduce disability and mortality. Most people who live with the consequences of a stroke will have a great need for health services after the acute stroke treatment. This condition affects the next of kin as well as the individual patient. It is therefore important to ensure good treatment and follow-up of this large patient group. The number of patients living with sequelae of a stroke will increase, as the number of strokes is expected to increase in step with the increasing number of elderly in the population and as improvements in acute stroke treatment reduce mortality.

The Norwegian Stroke Register has developed a number of indicators for good treatment practices. The proportion of patients who are taken quickly to hospital (within four hours) will have an effect on the possibility of administering thrombolysis (clot-busting treatment). It has long been well documented that thrombolysis treatment reduces disability among patients under 80 years of age with ischaemic stroke if the treatment is started within 4.5 hours of the onset of symptoms (Hacke et al. 2004; Bluhmki et al. 2009). In 2012, documentation was also published for thrombolysis in the age group 80 years and older (The IST-3 collaborative group 2012). At present, there is therefore no documentation that support or medical reason for limiting thrombolysis to the age group under 80 years (Wardlaw et al. 2014; Ellekjær et al. 2016).

Treatment at a stroke unit reduces disability, mortality and the need for nursing home care (Stroke Unit Trialists' Collaboration 2013). Stroke units shall have interdisciplinary teams with specialist knowledge that work in a coordinated and systematic manner on acute diagnosis, observation, treatment and early rehabilitation in close cooperation with the patient and his/her next of kin. Stroke unit treatment is the single most important component of the treatment chain for stroke patients, and national guidelines recommend that all patients with an acute stroke should be treated at a stroke unit. In practice, some patients will have to be cared for in other departments due to other concurrent conditions, including patients in the terminal phase. The goal is therefore that as many patients as possible, and at least 90%, should be treated at stroke units, and this is also a national quality indicator for the health service.

Sample

Admissions for strokes are defined as emergency admissions with the primary diagnosis (ICD-10) I61, I63 and/or I64. A requirement has been stipulated that more than 28 days must elapse between admissions with the above-mentioned codes in order for another admission to be counted as a new stroke. This is in order to eliminate admissions for rehabilitation or follow-up incorrectly coded as an acute stroke. Readmission rates and 30-day mortality proportion are defined in Chapter 4.3

Data from the Norwegian Stroke Register for the years 2014 and 2015 have been disclosed for the purpose of analysing the proportion of elderly stroke patients admitted within four hours of

the onset of symptoms (Figure 7.36). Of a total of approx. 8,500 patients (all ages), the time of onset of symptoms is uncertain for 35% because the time has not been registered and/or the patient woke up with the symptoms. The Norwegian Stroke Register has defined these patients with unknown or undocumented onset of symptoms as patients not admitted within four hours of the onset of stroke symptoms.

Data from the Norwegian Stroke Register for the years 2014 and 2015 have been used to analyse the proportion of stroke patients treated at a stroke unit (Figure 7.37)

Some hospitals have reported fewer than 70% of the stroke cases they have treated to the Norwegian Stroke Register. This applied to the following hospitals in 2015: Akershus University Hospital, Haukeland University Hospital, Hamar Hospital and Kirkenes Hospital. The results for the relevant hospital referral areas (Akershus, Bergen, Innlandet and Finnmark) must therefore be interpreted with caution.

Findings

Approx. 5,200 elderly patients have a total of 5,300 emergency admissions for strokes (Figure 7.33). The proportion of women is 56%, and the average age in the sample is 84.2 years (see appendix). The national rate and the rates of many hospital referral areas have decreased during the period studied. The admission rate for UNN hospital referral area is 1.4 times higher than for the Stavanger area.

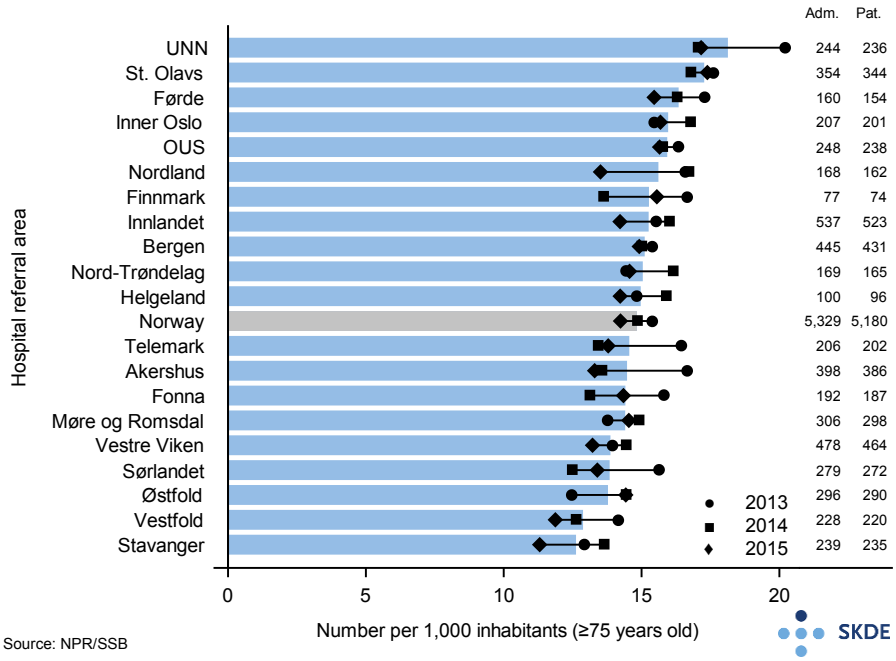


Figure 7.33: Strokes. Number of admissions per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of admissions and patients shown on the right.

The average 30-day readmission rate after discharge following admission for a stroke is 13% for Norway as a whole (Figure 7.34). The readmission rate for Førde hospital referral area (16%) is twice as high as for the UNN area (8%), which has the lowest readmission rate. Innlandet hospital referral area has the shortest length of stay for primary admissions, with an average of 5.9 days, while the OUS area has the longest with an average of 16.6 days. The national average

length of stay for Norway is 9.4 days for elderly patients. There is no correlation between the length of stay for primary admissions and the readmission rate ($r_s = 0.17$, $p = 0,47$).

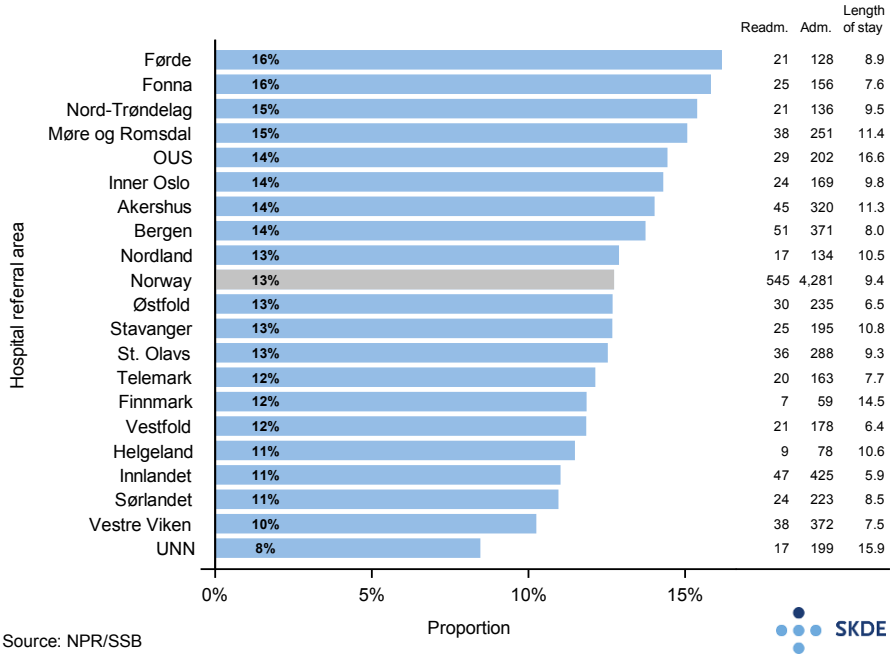


Figure 7.34: Strokes. Readmissions as a proportion of primary admissions for strokes, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of readmissions, primary admissions and average length of stay for primary admissions on the right.

Among elderly patients, the average 30-day mortality following their last admission for a stroke is 20% for Norway as a whole (Figure 7.35).

The mortality proportion for Finnmark hospital referral area (27%) is 1.6 times higher than for the Bergen area (17%), which has the lowest mortality proportion. On average, 33% of patients die within a year of suffering a stroke. The hospital referral areas Finnmark and Vestfold (37%) have the highest 365-day mortality proportion, while the Bergen area (29%) has the lowest. No adjustments have been made for the severity of the strokes, since such data are not available in NPR. The severity of a stroke can have a bearing on mortality.

The average proportion of elderly patients admitted within four hours of the onset of symptoms is 42% for Norway as a whole (Figure 7.36). The proportion admitted within four hours in Stavanger hospital referral area (54%) is 1.5 times higher than in the St. Olavs area (36%), which has the lowest proportion.

The national average proportion of elderly patients treated at a stroke unit is 90% (Figure 7.37). The proportion of patients treated at a stroke unit in Akershus hospital referral area (99%) is 1.5 times higher than in the Førde area (67%), which has the lowest proportion. Akershus University Hospital has a coverage of 63% in the Norwegian Stroke Register for 2015, and the result for Akershus hospital referral area must therefore be interpreted with some caution. The proportion of patients in the Førde area treated at a stroke unit varied from 50% in 2014 to 85% in 2015, and the average of 67% for these years is related to the low number for 2014, which is due to either poor inclusion in the register or a low number of patients treated at a stroke unit.

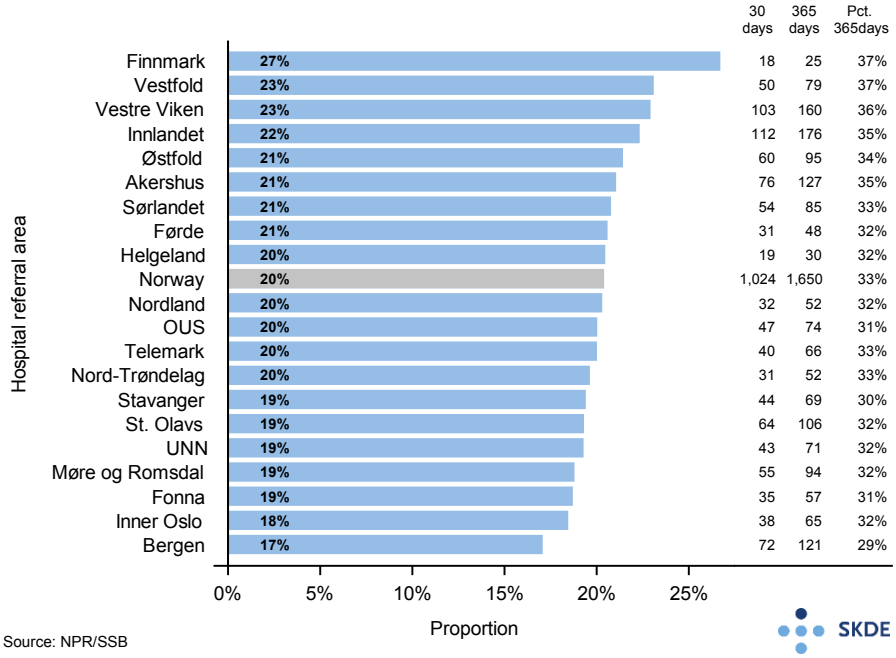


Figure 7.35: Strokes. 30-day mortality proportion following the last emergency admission for strokes in the period 2013–2015, 75 years and older, adjusted for gender and age, broken down by hospital referral area. Average number of deaths within 30 days and one year and 365-day mortality proportion following admission on the right.

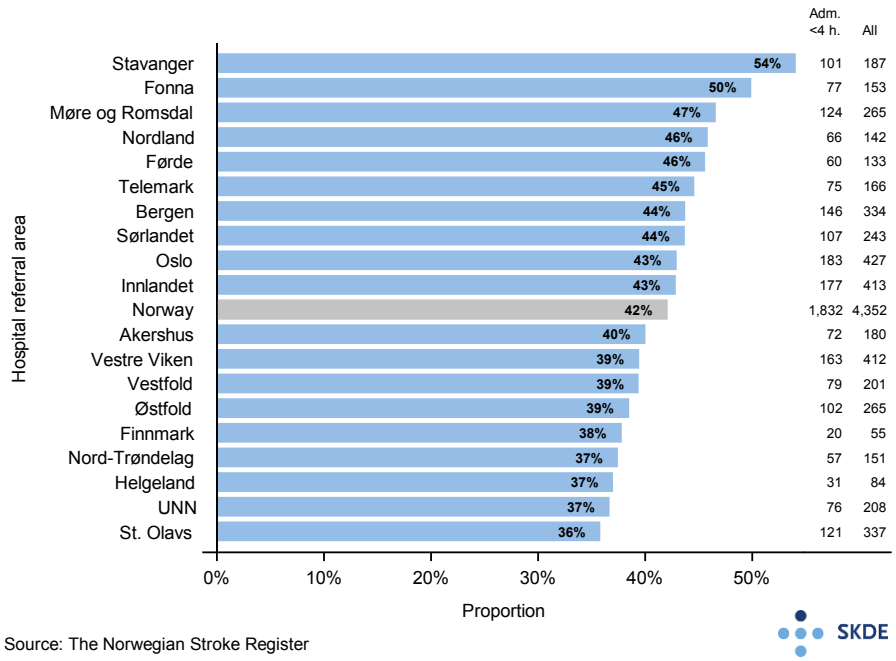


Figure 7.36: Stroke, proportion of patients admitted within four hours of the onset of symptoms, 75 years and older, adjusted for gender and age, average per year 2014-2015 broken down by hospital referral area. Average number admitted within four hours and number of potential admissions on the right. Hospitals with a coverage of <70% are included in the analysis (in 2015: Akershus University Hospital, Haukeland University Hospital, Hamar Hospital and Kirkenes Hospital). The hospital referral areas OUS and Inner Oslo have been merged into Oslo hospital referral area due to the absence of information about city districts.

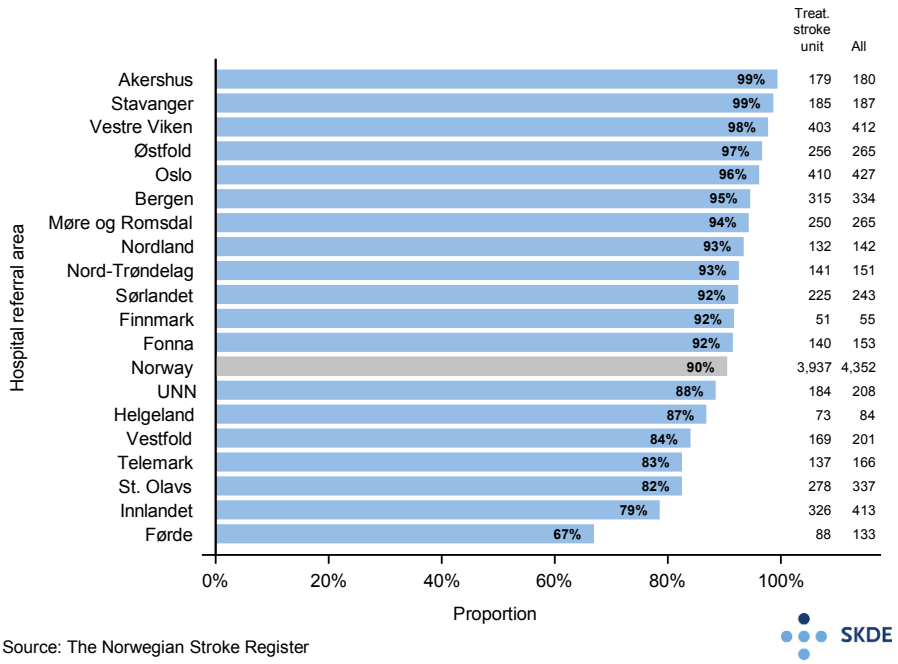


Figure 7.37: Stroke. Proportion of patients treated at a stroke unit, 75 years and older, adjusted for gender and age, average per year 2014-2015 broken down by hospital referral area. Average number treated and number of candidates for treatment at a stroke unit on the right. Hospitals with a coverage of <70% are included in the analysis (in 2015: Akershus University Hospital, Haukeland University Hospital, Hamar Hospital and Kirkenes Hospital). The hospital referral areas OUS and Inner Oslo have been merged into Oslo hospital referral area due to the absence of information about city districts.

Comments

The geographic distribution of admissions of elderly patients for an acute stroke in Norway is relatively even, which may indicate that the disease is evenly distributed. A decrease in admission rates during the three-year period, nationally and for many hospital referral areas, indicates lower incidence among the elderly during the short period described. The annual number in this analysis is based on data from NPR. The data reported to the Norwegian Stroke Register show somewhat lower figures, approx. 85%. The main reason for this is that not all patients who have suffered a stroke are included in the Norwegian Stroke Register (84% coverage in 2015), but coding errors may also have contributed, as validation studies suggest a certain 'over-registration' in NPR (Varmdal et al. 2016).

Readmission figures vary considerably, with almost twice as many readmissions in Førde hospital referral area as in the UNN area. The clinical significance of readmission is somewhat unclear. Readmissions could be a sign that patients are discharged early, but we find no correlation in this material between length of stay and the proportion of patients readmitted. Other possible explanations for a high proportion of readmissions are that the municipal reception system is poorly prepared or that there is good cooperation between the specialist health service and the primary healthcare services through 'open return' schemes. It is probably necessary to be familiar with local conditions to assess whether the level of readmissions should be changed or whether the current level is appropriate. The average length of stay is long, varying from 5.9 to 16.6 days. Rehabilitation is included in the hospital stay for some patients, while others are transferred to private rehabilitation institutions or municipal institutions for which no data are available. Nor are data available for which patients are discharged to their home. The length of stay must therefore

be interpreted with caution.

An acute stroke is a serious condition, and 20% of patients die within 30 days of being admitted. The lack of adjustment for severity of the strokes could have a bearing on the variation described between hospital referral areas. Any differences in the distribution of severe cases will have the greatest impact in hospital referral areas with a small number of patients, for example the Finnmark area, which has the highest mortality. The geographical variation in 30-day mortality following admission is relatively low, but a difference of 60% between the highest and lowest proportion must nevertheless be considered significant, since it is mortality we are studying.

Rapid response from the first symptom of a stroke is important in relation to the possibility of administering thrombolysis within the recommended time. Factors that determine how much time elapses from the first symptom until treatment is initiated include the patient him/herself, the regular GP/emergency primary healthcare/nursing home doctor, and transport to hospital. The patients' average response time must be assumed to be approximately evenly distributed between hospital referral areas. The general practitioner and transport services are factors that could have a bearing on the response time. The Stavanger area, which has the highest proportion of patients admitted within four hours of the onset of symptoms, is a geographical area where all inhabitants have a relatively short distance to travel to hospital. Many inhabitants in the Northern Norway RHA and Western Norway RHA regions have to travel a long distance to get to a hospital. Considering the different geographical conditions, the proportion of patients who arrive at hospital within four hours is relatively similar between hospital referral areas.

Treatment at a stroke unit is a critical precondition for improving survival and the level of functioning following acute strokes. Seven out of the 20 hospital referral areas fall short of the national target for high goal achievement, which stipulates that at least 90% of stroke patients should be treated at a stroke unit. This result is nearly identical to the result of the same analysis conducted for all ages (SKDE 2016).

7.5.2 Dementia and mild cognitive impairment

Dementia is a collective term for various diseases of the brain that are characterised by symptoms such as impairment of memory, attention, language and general intellectual abilities, personality changes and impaired ability to function in everyday life. The condition impairs a person's self-care ability.

Mild cognitive impairment is characterised by symptoms of impaired cognitive functioning (thinking, perception and understanding) that are not sufficiently serious to meet the criteria for a dementia diagnosis. Patients with this condition experience memory problems, learning difficulties and an impaired ability to focus on a task over time. These symptoms are more pronounced than would normally be expected for a person their age. These patients should be followed up and monitored for dementia development.

Depression in the elderly can cause symptoms resembling cognitive impairment, and it is important to rule out this possibility along with side effects of medication, sleep disorders and conditions such as hypothyroidism.

There are several types of dementia. The most common form (approx. 60%) is Alzheimer's disease, which is most common in persons over 70 years of age (Engedal 2016). The causes of Alzheimer's disease are not fully understood. There is no cure for dementia, but medication can be effective against the symptoms of some types in some patients for a while. The proportion

of people with dementia increases with age. There are probably more than 75,000 persons in Norway who suffer from dementia (Engedal 2016). In the age group 80 years and older, two out of ten have dementia (Engedal 2016). The number of people with dementia is expected to increase considerably (Helse- og omsorgsdepartementet 2015). Since dementia becomes more common with age, demographic developments give reason to expect a near doubling of the number of dementia sufferers in the period up until 2040. Dementia conditions are also found in people under the age of 65. Around 5,000 people under 65 years of age have been diagnosed with dementia (Engedal 2016)

Assessment and follow-up of elderly patients with suspected dementia is normally the primary healthcare service's responsibility. The Norwegian National Advisory Unit on Ageing and Health has prepared a guide to dementia assessment in the municipal health service (Nasjonal kompetansetjeneste for aldring og helse og Helsedirektoratet 2011). This guide states that some patients should be referred to the specialist health service. This applies to patients with suspected cognitive impairment without definite symptoms and patients with cognitive symptoms and concurrent signs of behavioural problems or other complicating conditions. It also applies to persons with developmental disabilities and immigrants with poor language skills. Dementia assessment in the specialist health service usually takes place at geriatric, neurology and geriatric psychiatry units.

Sample

Dementia is defined as a primary diagnosis of one of the following ICD-10 codes: F00*, F01*, F02*, F03*, G30*, G31.0, G31.8. Patients with a secondary diagnosis of F00* and a primary diagnosis of G30* are also considered to be suffering from dementia. The same applies to persons with a secondary diagnosis of F02* and one of the following as the primary diagnosis: A81.0, A52.1, B22.0, B56*, B57*, E01*, E03*, E52*, E53.8, E75*, E83.0, E83.5, G10*, G20*, G35*, G40*, M30.0, M32*, N18.5, T4*, T5*, T60*, T61*, T62*, T63*, T64*, T65*.

Mild cognitive impairment is defined by the ICD-10 code F06.7 or F07.8 as the main diagnosis.

Only patients who are in contact with the somatic specialist health service for dementia and mild cognitive impairment are included in the analyses. Dementia assessments are also carried out in geriatric psychiatry, but SKDE does not have access to data from the psychiatric health service. Due to the low number of hospital admissions for dementia, only outpatient consultations are included in the analyses.

Findings

Each year, approximately 3,300 patients have a total of approx. 4,500 outpatient consultations for dementia (Figure 7.38). The average age in the patient sample 75 and older is 82.3 years, and the proportion of women is 58% (see appendix).

People resident in Inner Oslo hospital referral area (the referral areas of Lovisenberg and Diakonhjemmet hospitals) use outpatient services for dementia eleven times more than residents of the Telemark area. The OUS area also has a high number of consultations for dementia, but the hospital referral area has seen a great reduction in the number of consultations during the period 2013–2015. Inner Oslo and OUS have more consultations per patient than the other hospital referral areas.

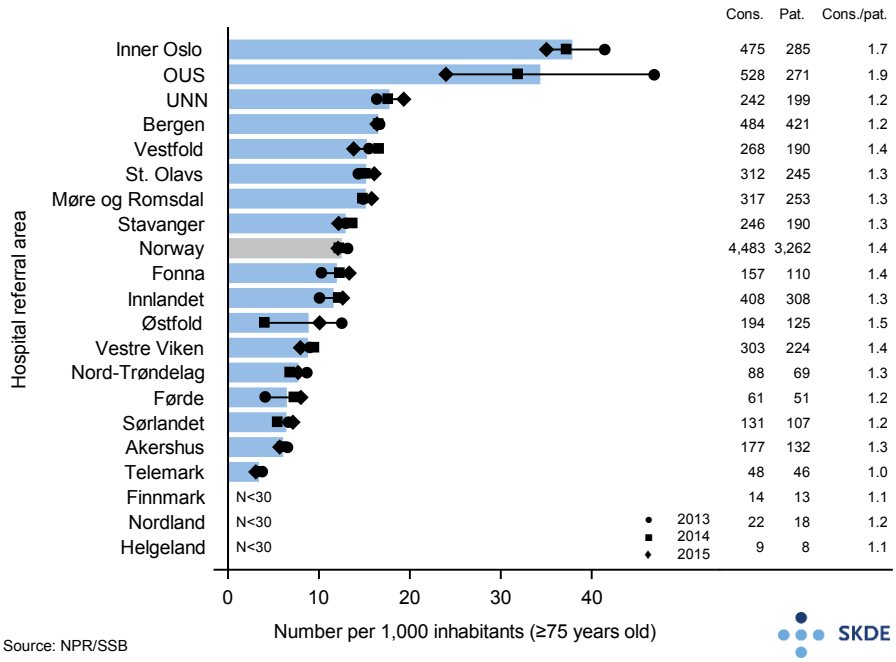


Figure 7.38: Dementia. Number of outpatient consultations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of consultations, patients and consultations per patient shown on the right.

There is considerable variation in the use of outpatient services for dementia even if we eliminate the areas Inner Oslo and OUS. Residents of UNN hospital referral area have more than five times as many outpatient consultations relating to dementia as residents of the Telemark area.

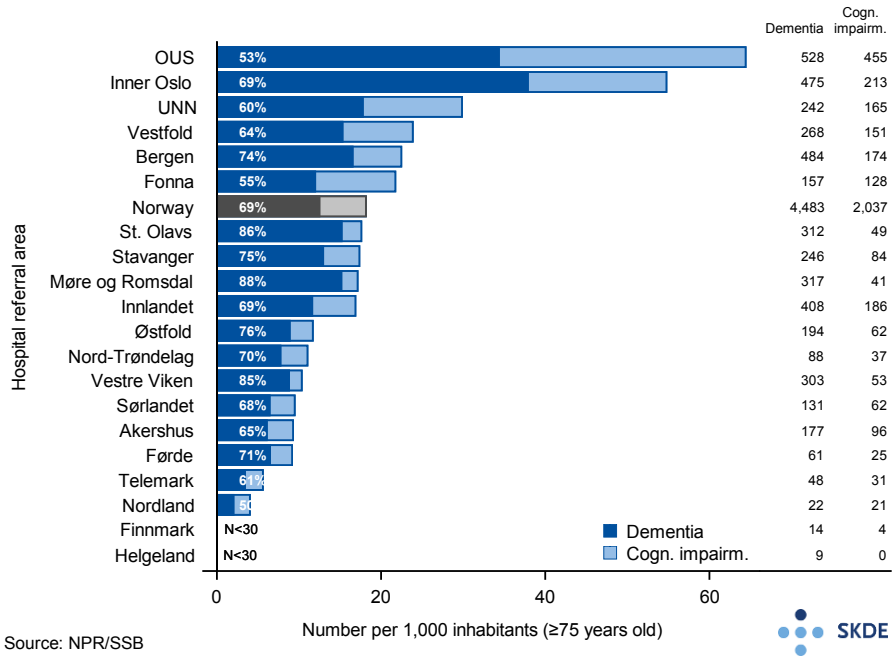


Figure 7.39: Dementia and mild cognitive impairment. Number of outpatient consultations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and diagnosis for dementia or mild cognitive impairment. Average number of consultations for dementia and mild cognitive impairment on the right.

Figur 7.39 shows outpatient consultations for the diagnoses dementia and mild cognitive impairment together. Just over 2,000 consultations take place each year with cognitive impairment as the primary diagnosis. The result is much like that for dementia alone, but with greater variation. Hospital referral areas with a low consultation rate for dementia also have a low rate for mild cognitive impairment, while areas with a high rate for dementia have a high rate for mild cognitive impairment. Residents of the OUS area use outpatient services sixteen times more for the conditions dementia and mild cognitive impairment combined than the residents of Nordland (Figure 7.39).

Comments

There is great variation in the use of outpatient services in connection with dementia, particularly due to the high number of consultations in the Oslo area. The variation in the use of outpatient services is also considerable if the Oslo area (OUS, Indre Oslo) is excluded.

The Oslo area has the highest average number of consultation per patient with dementia, and the OUS has almost as many consultations for the diagnosis mild cognitive impairment as for dementia. The fact that the specialist health service has provided a good and comprehensive service for this patient group in the Oslo area for more than 25 years could contribute to the high consultation rates in the Oslo area. This both increases demand among patients and has long reduced the workload of the regular GPs in the area. The establishment of dementia teams in the city districts, which contribute to more extensive assessment in the primary healthcare services, is a possible explanation for the reduction in outpatient service rates in recent years.

With the exception of the UNN area, very few patients have attended outpatient appointments for dementia in the hospital referral areas in Northern Norway. The somatic health service in these areas has few specialists (particularly geriatricians), and this is a possible and probable explanation for the low rate of outpatient activities for dementia and mild cognitive impairment patients in parts of Northern Norway RHA's area.

It is a weakness of the analyses that we do not have geriatric psychiatry data. An estimated 500 patients per year are assessed for dementia in the speciality geriatric psychiatry (personal communication, Knut Engedal 2017). Particularly high numbers of persons with dementia are assessed in geriatric psychiatry units in the counties of Telemark, Vestfold and Hordaland (the latter comprises Bergen hospital referral area and parts of Fonna hospital referral area). This could explain the low outpatient services rate for residents of Telemark, but will increase the already high rate in Vestfold and Bergen. The different ways in which the health trusts organise dementia assessment probably influence the results. This variation is nonetheless so striking that it cannot be explained by a lack of geriatric psychiatry data alone.

It is difficult to estimate the correct level of specialist health service assessment and follow-up of elderly dementia sufferers. According to the guide produced by the Norwegian National Advisory Unit on Ageing and Health, the primary healthcare service should refer 'difficult' cases. It is hard to believe that such cases are so unevenly distributed in Norway that this could explain the great variation between hospital referral areas. Some groups may need referral to the specialist health service more than others, for example persons for whom language and/or cultural factors can be an obstacle to assessment. Immigrants are potentially one such group. However, the proportion of elderly immigrants in the period studied is not assumed to be large enough to explain the great variation between, e.g., OUS/Inner Oslo and Akershus hospital referral areas (Norwegian National Advisory Unit on Ageing and Health, Statistics Norway).

It is also a possibility that aspects of the health service contribute to the variation described. The primary healthcare service should be the primary provider of assessment and follow-up of patients with suspected dementia. The regular GPs' level of expertise can vary, and the different ways in which municipalities organise dementia care and their cooperation with hospitals could also have a bearing on referral rates. The services available from the specialist health service can also vary between hospital referral areas based on their expertise and interest in the field.

Dementia care is a collaborative effort by several parties, and it is important to clarify tasks and responsibilities and ensure good cooperation. National guidelines for dementia are under way.[17] The national guidelines that are being prepared can have a positive effect in terms of achieving more equitable specialist health services for this group of patients all over Norway.

7.5.3 Parkinson's disease

Parkinson's disease affects parts of the brain responsible for fine motor control (the basal ganglia). It is assumed that between 7,000 and 8,000 Norwegians have Parkinson's disease. The incidence increases with age; most patients develop symptoms after the age of 50, and it is very rare for people under 30 years of age to be diagnosed with Parkinson's disease. The disease causes characteristic motor difficulties, including:

- Tremor at rest (resting tremor)
- Increased stiffness and inflexibility of joints during passive movement (rigidity)
- Slow movement, difficulties starting movements, or sudden freezing of movement (akinesia/bradykinesia)

A patient must exhibit two of these three symptoms in order to be diagnosed with Parkinson's disease.

People with Parkinson's will walk with short, shuffling steps, and will with time become unsteady. A typical sign is that the patient will swing his or her arms less than usual when walking, in many cases starting on one side. Patients' speech often becomes softer and more monotonous, and their face may seem to lack expression ('masked face'). Parkinson's disease can also cause many other symptoms, such as bladder problems, constipation, sleep problems, fatigue, depression and cognitive impairment (dementia, if any, develops at a late stage of the disease). Not all people with Parkinson's disease will experience such symptoms. The disease is chronic and progressive. The severity of the disease and its development vary from person to person, but most patients will develop significant health problems, reduced quality of life and need for considerable assistance within a few years.

There are several Parkinson's-like conditions with similar symptoms that turn out not to be Parkinson's disease. Secondary parkinsonism caused by either medication, microbes or poor circulation is one such condition. Symptoms often affect both sides, and not just one side as with Parkinson's disease. The condition develops more rapidly, and pharmacological treatment is not particularly effective in such cases.

Patients with Parkinson's disease should be followed up regularly by the specialist health service. The assessment, treatment and follow-up are complicated and demanding in terms of resources because the disease affects every patient differently, and because the medication used to treat it

[17] External consultation paper – National medical guidelines regarding dementia

may have serious side effects and has to be individually adjusted. When to initiate pharmacological treatment is a matter for specialists to assess. The action time of the medication used will decrease with time, which results in considerable and sometimes unpredictable fluctuations in symptoms ('on-off effect'). Such fluctuations can be an indication for infusion pump treatment (continuous infusion). Surgery, known as 'deep brain stimulation', may be an option in complicated Parkinson's cases where all types of medication have been tried and medication is no longer effective. The surgery involves implanting electrodes deep in the brain under MRI guidance, and a neurostimulator is implanted under the skin and connected to the electrodes.

The regular GPs play an important role in relation to this patient group. They should see the big picture as regards the patient's situation, ensure sufficient contact with the specialist health service and facilitate regular exercise and physical therapy to improve the patient's functioning and quality of life.

Sample

The sample is defined as elderly patients in the somatic specialist health service, including specialists in private practice under public funding contracts, with a primary diagnosis of Parkinson's disease defined by the ICD-10 code G20*. Only outpatient activities are included in the analysis, since the number of admissions with Parkinson's as the primary diagnosis is very low, approx. 500 admission per year in Norway in this age group. Patients with Parkinson's-like conditions are not included in the sample.

Findings

Each year, approx. 2,900 elderly patients with Parkinson's disease as their primary diagnosis have a total of nearly 8,000 outpatient consultations (Figure 7.40). The level of activity appears to have risen in the last two years. Women are in a slight minority (45%), and the average age in the sample is 80.1 years (see appendix).

Parkinson's patients resident in the Vestfold area uses 2.3 times more outpatient services than those resident in St. Olavs hospital referral area. On average, each patient attends 1.7 outpatient clinic appointments a year, but there are big differences between hospital referral areas. Parkinson's patients resident in OUS hospital referral areas have 2.4 appointments a year, while those resident in the Helgeland area have 1.3 appointments a year.

Comments

There is relatively large geographical variation in outpatient consultations for Parkinson's disease. Part of the variation may be caused by differences in coding practice or uncertainty about whether patients should be diagnosed with Parkinson's disease or a Parkinson's-like condition. St. Olavs has a relatively high rate for Parkinson's-like conditions compared with the other hospital referral areas (results not shown), which could indicate a difference in coding practices. It is therefore possible that the actual rate of outpatient consultations for Parkinson's disease in the St. Olavs area's is somewhat higher than shown. The variation remains relatively high even if we choose to disregard the St. Olavs area; doing so reduces the ratio between the areas with the highest and the lowest rate from 2.3 to 2.1. Our findings are supported by a recently published study showing that the distribution of advanced therapies for Parkinson's disease (continuous infusion

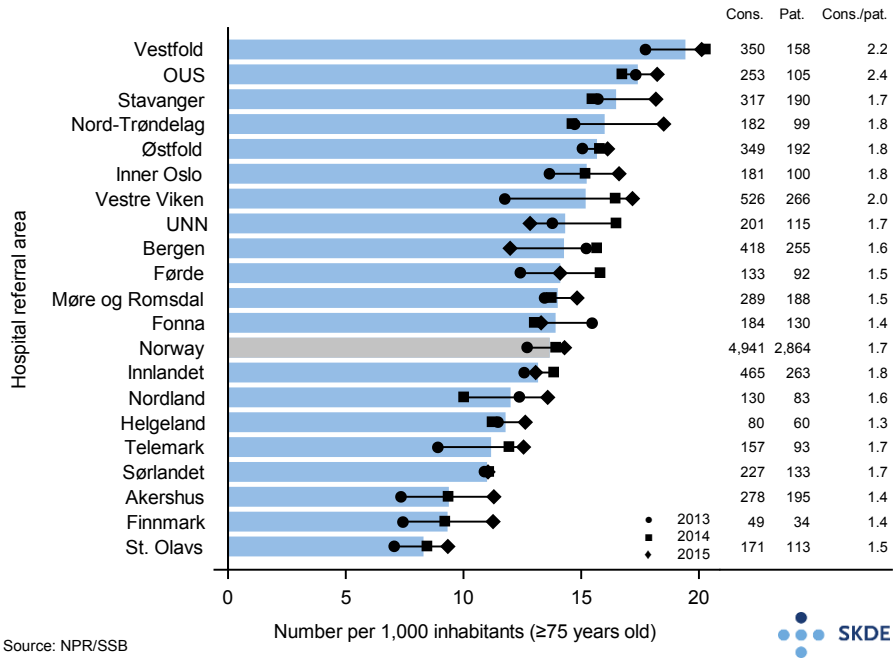


Figure 7.40: Parkinson's disease. Number of outpatient consultations per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of consultations, patients and consultations per patient shown on the right.

and deep brain stimulation) varies depending on which county the patient is resident in (Ezat et al. 2017). Patients resident in Troms county received the most advanced therapy, while residents of Finnmark received least treatment.

The variation observed gives reason to question whether the services available to elderly Parkinson's patients are equitably distributed across Norway. Parkinson's disease is a serious disease with profound implications for those affected. Regular GPs have an overall responsibility for patients over time and refer them to specialist services as required. Pharmacological treatment of Parkinson's disease is a difficult exercise that should be carried out by specialists with experience of treating this disease. Nonetheless, we see big differences in the use of outpatient services and also in the number of appointments per year. There are no national guidelines, but advisory guidelines for the treatment of Parkinson's disease have been prepared (Nasjonalt kompetansesenter for bevegelsesforstyrrelser 2010). It is possible that guidelines with national status could help to reduce the geographical variation by raising awareness in specialist communities and harmonising indications and treatment choices. Work is under way to establish a national medical quality register for this group of patients. This is a good and important initiative, but results will not be available for use in adjusting the provision of services for some years.

7.6 Non-surgical cancer treatment

Approx. 10,500 new cancer cases are diagnosed per year in the age group 75 years and older, and men account for 55% of these cases. Prostate cancer is the most common form of cancer in elderly men (13% of all cancer diagnoses), while breast cancer is the most common cancer type in elderly women (8% of all cancer diagnoses). Lung cancer and colon cancer are the second and third most common forms of cancer among elderly patients of both sexes (Cancer Registry of Norway 2016). Irrespective of age, the incidence of lung cancer in men seems to have levelled off, while the number of cases of the other above-mentioned forms of cancer are increasing. The number of new cancer cases is not evenly distributed across Norway. According to the Cancer Registry of Norway, 1.4 times more new cases are diagnosed among residents of Vestfold than in Finnmark (Figure 7.41).

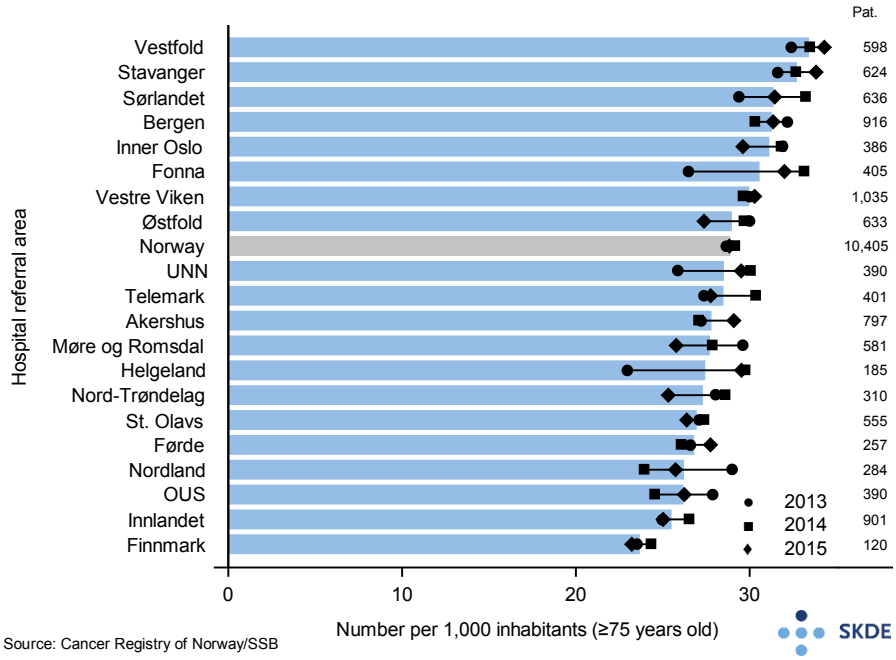


Figure 7.41: New cancer cases among the elderly in Norway. Number of new cancer cases per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of new cases per year on the right. Data have been obtained from the Cancer Registry of Norway. The interpretation and reporting of these data are the sole responsibility of SKDE, and they have not been subject to approval by the Cancer Registry.

Approx. 18,000 new cases of cancer per year are diagnosed in the age group 50-75 years. The variation between hospital referral areas is minimal, with a ratio of 1.2 between the highest and lowest rate (figur 7.42). The incidence of cancer is more than twice as high in the oldest than in the younger age group.

Together – against cancer. National Cancer Strategy 2013-2017 (Helse- og omsorgsdepartementet 2013) mentions the increased incidence of cancer among the elderly as a big challenge in the coming years. The total number of new cancer cases will increase by approx. 34% in the period up until 2030, while the forecast for the group older than 74 years is approx. 18,000 new cases in 2030, which is an increase of 76%. Men are expected to account for 60% of cancer patients in the age group over 74 years.[18]

[18]The NORDCAN database

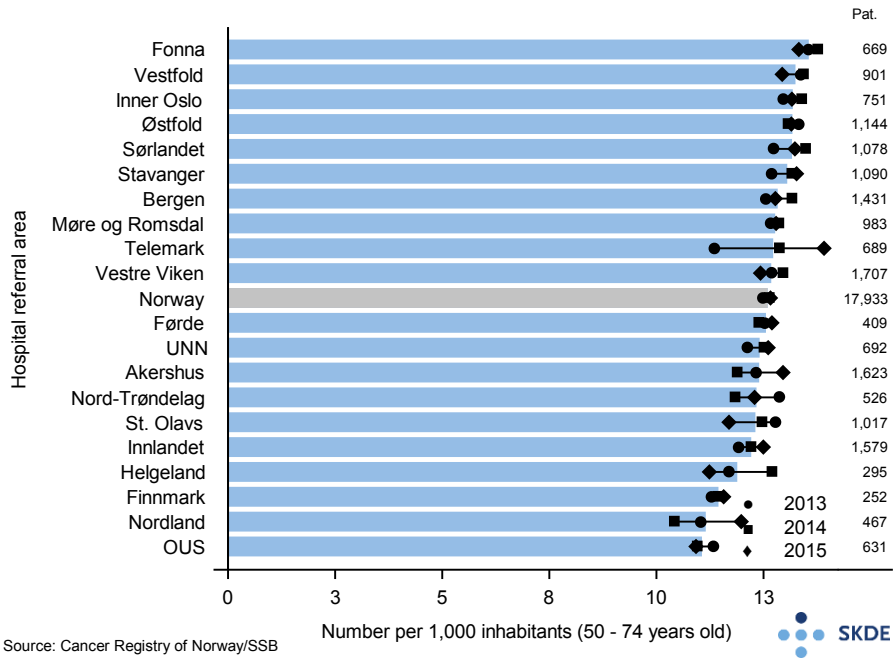


Figure 7.42: New cancer cases in Norway, 50–74 years. Number of new cancer cases per 1,000 population, 50–74 years, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of new cases per year on the right. Data have been obtained from the Cancer Registry of Norway. The interpretation and reporting of these data are the sole responsibility of SKDE, and they have not been subject to approval by the Cancer Registry.

The national cancer strategy points out that the increase will place great demands on the capacity and expertise of hospitals and that it will be necessary to invest in equipment and infrastructure. It also points out that the increased incidence of cancer will be equally challenging for the municipal health and care services.

Providing good cancer treatment and care for elderly patients is challenging both professionally and in terms of capacity, since many elderly patients have other concurrent diseases, which could represent a challenge both in the assessment process and in connection with decisions about treatment. Moreover, many elderly people have a weakened immune system (Weiskopf et al. 2009) as well as weakened barriers against infection (thin skin and mucous membranes). Cancer treatment, particularly pharmacological cancer treatment, further weakens the immune system and increases the risk of infection. It can be more difficult to diagnose infections in time, since the elderly have a reduced ability to react with typical symptoms such as sweating, fever and coughing. The knowledge that forms the basis for decisions and treatment choices often builds on results from younger and healthier patients, since elderly cancer patients are strongly under-represented in clinical studies. Elderly patients' suitability for treatment must therefore largely be assessed on the basis of their biological age and general state of health – and as shared decision-making with the patient.

Surgery is a very important form of treatment for cancer. Cancer surgery is not an unambiguous concept, however – it covers a wide range of different surgical procedures on different organs. In addition to the procedure code, the procedure must also be coded for cancer in order to be identified as cancer surgery in NPR. We have therefore refrained from providing an overview of cancer surgery among elderly patients, but have described pharmacological cancer treatment and radiotherapy.

7.6.1 Pharmacological cancer treatment

The types of medication used to treat cancer include traditional cytostatics, new targeted drugs, drugs that act on the immune system and various hormones. Combinations of several drugs are often used, and the purpose of treatment can be curative, life-prolonging or palliative. Many of the treatment regimes have very serious side effects that can be life-threatening and reduce the patient's quality of life. There has been a considerable increase in the use of medication in cancer treatment over the past ten or fifteen years as several effective new treatment regimes have become available. In principle, no age limit is defined for pharmacological cancer treatment, but the serious side effects can limit use in patients who have other concurrent conditions, which is more often the case with elderly patients. A Norwegian study has shown that frail elderly patients fare less well than more robust elderly patients with no comorbidity following surgery for colon cancer (Ommundsen et al. 2014). When weighing the potential benefits of treatment for a patient against the risks, taking into consideration such factors as cardiovascular disease, diabetes and COPD, the individual assessment can result in different conclusions depending on the treatment provider and patient. Local geographical conditions, for example a long distance to hospital, can also be a factor in the decision-making process. Infection is an ever-present risk during chemotherapy, since the patient's own immune system is temporarily weakened. Patients who become ill must be admitted to hospital quickly.

Sample

Here, pharmacological cancer treatment is defined as treatment of patients diagnosed with cancer, defined by ICD-10 code (primary or secondary diagnosis) C*(all), D0 and/or B21, in combination with procedure code (NCMP) WBOC* (all) and/or a code for pharmacological cancer treatment (Kur-ID) in accordance with the National Pharmacological Cancer Treatment Registry. Antihormone therapy is not included under this definition. The ICD-10 codes are used in combination with tariff code 126 for cancer patients treated by specialists in private practice under public funding contracts. Cancer patients have been divided into two samples on the basis of age: one sample for patients aged 75 years and older (elderly) and one for younger patients aged 50-75 years. This was done in order to determine whether elderly cancer patients receive different treatment than patients in the age group 50-75 years.

Findings

Each year, just over 3,200 patients aged 75 years or older undergo pharmacological cancer treatment in Norway (Figure 7.43). The distribution between men and women in the sample is even (see appendix). Vestfold hospital referral area' patient rate is nearly twice as high as the rate for the Finnmark area, which has the lowest rate. The highest rates for Norway as a whole and for half of the hospital referral areas was in the last year – a trend that indicates that an increasing number of elderly patients are receiving pharmacological cancer treatment. On average, the number of hospital appointments per patient is highest in Østfold (8.4 appointments per year) and lowest in Finnmark (5.1 appointments per year). In areas with a long distance to hospital, courses of treatment are more often administered by the municipal health service, and these treatments are not reported to the NPR.

Each year, 12,300 patients in the age group 50–74 years receive pharmacological cancer treatment (Figure 7.44). Førde hospital referral area has a rate that is 1.3 times higher than for the

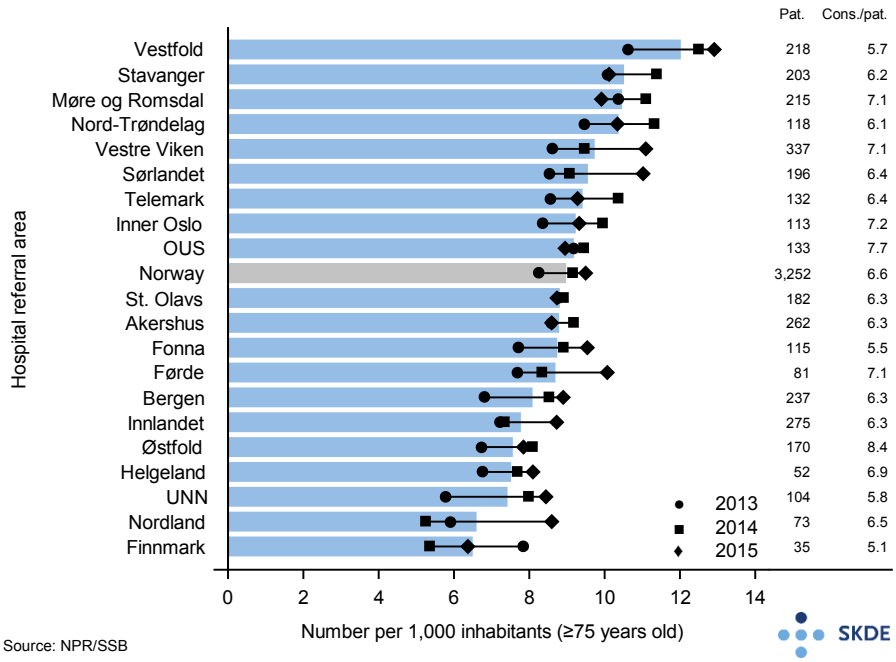


Figure 7.43: Pharmacological cancer treatment. Number of patients per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number patients and appointments per patient on the right.

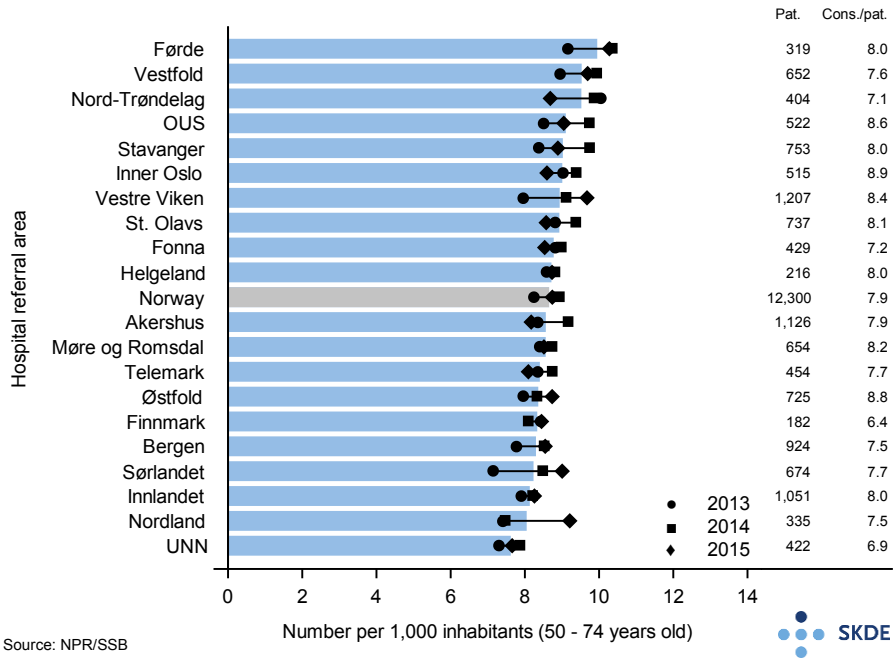


Figure 7.44: Pharmacological cancer treatment. Number of patients per 1,000 population, 50–74 years, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number patients and appointments per patient on the right.

UNN area, which has the lowest rate. The annual number of patients per 1,000 population who receive pharmacological cancer treatment remained relatively stable throughout the period. On average, the hospital referral areas Inner Oslo, Østfold and OUS had the highest number of hospital appointments per patient (8.9-8.6 appointments per year), while the areas UNN and Finnmark

had the lowest number (6.9-6.4 appointments per year). As mentioned above, patients resident in areas with a long distance to hospital sometimes receive courses of treatment under the auspices of the municipal health service that are not reported to NPR.

Figure 7.45 shows the use of pharmacological cancer treatment (patient rates) among the elderly compared with the younger patient group ('rate elderly'/'rate younger'). Vestfold hospital referral area has high patient rates for pharmacological cancer treatment for both older and younger patients, but a comparison of the rates show that they go in favour of the elderly. Finnmark hospital referral area has the lowest patient rate for the elderly, while the patient rate for the younger age group is somewhat higher. This means that in the Finnmark area, the rate for pharmacological cancer treatment goes in favour of younger patients.

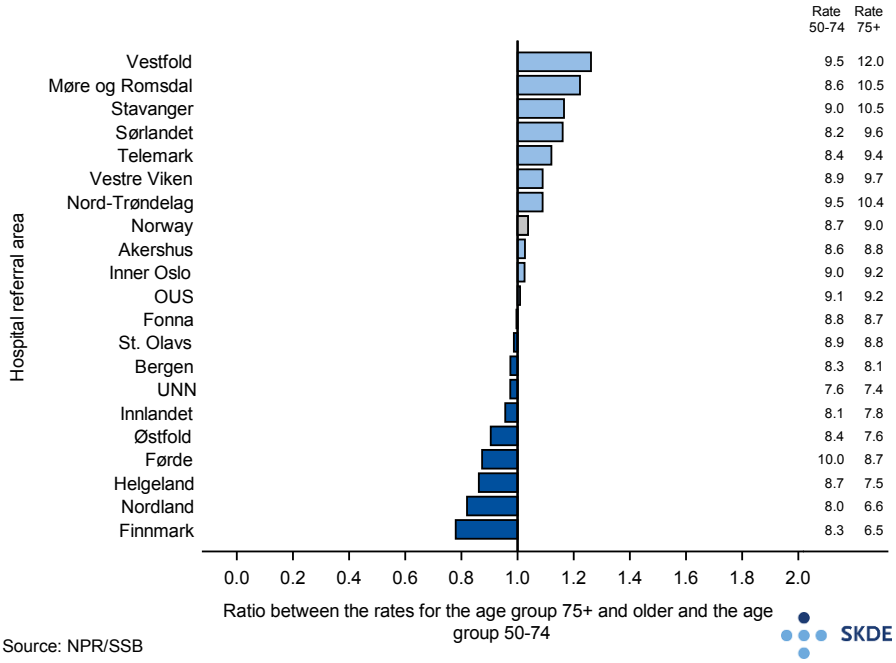


Figure 7.45: Pharmacological cancer treatment, ratio between the rates for the age group 75 years and older and the age group 50–75 years. Rates, the number of admissions per 1,000 population adjusted for gender and age, are shown on the right in the figure.

7.6.2 Radiotherapy

Radiotherapy damages and kills cells that are dividing. Since cancer cells divide faster than many healthy cells, radiotherapy does more damage to cancer cells. Radiotherapy can either be the primary form of treatment if the tumour is too big to be surgically removed or is in a location where it cannot be removed without causing too much damage, or it can be used as adjuvant radiotherapy to remove any remaining cancer cells after surgery. Radiotherapy is also much used as palliative therapy. Many cancer patients cannot be cured, but the best possible control over the tumour is important in order to improve function and quality of life and, not least, to provide good pain relief. Radiotherapy can reduce the need for pharmacological pain relief.

Palliative radiotherapy is often a short-term treatment and usually has few side effects. Side effects of longer treatment series will depend on which part of the body the treatment targets. Sore skin and mucous membranes is common problems, and many patients experience tiredness. Patients over 75 years of age are not included in many studies, so there is little published knowledge

about elderly patients' tolerance for radiotherapy (Shi et al. 2016).

There are currently ten radiotherapy centres in Norway. They are located in Tromsø, Bodø, Trondheim, Ålesund, Bergen, Stavanger, Kristiansand, Oslo (at Ullevål Hospital and the Norwegian Radium Hospital) and in Gjøvik.

Sample

Radiotherapy is defined as patient treatment with the procedure codes (NCMP) WEOA00 and/or WEOB05. Cancer patients have been divided into two samples on the basis of age: one sample for patients aged 75 years and older (elderly) and one for younger patients aged 50-75 years. This was done in order to compare radiotherapy provided for elderly patients with the treatment provided for patients aged 50–74 years.

Findings

Each year, just over 3,200 patients aged 75 years or older undergo radiotherapy in Norway (Figure 7.46). About 45% of cancer patients in this age group are women, while women make up 36% of the patients who receive radiotherapy (see appendix). The difference between the proportion of women among cancer patients and the low proportion who receive radiotherapy can probably be partly explained by the fact that the gender-specific forms of cancer dominate at different ages. The average age for prostate cancer is higher than for breast cancer. Radiotherapy is also a much used treatment method for prostate cancer.

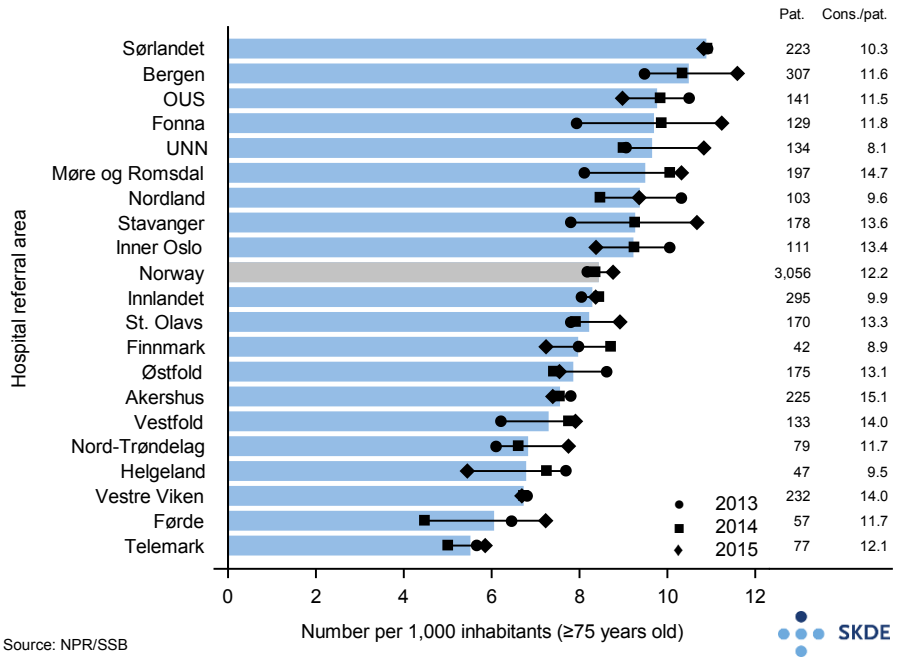


Figure 7.46: Radiotherapy. Number of patients per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number patients and appointments per patient on the right.

Sørlandet hospital referral area has twice as many radiotherapy patients as the Telemark area, which has the lowest number. Geographically, these two areas are neighbours. Other neighbouring hospital referral areas, for example Bergen and Førde, also have high and low patient rates,

respectively, for radiotherapy. There seems to be a trend towards increasing use of radiotherapy for elderly patients. The highest rate was seen in the last year (2015), both for Norway as a whole and for approximately half of the hospital referral areas. The hospital referral areas under Northern Norway RHA have the lowest number of appointments per patient (8.1-9.9 appointments per year), while Akershus hospital referral area has the highest number (15.1 appointments per year).

Each year, 7,700 patients in the age group 50–74 years receive radiotherapy (Figure 7.47). Bergen hospital referral area has a rate that is 1.3 times higher than that for the Nord-Trøndelag area, which has the lowest rate. Increased use of radiotherapy is also a national trend among the age group 50–74 years. The highest radiotherapy rate was in 2015, both for Norway as a whole and for just over half of the hospital referral areas. The number of appointments per patient is lowest in Finnmark hospital referral area (13.3 per year) and highest in the Møre og Romsdal area (19.4 per year).

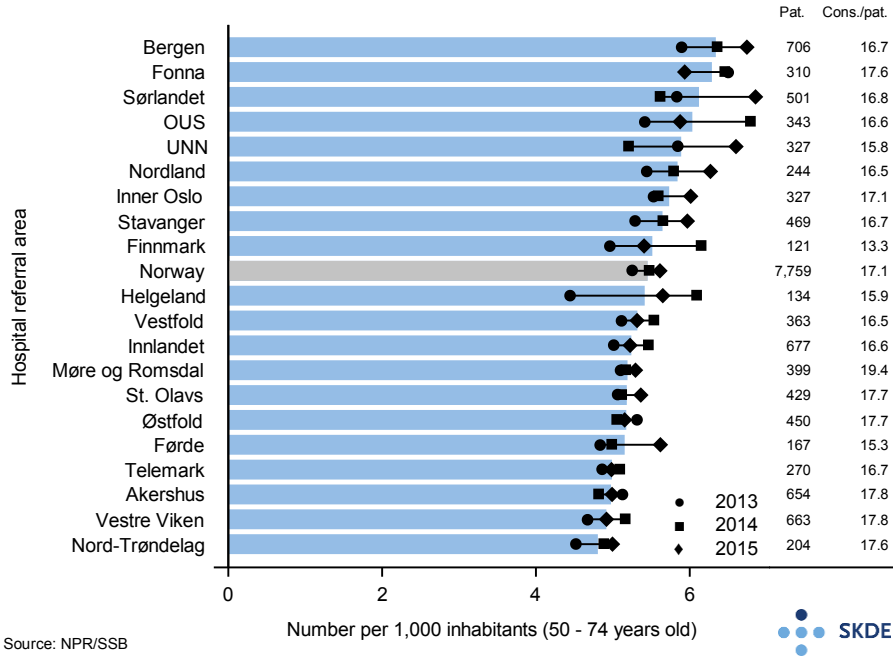


Figure 7.47: Radiotherapy. Number of patients per 1,000 population, 50–74 years, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Annual rates shown by symbols. Average number of patients and appointments per patient on the right.

Figure 7.48 shows the use of radiotherapy (patient rates) among the elderly compared with the younger patient group ('rate elderly'/'rate younger').

The rate is higher for the elderly than for patients aged 50–74 years in all the hospital referral areas. Møre og Romsdal hospital referral area has a radiotherapy rate above the national average for elderly patients, while the area's radiotherapy rate for the age group 50–74 years is somewhat below the national average. Relatively speaking, Møre og Romsdal favours the older group when it comes to radiotherapy. The Telemark area stands out with the lowest radiotherapy rate for the oldest group and a fairly low rate for younger patients, but, relatively speaking, it also has the lowest proportion of radiotherapy for the elderly when the age groups are compared.

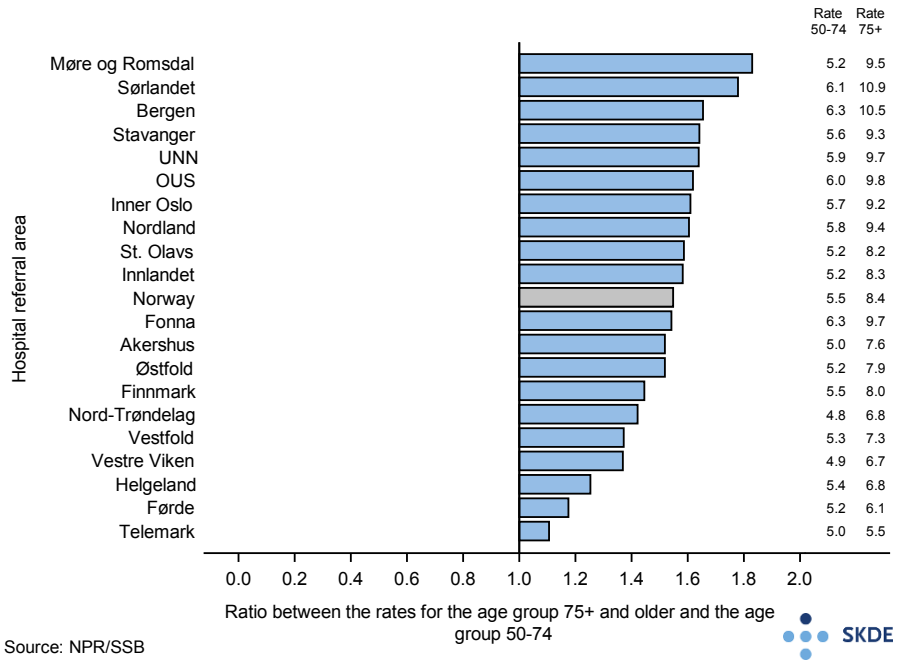


Figure 7.48: Radiotherapy, ratio between the rates for the age group 75 years and older and the age group 50–75 years. Rates, the number of admissions per 1,000 population adjusted for gender and age, are shown on the right in the figure.

Comments

There are twice the number of cancer cases in relation to the population among the elderly than in the age group 50–74 years. It is worth noting the general trend towards increasing use of both pharmacological cancer treatment and radiotherapy among the elderly described for the three-year period. Despite having twice the incidence, the national rate among elderly patients who receive pharmacological cancer treatment is about equal to that in the younger age group. The variation observed between hospital referral areas seems to a certain extent to correlate with incidence. However, the variation seems to be greater than differences in incidence and random variation can explain. Decisions to provide pharmacological cancer treatment should be based on national guidelines, although, for older patients, there will always be an element of discretionary judgement taking into account other illnesses, general state of health, life expectancy and the patient's own preferences. Long distance from the home to the hospital can be a factor in the assessment when weighing the benefit of a treatment against the risks, for example the risk of infection due to weakening of the immune system. Local practice established at a local hospital can have consequences for the population in the hospital referral area in question. It is possible that the variation described can be partly explained by differences in how age is assessed as a risk factor or criterion.

The national radiotherapy rate among elderly patients is approx. 50% higher than among younger patients. The radiotherapy rate among the elderly does not appear to correlate with the incidence of cancer in the hospital referral areas. For example, Vestfold hospital referral area has the highest incidence of cancer, but low use of radiotherapy – even lower than Finnmark, which has the lowest cancer incidence in Norway. Telemark hospital referral area has a cancer incidence that is on a par with the national average, but the country's lowest use of radiotherapy. The described variation in radiotherapy for elderly patients is therefore more unwarranted than the variation in pharmacological treatment.

Ten out of the eleven hospital referral areas with the highest rate of radiotherapy in elderly patients have a radiotherapy centre. A closer examination of Figure 7.48 which shows the use of radiotherapy among the elderly compared with the younger patient group, shows that all the hospital referral areas below the national average are areas without a radiotherapy centre. For the age group 50–74 years, the areas with radiotherapy centres do not appear to stand out with particularly high or low rates. The significant differences between, e.g., such geographically close areas as Sørlandet and Telemark cannot be random. It appears that age could be a factor that reduces the referral of patients to radiotherapy when there is no radiotherapy centre in the health trust in question. The specialist community should discuss whether elderly patients who live in areas without own radiotherapy centres receive adequate services.

7.7 Diseases of the eye

7.7.1 Age-related cataracts

Cataracts make the lens of the eye unclear, which causes visual impairment and, if left untreated, blindness. The visual impairment usually develops slowly over a period of years, on one or both sides, and is most noticeable when looking at things from a distance. Most patients develop cataracts as part of the aging process, but there are also hereditary and congenital conditions. Cataracts are believed to be one of the world's leading causes of blindness (Brian and Taylor 2001). It is assumed that 50-60% of Europe's population over the age of 70 years have some degree of cataracts, and the prevalence increases with age (Prokofyeva et al. 2013).

Current medical science cannot prevent, delay or avert cataracts. The most important symptom is visual impairment, but symptoms also include double vision and problems with glare (light is refracted in all directions). There is general agreement that treatment is warranted when the patient's visual function impairs the activities of daily living. Surgery is performed by a specialist in diseases of the eye, and consists of removing the old lens and replacing it with an artificial lens. The procedure is often carried out as outpatient surgery and normally takes about 20 minutes.

Sample

Cataract surgery is defined by a primary or secondary diagnosis (ICD-10) of H25* in combination with procedure code (NCSP) CJE20 for hospitals with activity-based funding. For specialists in private practice under public funding contracts, the same diagnosis codes apply, if relevant in combination with tariff code K01a from the Norwegian Medical Association's normal tariff for specialists in private practice under public funding contracts.

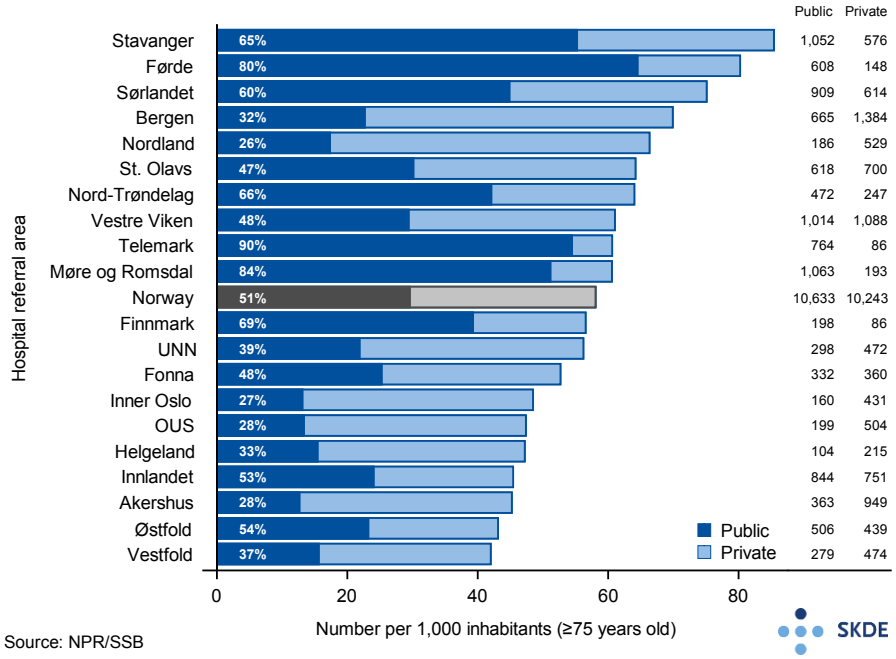


Figure 7.49: Cataracts. Number of procedures per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area and public or private service provider. Average number of contacts with public and private service providers on the right.

Findings

Approx. 21,000 procedures per year are performed on elderly patients for age-related cataracts, and the breakdown between the public and private sectors is reasonably even (Figure 7.49). For Norway as a whole, the number of procedures per year remained stable during the three-year period (not shown in figure).

Twice as many cataract operations are carried out on residents of Stavanger hospital referral area as among people resident in the Vestfold area. In the hospital referral areas with the highest rates, namely Stavanger, Førde and Sørlandet, a relatively high proportion of patients are treated in the public sector, ranging from 60 to 80%. Hospital referral areas in central parts of Eastern Norway and the Helgeland area have low rates and treatment is more often provided by specialists in private practice under public funding contracts.

Comments

Many cataract operations are performed each year. No geographical differences have been described in the prevalence of cataracts in Norway. This means that the variation described here is not immediately explicable by differences in morbidity, and the variation must be deemed to be moderate and probably unwarranted. A corresponding variation has previously been described for the Norwegian population as a whole in the healthcare atlas 'Day Surgery in Norway 2011-2013' (Balteskard et al. 2015). The indication for the procedure is relatively clear, but perhaps not clear enough. The specialist community must consider whether there is a need to discuss the variation described.

7.7.2 Eye injection treatment for age-related macular degeneration, diabetic retinopathy and blood clots

Some eye conditions are caused by new blood vessels growing and damaging the retina, and thereby also the patient's vision. Medicines now exist that can inhibit the growth of such blood vessels. The medication is injected directly into the eye (into the vitreous body), and it has proved to stop further deterioration – and it can also improve the patient's vision. Such injection treatment is mostly used for the condition known as age-related macular degeneration (wet AMD). The treatment can also be used in cases of retinal damage caused by diabetes (diabetic retinopathy) and blood clots.

Age-related macular degeneration (AMD)

AMD affects the retinal macula ('the yellow spot'). The macula has a high concentration of light-sensitive cells (cone cells) that are responsible for our colour vision. AMD causes loss of visual acuity. There are two types of AMD – dry and wet. Dry AMD is the most common form, and accounts for 90% of all cases. The condition leads to slow deterioration of the macula, while deposits of fatty substances build up, causing gradual loss of vision. The damaged areas end up with no visual function at all. There is no medical treatment for dry AMD. Dry AMD can develop into wet AMD. The wet form makes up the remaining 10% of cases, and the condition develops faster. Fatty substances are deposited as in the case of dry AMD, but in addition, new blood vessels develop in the choroid, which lies behind the retina. These new vessels are fragile

and prone to leaking, resulting in fluid, proteins and blood gathering behind the retina. Wet AMD is treated by repeated injections into the vitreous body of medication intended to inhibit the growth of new blood vessels. The effect of this treatment is documented, e.g., in a 2014 Cochrane systematic review (Solomon et al. 2014). The treatment is available at all Norwegian ophthalmology departments. There are no national guidelines for the diagnosis, prevention or treatment of wet AMD.

The risk of developing AMD increases with exposure to UV radiation, smoking and age. In a population over 80 years of age, nearly 6% will have wet AMD (Solomon et al. 2014). Even though AMD rarely results in complete blindness, the loss of visual acuity can be a sufficiently severe visual impairment to make the patient functionally blind.

Diabetic retinopathy

Diabetic retinopathy (diabetes-related macular changes) is a complication of poorly controlled type 1 and type 2 diabetes mellitus. Diabetes affects the small blood vessels, weakening them and making them more fragile. This particularly affects the retina, nerves and kidneys. In the retina, weakening of blood vessels can lead to fluid leaking through the wall of the vessel (macular oedema) or small bleedings. Small blood clots can also form, causing lack of oxygen and small infarctions. The lack of oxygen stimulates the formation of new blood vessels, which will be weak and can be the source of bleeding in the retina and the vitreous body. Laser treatment has been the standard treatment for diabetic retinopathy and macular oedema. Removal of the vitreous gel (vitrectomy) is performed if bleeding in the vitreous body does not clear up. The procedure will usually improve the patient's vision, although in some cases it only leads to further deterioration of the condition. Injections of anti-growth medication, as used for AMD, are becoming more and more widespread (The Diabetic Retinopathy Clinical Research Network 2015).

There are national guidelines for monitoring and following up diabetic retinopathy, but the guidelines do not cover treatment for the condition (Helsedirektoratet 2016). Hardly anybody has retinal changes when they are diagnosed with type 1 diabetes, but after approx. 25 years, retinal changes are found in all these patients. For type 2 diabetes, 25% have retinal changes at the time of their diagnosis, and approx. 60% have developed visible retinal changes 15 years after being diagnosed.

Blood clots in the eye

The vessels leading out of the eye can become partly or completely blocked by a blood clot (venous thrombosis). The deoxygenated blood builds up, the pressure increases, and fluid leaks out and affects vision. New blood vessels start to grow into the area to ensure the oxygen supply, but they damage the patient's vision. Serious cases are treated by laser. Injections of anti-growth medication, as used for AMD, have also been found to be effective (Braithwaite et al. 2014). There are no national guidelines for how to treat blood clots in the eye.

Risk factors for this condition include glaucoma (elevated pressure in the eye), hypertension and smoking. It is important to normalise elevated pressure in the eye as well as blood pressure in order to prevent blood clots in the eye.

Sample

Injection treatment in the eye is defined as treatment provided to patients who annually undergo procedure code (NCSP) CKD05 at hospitals with activity-based funding in combination with one of the diagnose codes (primary or secondary diagnosis) listed below: AMD is defined by code (ICD-10) H35.3, diabetic retinopathy is defined by code (ICD-10) H36.0, E10.3 and/or E11.3, and blood clot in the eye is defined by (ICD-10) H34.8.

Findings

Each year, between 6,000 and 7,000 elderly patients receive treatment in the form of injections in the eye (Figure 7.50). Some of these patients have several diagnoses that are relevant to this form of treatment. Each patient has multiple appointments, on average five appointments per patient (data not shown). AMD is the most common indication for treatment, followed by blood clots and to a lesser extent retinal changes caused by diabetes. More than twice as many residents of UNN hospital referral area receive such treatment compared with the residents of the Førde area.

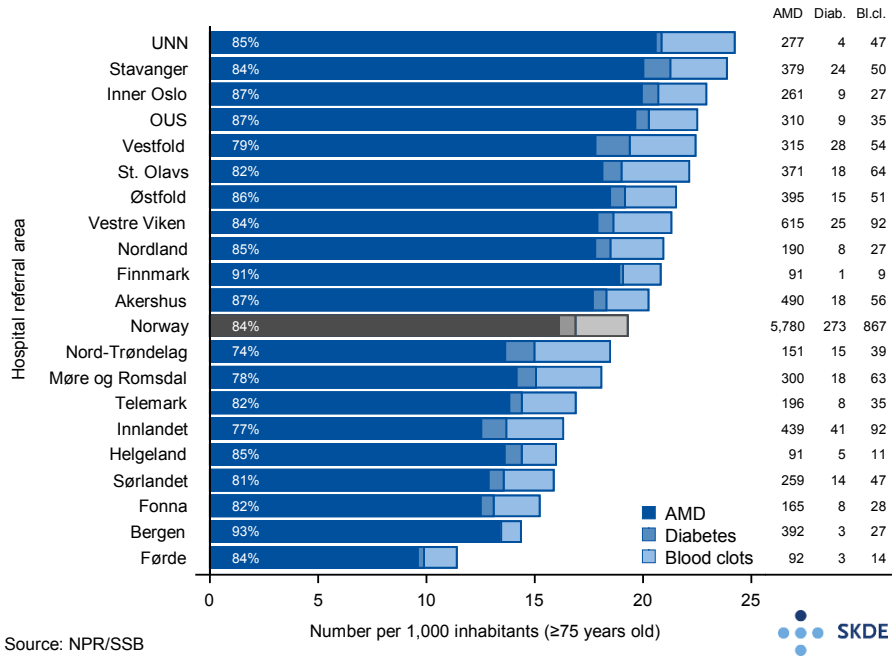


Figure 7.50: Eye injection treatment for the conditions age-related macular degeneration, diabetic retinopathy and blood clots. Number of patients per 1,000 population, 75 years and older, adjusted for gender and age, average per year 2013–2015 broken down by hospital referral area. Average number of patients receiving injection treatment broken down by conditions for which such treatment indicated on the right.

Comments

There is no known geographical variation in the prevalence of retinal diseases. The variation described is greater than can be ascribed to random variation. There is a striking difference between nearby hospital areas such as Stavanger and Bergen. Haukeland University Hospital has experienced capacity problems, but has now started using nurses to perform this treatment. A certain inertia will often make itself felt when an indication is to be implemented or expanded, and this is probably also true for eye injection treatment. The effect of injection treatment against

AMD has long been well documented (Solomon et al. 2014). It has also been relatively well documented that this treatment is also effective against blood clots (Braithwaite et al. 2014), while its effect in patients with diabetic retinopathy has only recently been documented (The Diabetic Retinopathy Clinical Research Network 2015). There are no national guidelines for treatment of any of these conditions. The observed variation in eye injection treatment could therefore be a result of differing interpretations of the available documentation. If there are capacity problems, that could necessitate prioritisation that results in the population not having equitable access to health services.

7.8 Other

7.8.1 Fitting of new hearing aids

Our senses deteriorate with age, and age-related hearing loss normally starts at around 60 years of age. Data from the Nord-Trøndelag Hearing Loss Study 1996-1998, which forms part of the Nord-Trøndelag Health Study (the HUNT Study), showed that more than 62% of people over 80 years of age had a significant demonstrable (objective) hearing loss (Engdahl et al. 2005). Of the respondents over 80 years of age, 15% stated that their hearing loss was causing them significant problems. Hearing loss is caused by the loss of sensory cells inside the cochlea, which is part of the inner ear. The sensory cells that receive high-frequency sounds deteriorate first. Hearing loss can reduce quality of life and contribute to social isolation, depression, loss of self-esteem, and even cognitive impairment. Aids can compensate for loss of hearing and help to improve people's quality of life. If hearing loss is suspected, it is important, particularly in the case of elderly people, to have their hearing tested so that necessary measures can be implemented.

Funding for hearing aids as an assistive technology measure is a National Insurance entitlement administered by NAV Work and Benefits (Hervik et al. 2017), while fitting and follow-up are the responsibility of the specialist health service.

The regular GP refers a patient to an ear, nose and throat (ENT) specialist for assessment when the patient and/or the next of kin feels that a hearing aid or other hearing technology device is needed. The ENT specialist will ensure that the diagnosis is correct and that the hearing loss is not caused by another illness. It is the ENT specialist who determines whether a hearing aid is indicated and fills in the requisition form for submission to the Norwegian Labour and Welfare Administration (NAV). An audiologist tests the patient's hearing before a decision is made in consultation with the patient as to whether it is likely that the patient will benefit from using a hearing aid. If follow-up and check-ups are inadequate, many patients will not use their hearing aids.

Hearing aids are fitted in hospitals, in private ENT practices under public funding contracts, or at private audiologist clinics. When a doctor and an audiologist are co-located in a private audiologist clinic, tariffs and patient charges for hearing tests and the fitting of hearing aids will be reimbursed by reporting to NPR or HELFO (settlement scheme for specialists in private practice under public funding contracts). If a hearing aid is fitted at a private audiologist clinic that is not co-located with an ENT specialist, NAV will reimburse the cost of the hearing aid, provided that a requisition has been submitted by a specialist, but not of the hearing test and fitting. These expenses could be from NOK 4,000 upwards, depending on the amount of individual adjustment and follow-up required. Some parts of Norway have long waiting times for assessment, treatment and follow-up of patients with hearing loss. Private audiologist clinics have therefore been established in some areas, even though the patients have to pay to have hearing aids fitted there. This activity is not reported to NPR or HELFO, and is therefore not included in our analysis. Private audiologist clinics are most common in Sør-Trøndelag county, i.e. in St. Olavs hospital referral area. The reason for this is probably that Norway's only audiologist training programme is located in Trondheim and the audiologists wish to live in Sør-Trøndelag after completing their studies.

Sample

Fitting of new hearing aids is defined by procedure code (NCMP) DXGT00. The code is often used several times for one patient, in some cases several times in the same year. Coding practices may vary for this code, with some using DXGT00 for all consultations relating to first-time fitting of a hearing aid (normally three appointments) and some using DXGT05 after the first consultation. Since NAV will reimburse a new hearing aid every six years, it is assumed that repeated reporting of this code concerns multiple appointments for fitting. The sample has been limited to patients who have been registered with the procedure code at least once, so that each patient is only counted once. We have chosen to limit our analysis to patients in 2015 to avoid the challenge of the same patient being counted in more than one year. For specialists in private practice under public funding contracts, the same diagnosis code applies in combination with tariff codes 324a and/or324b. A previous review of the material concluded that there is a high degree of agreement between the use of the normal tariff and the NPR reporting, which confirms that the quality of the data is good.

Activities at private audiologist clinics are not reported to NPR and are therefore not included in this analysis. Such clinics exist all over Norway, but the highest concentration is found in St. Olavs hospital referral area (where the audiologist training programme is located), while they are nearly non-existent in the South-Eastern Norway health region.

Findings

In 2015, just over 17,000 elderly patients had a new hearing aid fitted (see appendix). The proportion of women in the sample is 54%, and the average age is 82.8 years.

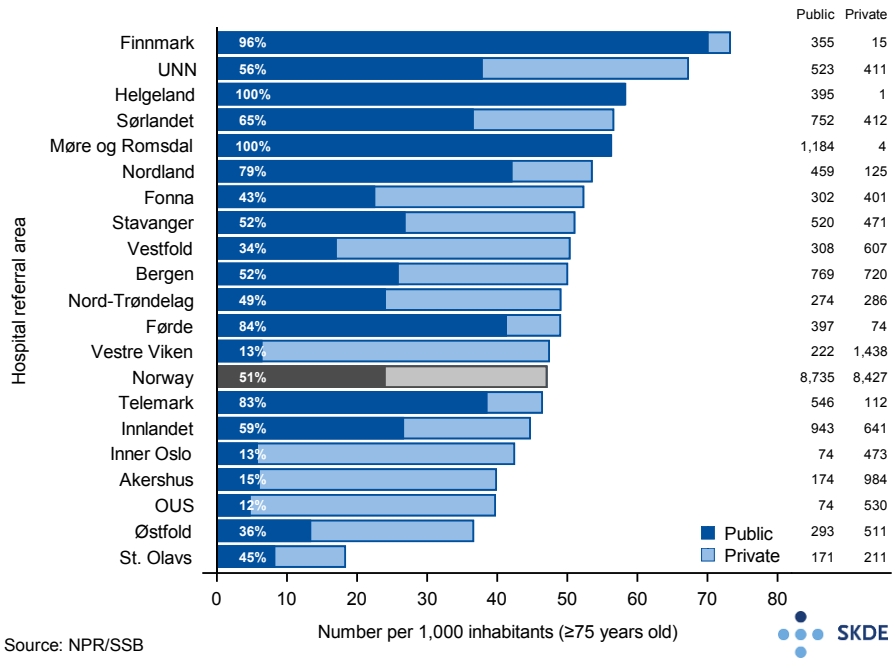


Figure 7.51: Hearing aids. Number of patients who had a new hearing aid fitted in 2015 per 1,000 population, 75 years and older, adjusted for gender and age, broken down by hospital referral area and public or private service provider. Number of patients who had their hearing aid fitted in a public hospital or by a private service provider on the right.

Four times as many residents of Finnmark hospital referral areas have hearing aids fitted compared with the residents of the St. Olavs area (Figure 7.51). If we choose to disregard St. Olavs, which has a significant, but unknown, use of private services, twice as many residents in Finnmark have hearing aids fitted as in Østfold. For Norway as a whole, about half of the patients are served by public hospitals and half by specialists in private practice under public funding contracts. Public services predominate strongly in some hospital referral areas (79-100%). This applies to the hospital referral areas in Northern Norway RHA's region, with the exception of the UNN area, in addition to Førde, Møre og Romsdal and Telemark. Patients in the central areas of South-Eastern Norway RHA's region mostly (80-90%) have their hearing aids fitted by specialists in private practice under public funding contracts.

Comments

The data reported to NPR shows relatively large variation between hospital referral areas in the fitting of new hearing aids. Private audiologist clinics also fit hearing aids, but at a higher cost to the patients, and, as mentioned above, they do not report their activities to NPR. The number of private audiologist clinics is highest in St. Olavs hospital referral area, which can partly explain the area's low rate.

It is not known know whether private audiologist clinics have been established in Finnmark or Østfold. If we choose to disregard St. Olavs hospital referral area due to the uncertainty associated with the number of hearing aids fitted by private audiologist clinics, twice as many elderly patients in the Finnmark area have hearing aids fitted compared with the Østfold area. Even when the St. Olavs area is eliminated, the variation in hearing aid fittings is greater than can be explained by random variation, and it must be characterised as moderate. This should give rise to important discussions in the specialist community about the indication for hearing aids and attention to hearing loss in the primary healthcare service. The lower rate in densely populated areas could be an indication that the services provided do not cover the need for hearing aids. Figures provided by the Norwegian Association of the Hard of Hearing (HLF) suggest that, in 2020, 3,200 people per 100,000 population, regardless of age, will need a hearing aid.[19] The growing number of elderly people will challenge the capacity of existing services.

Some of the services are organised as private clinics run by audiologists, where patients have to pay more for the service than they would if they had their hearing aid fitted at a public hospital or by a specialist in private practice under a public funding contract. Private audiologist-run clinics reduce waiting times, but do not necessarily fulfil the authorities' responsibility to provide equitable health services for this group of patients.

The specialist community and the authorities responsible for funding should discuss whether the provision of services is equitable by clarifying the threshold for assessment and treatment for the benefit of all the patients.

7.8.2 Biological drugs

Traditionally, biological drugs have been defined as a medicinal product produced by or extracted from living cells or tissue.[20] An expanded definition has now come into use: a medicinal product with an immunomodulatory mechanism of action that is indicated for treatment of autoim-

[19] HLF's action plan 2015-2018
[20] Norwegian Medicines Agency

mune and chronic inflammatory diseases.[21] Our analyses include the use of biological drugs for rheumatic joint and back diseases (rheumatoid arthritis, ankylosing spondylitis), connective tissue diseases and vasculopathies, chronic inflammatory bowel diseases, psoriasis and multiple sclerosis (MS). Such treatment is considered for patients who do not tolerate other forms of treatment or for whom other treatments are not sufficiently effective, and many patients find that biological drugs greatly improve their condition and quality of life.

Biological drugs have side effects, most importantly an increased risk of infections. The risk of side effects can exceed the potential benefits from treatment with biological drugs, and such treatment is not suitable for all patients. This applies, for example, to patients with heart failure, a weakened immune system and a high risk of infection.

Biological drugs are very expensive and subject to a special funding regime known as the 'H prescription scheme'. As a rule, only hospitals doctors employed by health trusts can prescribe such drugs. They can only be prescribed by others by agreement with the RHAs. The individual RHA must pay for the biological drugs used by residents in its catchment area.

Sample

Valid data for biological drugs only exist for 2015, and the sample consists of patients with one or more of the following conditions identified by the following ICD-10 codes as a primary or secondary diagnosis:

- Multiple sclerosis and other demyelinating diseases (G35*, G36*, G37*)
- Chronic diseases of the intestines (K50*, K51*, K52*)
- Psoriasis, parapsoriasis (L40*, L41*)
- Rheumatic diseases of the joints and back and psoriatic arthritis (M05*-14*, M45, L40.5)
- Systemic connective tissue disorders and vasculopathies (M30*-36*)

All stays with a cancer diagnosis (ICD-10 diagnoses from the C chapter, D0* and B21) have been excluded.

Treatment with biological drugs is defined by the following procedure codes (NCMP): WBGM00 (Intravenous injection/infusion of medicinal product) and/or WL000 ('H prescription') in combination with one or more medicinal products from the special code list: 1XC02, 3AB07, 3AB08, 3AB13, 3AX13, 4AA23, 4AA24, 4AA26, 4AA27, 4AA31, 4AA33, 4AA34, 4AB01, 4AB02, 4AB04, 4AB05, 4AB06, 4AC03, 4AC05, 4AC07, 4AC10, 7XX09, 7XX10. The sample has been limited to 2015 out of consideration for the completeness of coding of the biological drugs.

Findings

Just over 1,000 elderly patients were treated with biological drugs in Norway in 2015 (Figure 7.52). The proportion of women in the sample is 69%, and the average age is 79.1 years (see appendix). Residents of Telemark hospital referral area are treated with biological drugs twice as often as people resident in Østfold. Finnmark, Helgeland, Nord-Trøndelag and Førde hospital referral areas had too few patients for gender-adjusted and age-adjusted rates to be calculated.

[21] Records: Norwegian Quality Registry for Biological Drugs (NOKBIL) Version of 27 February 13

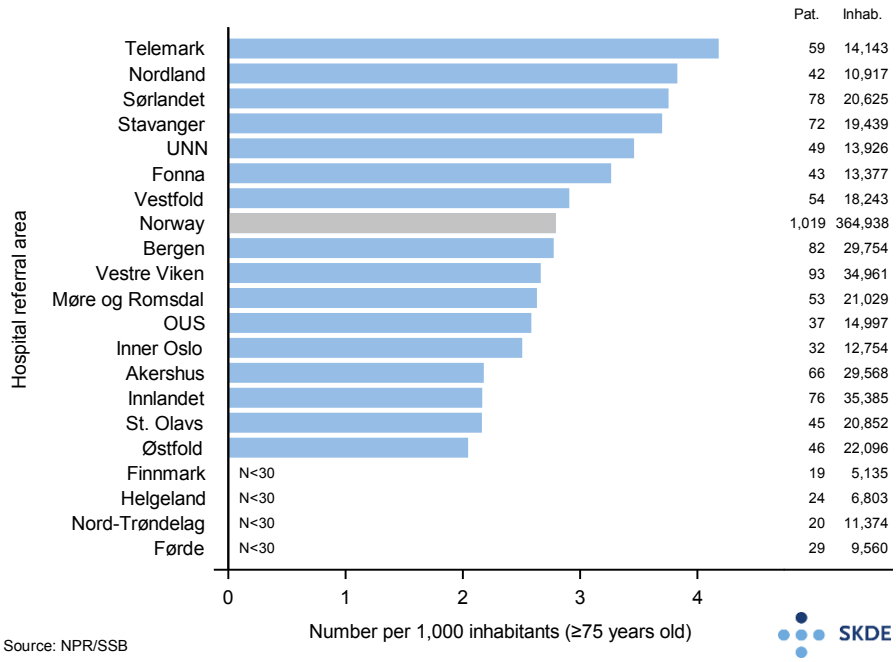


Figure 7.52: Biological drugs. Number of patients per 1,000 population, 75 years and older, adjusted for gender and age, for 2015 broken down by hospital referral area. Number of patients and population on the right. Finnmark, Helgeland, Nord-Trøndelag and Førde hospital referral areas had too few patients for gender-adjusted and age-adjusted rates to be calculated.

Approx. 11,500 patients aged 50–74 years were treated with biological drugs in 2015 (Figure 7.53). In Nordland hospital referral area, 1.8 times as many were treated with biological drugs compared with the residents of Inner Oslo (Diakonhjemmet and Lovisenberg hospitals).

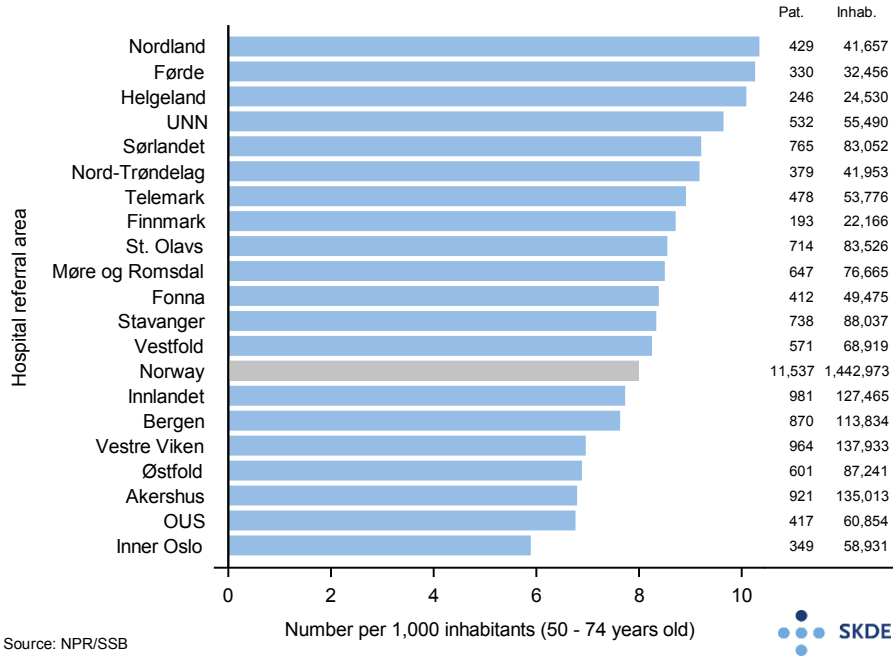


Figure 7.53: Biological drugs. Number of patients per 1,000 population, 50–74 years, adjusted for gender and age, for 2015 broken down by hospital referral area. Number of patients and population on the right.

Figure 7.54 shows the use of biological drugs (patient rates) among the elderly compared with the

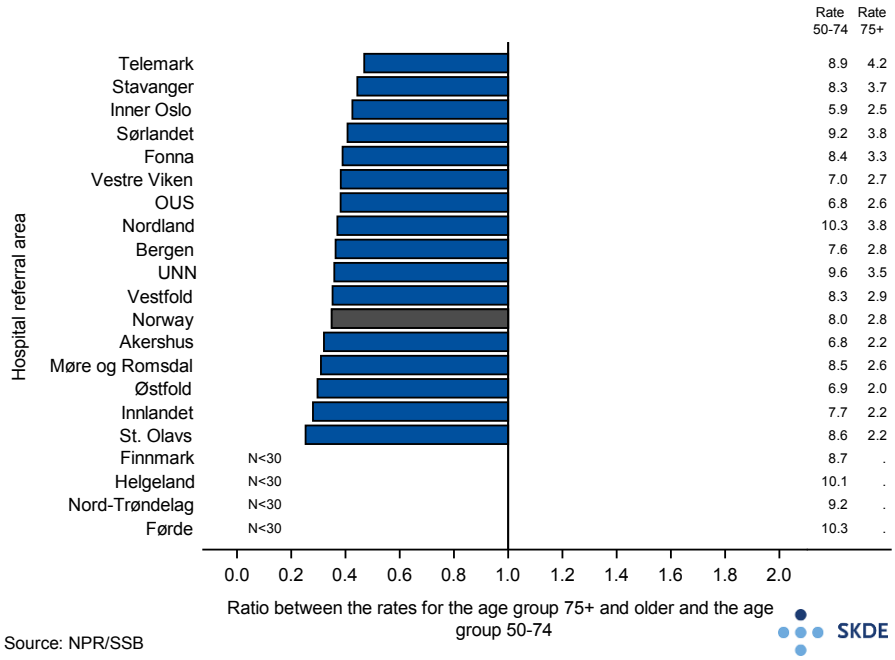


Figure 7.54: Biological drugs, ratio between the rates for the age group 75 years and older and the age group 50–75 years. Rates, the number of admissions per 1,000 population adjusted for gender and age, are shown on the right in the figure.

younger (50–74 years) patient group. All the hospital referral areas have a considerably higher rate for the younger group, and this is a consistent trend with little variation between areas. For Norway as a whole, the rate for the elderly is about one-third of the rate for the younger group.

Comments

There is variation between hospital referral areas, with a ratio of just over 2 between the highest and lowest usage rates for biological drugs for elderly patients. The low number of elderly patients treated gives reason to believe that some of the variation observed is random.

The prevalence of relevant underlying morbidity is not known, but there is probably no significant variation between hospital referral areas. Overall, the variation for the elderly between hospital referral areas is therefore deemed to be somewhat in excess of what can be explained by random variation. On the other hand, the prevalence of underlying illness must be expected to differ between younger and older patients. Some of the conditions in question are associated with increased mortality.

A more detailed analysis of the available data shows that most of the elderly patients who were treated with biological drugs suffer from rheumatic diseases of the joints and back (85%), but there were also some patients with chronic intestinal diseases (7%) and psoriasis (7%). The picture is a little different for patients in the age group 50–74 years who were treated with biological drugs. The categories rheumatic diseases of the joints and back and connective tissue diseases are less dominant in this age group (54%), and the proportion suffering from chronic intestinal disease (16%), psoriasis (15%) and MS (14%) is higher. However, several studies, particularly on arthritis patients, have shown that the elderly benefit as much from these medicines as younger patients and that the risk of infection is not higher among the elderly (Radovits et al. 2009; Galloway et al. 2011; Genevay et al. 2007). A UK study found that rheumatoid arthritis patients over

the age of 65 were less likely to be treated with biological drugs than younger patients (Morsley et al. 2015). Alternative treatment of these conditions, which often takes the form of long-term corticosteroid treatment, also has side effects, such as increased risk of infection and osteoporosis.

All in all, the results give reason to monitor whether age is used as a criterion for prioritising patients for treatment with these expensive medicines, the use of which is strictly regulated through a special funding regime. The national quality register NOKBIL will help to provide more information about the use of biological drugs in the time ahead.

Chapter 8

Discussion

8.1 Choice of health services for analysis

The purpose of this report has been to map today's provision of important somatic specialist health services for the elderly population. By important services is meant services that are important to the elderly, services where the elderly use a large proportion of the services provided and resource-intensive services. We have not tried to provide an exhaustive description of all the services. That would have resulted in an analysis much too comprehensive and detailed for the healthcare atlas format. The services chosen are of sufficient volume for reliable figures to be obtained, while they can also be reasonably uniformly defined across hospital referral areas. Some readers would probably have liked us to include a description of patients with complex health problems and significant functional impairment, a situation that is typical for the sickest of the elderly. These patients make up a considerable proportion of the patients in geriatric wards, but they are also found in other departments when they need other services. The healthcare atlas concept, whose primary purpose is to compare services between geographical areas, is best suited for patient samples based on unambiguous diagnoses or demographic variables.

8.2 Main findings concerning variation

One of the main objectives of health atlases is to map the degree of variation in the use of health services. The following is a brief general summary that will be elaborated on:

- There is relatively little variation between hospital referral areas for the most serious conditions for which patients are admitted to hospital: heart failure, pneumonia, COPD, hip fractures and strokes. This probably reflects the fact that hospital admissions for these conditions are necessary health services with little scope for discretionary judgement and choice.
- The greatest variation was observed for groups that undergo outpatient assessment, treatment and follow-up (patients with heart disease, dementia and Parkinson's disease). These are patient groups for whom the indications for referral may be unclear or where the division of labour between regular GPs and specialists is unclear or varies between hospital referral areas.

- The variation observed for patients who underwent procedures for heart disease, osteoarthritis, cancer, eye diseases and hearing damage carried out in hospital or by a specialist in private practice under a public funding contract, was for the most part moderate. The variation can be due to differences in risk/benefit assessments or in local practices that have consequences for those resident in the hospital referral areas.

It is very difficult to determine what constitutes a correct level. The national average can function as a target figure for equitable services, but it is not necessarily the optimum level to aim for. Generally speaking, adjustments should be planned in fields with a moderate or high degree of variation in service use between hospital referral areas.

8.3 Method

Population-based analyses of the use of health services depend on reliable basic data. Even though much of the present analysis covers the parts of the Norwegian Patient Registry that are generally considered to be most reliable, namely procedure codes, we cannot rule out the possibility of errors occurring in the basic data. A recent review of patient records carried out by the Office of the Auditor General of Norway showed that 16% of patients with the primary diagnosis pneumonia and 5% of patients who had undergone hip replacement surgery were given a new primary diagnosis (Riksrevisjonen 2017). Errors in the basic data can give rise to both systematic and random variation. We regard coding errors made by individual code-setters as random variation that is evenly distributed between hospital referral areas and age groups. Deviant coding cultures in individual departments represent a more serious problem. If the departments concerned are big or specialised ones, this could influence hospital referral areas' rates. In order to compensate for potential sources of error that differences in coding practices between departments and institutions represent, several experts from different specialities, and often from more than one hospital, have been consulted. Several code selections have been corrected based on these consultations, but we still cannot rule out the possibility that we may be ignorant of, and thereby may have overlooked, unorthodox coding cultures. However, we feel confident that any errors that may remain in our samples do not represent a threat to the main findings and conclusions in this report.

It is a methodological challenge associated with this type of analysis to be able to distinguish random variation from systematic variation and, for example, adjust for the case mix, cf. Figure 3.2. For a country such as Norway, however, which has a relatively homogeneous morbidity and severity distribution, the atlas approach, where analyses are based on hospital referral areas, is robust in relation to the effects of case mix and division of functions. There are several different approaches to the problem of distinguishing between random and systematic variation, but there is no generally recognised and commonly used method. In this report, we have relied on discretionary assessment of the volume of the service, the combination of the size of the ratio between the highest and lowest rates for hospital referral areas, and internal variation in rates for individual years for the same areas (stability across years). The methods used, together with the demographical adjustment methods, are simple standard methods that are unlikely to involve material sources of error.

8.4 Variation in the use of health services

8.4.1 The general practitioner service

Persons aged 75 years and older make up 7% of the population, but account for approx. 14% of all GP consultations. Given that this segment of the population has the highest morbidity, their proportion of the overall use of general practitioner services is unexpectedly low. There is a tendency for use to be lowest in hospital referral areas with long distances. The elderly do indeed see their regular GP twice as often as they attend specialist outpatient clinics, but the division of labour between the patient's regular GP and specialists nevertheless seems to be somewhat skewed. There is low to moderate variation in the use of general practitioner services between hospital referral areas.

8.4.2 The specialist health service

Admissions

Acute internal medicine conditions are a frequent cause of hospital admission among patients over 50 years of age (Heiberg 2013). Based on volume and severity, we have chosen to describe admitted patients diagnosed with heart failure, pneumonia, COPD, hip fractures and strokes in the age group 75 years and older (see Table 8.1).

Table 8.1: Overview of admissions for selected conditions, patients aged 75 years and older. Average number of admissions per year (n), ratio between the highest and lowest rates in the hospital referral areas (FT), average length of stay per admission, 30-day readmission rate following discharge, 30-day and 365-day mortality proportion following admission.

Condition	n	FT	Av. length of stay	Readm. rate	Mortality (%) <30 days	Mortality (%) <1 year
Heart failure	6,761	1.5	6.3	26	15	37
Pneumonia	12,477	1.7	7.0	22	22	42
COPD	8,180	1.6	6.1	29	21	43
Hip fracture	6,922	1.3	6.6	15	11	29
Stroke	5,329	1.4	9.4	13	20	33
All admissions ≥ 75 years	178,571	1.3	5.4	17	17	28
Mortality proportion per year in the total population ≥ 75 years						8

The five conditions heart failure, pneumonia, COPD, hip fractures and strokes account for approx. 22% of all admissions and about 32% of all admitted patients in the elderly group. It is a general trend that the admission rate for these five conditions does not vary much between hospital referral areas. The number of patients per population aged 75 years and older admitted for these conditions is more or less the same regardless of where in Norway they live. The average length of stay[22] for the five conditions is longer than the average for all admissions, which shows that these patients are seriously ill and demanding in terms of resources. However, the length of stay varies somewhat between hospital referral areas. No obvious pattern has been observed, but Sørlandet hospital referral area has the shortest length of stay for all the above-mentioned conditions except for strokes. There is no correlation between the length of stay for primary admissions and the 30-day readmission rate. Some variation has been observed between hospital

[22] See page 24 in the Method chapter for a definition of length of stay.

referral areas in terms of the readmission rate. The highest variation is found where the number of patients is lowest, and it can probably be partly explained by an element of random variation. When the different conditions are considered together, residents of the Inner Oslo area have the highest or second highest readmission rate, while those resident in UNN hospital referral area have the lowest or a very low readmission rate.

There are many potential reasons for readmission. The primary healthcare services are one important factor. The service provision varies, and the readmission rate cannot therefore be linked exclusively to the quality of hospital treatment. Some of these patient groups are seriously ill patients whose treatment cannot easily be 'completed' in hospital and it is difficult for the primary healthcare service to take care of the patient. The readmission rate is relatively high for patients diagnosed with heart failure, pneumonia and COPD, at 22-29%. The elderly are readmitted more often than the population as a whole, and 23% of all admissions and 34% of all readmissions concern elderly patients. We have also described the 30-day and 360-day mortality after admission for these diagnosis groups, and the figures show how seriously ill these patients are. There is little variation in mortality between hospital referral areas. Mortality is particularly high for patients admitted with the diagnoses pneumonia and COPD. In this age group, an emergency admission with a primary diagnosis of pneumonia is a very serious condition, and the diagnosis is often a 'label' used for patients with serious comorbidity or an impaired general state of health. In our sample, more than 50% of patients with the primary diagnosis pneumonia had one or more of the following secondary diagnoses: heart failure, ischaemic heart disease, stroke, COPD, diabetes or cancer. As a group, older patients who are discharged from hospital following admission for heart failure, pneumonia, COPD, hip fracture or stroke represent a professional challenge during treatment, in connection with discharge and for the municipal medical reception system.

Outpatient services

Every year, elderly patients have more than 1.1 million outpatient consultations in the specialist health service, i.e. 15% of all outpatient consultations.

Table 8.2: Overview of selected outpatient consultations and assessments, patients aged 75 years and older. Average number of consultations per year (n) and the ratio between the highest and lowest rate in the hospital referral areas (FT).

Outpatient services	n	FT
Heart failure	8,202	4.9
Parkinson's disease	4,941	2.3
Dementia	4,483	11.1
Exercise ECG	19,600	4.1
Echocardiography	31,813	2.8
Long-term ECG	9,040	4.7
All outpatient services ≥ 75	1,117,183	1.7

More detailed analyses have been conducted of a small number of patients under assessment and/or treatment for heart disease, dementia and Parkinson's disease. The common characteristic the selected groups share is that they are treated both by their regular GP/nursing home doctor and by specialists. For dementia, the specialists' contribution largely consists of assessment in order to clarify the diagnosis, while specialists also treat patients with heart failure and Parkinson's disease after they have been assessed.

There is considerable variation between hospital referral areas for all the patient groups, and the variation is greater than can be ascribed to random variation. There are many possible reasons for the variation observed, but it could be a factor that the division of functions between regular GPs and specialists varies between hospital referral areas. For example, it appears that specialists in some hospital referral areas assess dementia cases that would in other areas be assessed by regular GPs in cooperation with municipal dementia teams. The extent to which patients with Parkinson's disease who need specialist treatment are followed up by the specialist health service also seems to vary.

High variation has been found between hospital referral areas as regards different outpatient examinations for heart disease, such as exercise ECG, echocardiography and long-term ECG, and this variation cannot be explained by known geographical differences in morbidity. These examinations are only carried out by the specialist health service, which indicates that access to these services is not equitable or independent of where the patient lives.

Procedures

We have mapped important procedures (treatments) for elderly patients in some large fields, such as cardiology, orthopaedics, oncology and diseases of the eye. Some of the procedures are surgical procedures that vary in complexity, from hip or knee replacements that involve long hospital stays to replacement of opaque eye lenses – a procedure that takes approx. 15 minutes and is performed under local anaesthesia. Other procedures are recurrent treatments, such as cancer treatment or injections in the eye to prevent the patient going blind. The number of procedures or number of patients who receive these services vary relatively significantly from year to year. Each year, approx. 20,000 elderly undergo cataract surgery, while approx. 1,000 elderly patients receive biological drugs (see Table 8.3).

Table 8.3: Overview of selected procedures, patients aged 75 years and older. Average number of procedures or patients who receive the service per year (n) and the ratio between the highest and lowest rate in the hospital referral areas (FT).

Procedures	n	FT
Coronary revascularisation	3,403	2.1
Pacemaker	1,982	2.3
Hip replacement	2,330	1.7
Knee replacement	1,481	1.6
Pharmacological cancer treatment, pat	3,252	1.9
Radiotherapy, pat	3,056	2.0
Cataract surgery	20,876	2.0
Eye injection, pat	6,334	2.2
Hearing aid, pat	17,162	4.0
Biological drugs, pat	1,019	2.0

In general, the variation in such services between hospital referral areas is deemed to be moderate. Due to the low number, the variation for joint replacements and biological drugs is regarded as relatively low. A moderate variation between hospital referral areas cannot be explained by random variation, and it is therefore characterised as unwarranted. Before initiating advanced treatment, particularly surgery and pharmacological treatment, the hoped-for benefit must be weighed against the risk to the patient. When the variation between hospital referral areas exceeds what can be ascribed to random variation, there is reason to question whether the different

areas differ in their assessments of the risk/benefit to the patient. The variation could be the result of a prevailing culture among those who refer patients for treatment or make the final decision regarding treatment, 'this is how we do it here'. If the individual assessment of patients is inadequate, fear of undesirable incidents in frail patients could result in more robust patients also missing out on treatment.

Variation in health services broken down by hospital referral area

Out of consideration for those responsible for providing healthcare to residents in the health trusts' hospital referral areas and in the regional health authorities, we have found it most expedient to show the results for the 21 examined health services[23] in an overall presentation broken down by hospital referral area (Figure 8.1). The rates for 21 different health services are presented in

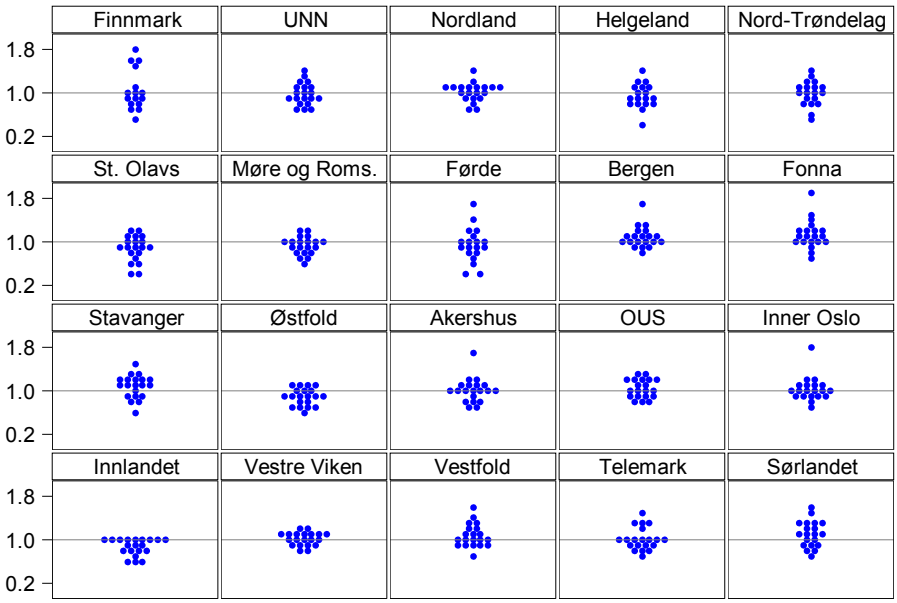


Figure 8.1: Rates for the different health services (samples) seen in relation to the national average, shown for the different hospital referral areas. If a hospital referral area's rate equals the national average, the ratio will be 1.0. If the rate is higher, the ratio will be higher than 1.0, and if it is lower, the ratio will be less than 1.0. The figure does not show which health service each marker represents. Some rates have not been calculated for some hospital referral areas due to low numbers, and some markers will be missing for these areas.

relation to the rate for Norway as a whole. If the hospital referral area's rate equals the national average, the ratio will be 1.0. If the rate is higher, the ratio will be higher than 1.0, and if it is under the national average, the ratio will be less than 1.0.

Innlandet hospital referral area has no services with a rate above the national average, while the Førde area has four services above the national average. At the other end of the scale, we find the hospital referral areas Stavanger and Fonna, which have rates above the national average for 14 and 13 services, respectively.

[23] The health services presented in tables 8.1, 8.2 and 8.3, excluding dementia outpatient services and including patients admitted for a myocardial infarction.

8.5 Where will the elderly boom hit the health service?

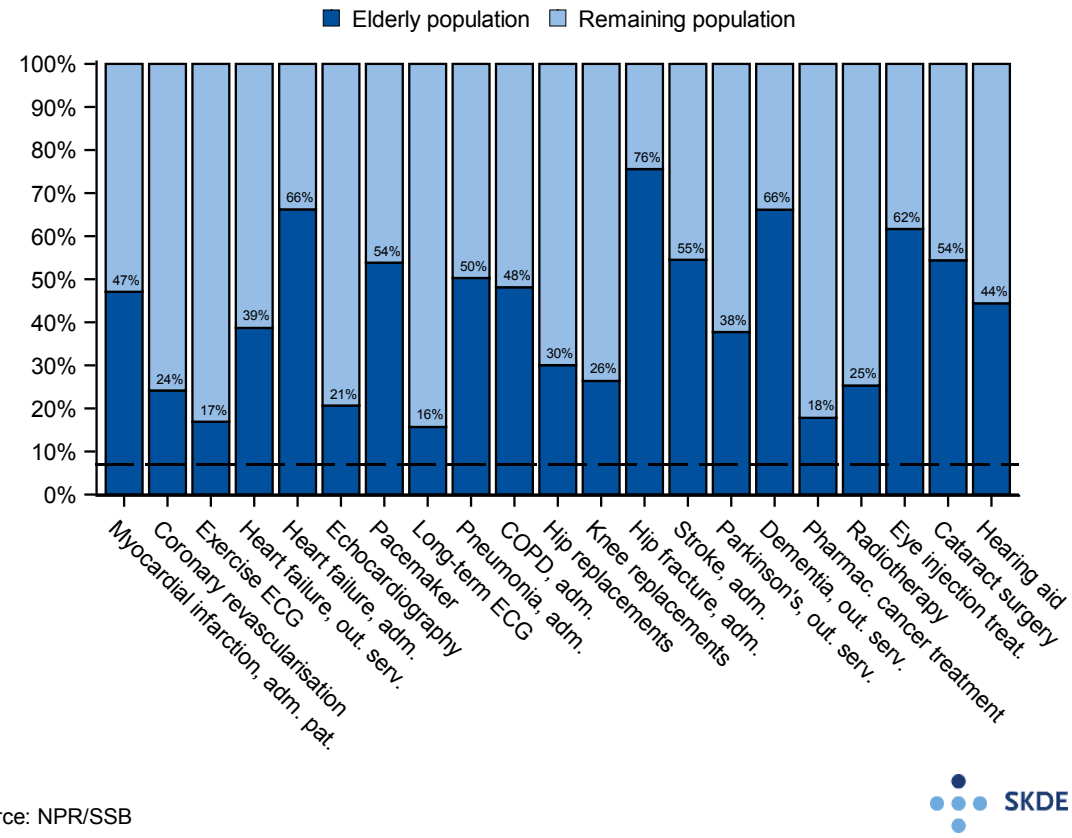
The number of elderly has been growing slowly for some years, but the increase is expected to gather pace around 2020, and Statistics Norway expects the present number of elderly (approx. 360,000) to have doubled by 2040 (to approx. 740,000). It is difficult to predict the need for health services in future, since it is not given that we will see an increase in morbidity that is proportional to the increasing number of elderly. Life expectancy has increased because the elderly are healthier, but very many will nevertheless be affected by illness and health problems at some point. Technological and medical advances will allow early diagnosis and better treatment, which, in turn, will result in more people living longer with serious diseases. Therefore, the demographic changes will under all circumstances be challenging for the health service, and the results from this report will be useful, particularly as support when dimensioning service provision. It is difficult to predict where the greatest challenges will arise, but we have endeavoured to lay a foundation for those responsible for planning the specialist health services.

Based on the relatively low proportion of the elderly who use the general practitioner service today, this service will probably not be affected to the same degree as the municipal care services and the specialist health service. However, it is open to discussion whether the elderly's use of the general practitioner service should be increased.

The growing number of elderly people in the population will not be equally challenging for all parts of the specialist health service. It is assumed that the challenges will be particularly great in areas where the elderly currently use a large proportion of the total services provided (see Figure 8.2).

The elderly account for a particularly high proportion of hospital admissions, and this patient group is also demanding for the health service. The organisational shift from admissions to day patient treatment will probably continue, but this will apply less to the elderly, since elderly patients often have complex health problems and require an interdisciplinary approach. There is reason to believe that the number of beds available for this group of patients must be increased in order to provide satisfactory services for acutely ill elderly patients. When municipal emergency bed units (KAD) were introduced, the intended target group comprised patients with acute deterioration of a known condition, such as COPD or heart failure. Considering the high proportion of patients who are readmitted and die within a short period of admission for these conditions, there is reason to question whether the KAD beds can be used for these patient groups to any great extent.

As Figur 8.2 shows, the proportion of the different services used by the elderly is consistently much greater than the 7% that the elderly make up of the Norwegian population. The services with the lowest proportions (16-21%) are outpatient cardiac assessment (exercise ECG, echocardiography and long-term ECG) and pharmacological cancer treatment. Admissions of elderly patients for heart diseases, lung diseases, hip fractures and strokes account for about 50% or more of admissions in the population as a whole. In most hospital referral areas, the expected increase in the number of elderly will be a great challenge as regards acute medical conditions for which a hospital bed will be required. The need for procedures such as cardiac revascularisation, pacemaker implantation, hip and knee replacements, and cancer treatment will also increase. Certain eye diseases and hearing loss are strongly age-related. The elderly make up approx. 50% of patients who receive eye injection treatment, undergo cataract surgery and have hearing aids fitted. Eye injection treatment is already a resource-intensive serial treatment, and the expected expansion of indications will be challenging for the capacity and organisation of Norwegian ophthalmology departments.



Source: NPR/SSB

SKDE

Figure 8.2: Use by the elderly of selected parts of the specialist health service as a proportion of the use of the population as a whole, average for the years 2013–2015. The dotted line indicates the proportion of elderly in the population (7%).

Figure 8.1 shows the rates in the different samples compared with Norway as a whole, broken down by the different health trusts' hospital referral areas. Areas with rates equal to or below the national average for many samples will probably face greater challenges in the time ahead than areas with rates above the national average for many samples. This information must be linked to the expected demographic development in the different hospital referral areas (Figure 5.7). For example, Innlandet hospital referral area currently has the highest proportion of elderly, and estimates suggest that the proportion will nearly double by 2040. Combined with low rates for most of the services, this development will result in major challenges for this area.

8.6 Age and health service prioritisation

Age should not in itself constitute a criterion for priority setting, but it may nevertheless have a bearing on prioritisation at group level (NOU (2014:12), Magnussen et al. 2015, Helse- og omsorgsdepartementet 2016). No findings in this healthcare atlas directly support the conclusion that elderly patients are given lower priority. Our approach to this question has been to compare treatment rates for the age group 75 years and older with corresponding treatment rates for the age group 50–74 years for four different services: revascularisation, pharmacological cancer treatment, radiotherapy and treatment with biological drugs. These services are not dominated by elderly patients (Figure 8.2) and are therefore suitable for comparison. If the prevalence of the illness in question, as an indicator of the need, is higher among the elderly, all else being

equal, we would expect the treatment rates to be correspondingly higher. However, there will often be more contraindications for elderly patients, such as other complicating illnesses and other reasons why they are less likely to tolerate a form of treatment. The phenomenon of patient preference can also have a greater impact among elderly patients. It is not unusual for elderly patients themselves to choose to refrain from procedures or treatment. There is no reason to believe that there is significant variation in patient preferences between hospital referral areas, however.

For revascularisation, the rates are, as expected, higher in the oldest age group, with a national ratio of 1.4 (Figure 7.10 page 53). This means that the rates are approx. 40% higher on average. However, the analysis shows that the rates for patients admitted with myocardial infarction are four times higher in the oldest age group. If hospital admissions for myocardial infarction can serve as a measure of morbidity in the two age groups, the difference in morbidity is considerably higher than the difference in revascularisation treatment.

Revascularisation by means of bypass was introduced in Norway in the late 1970s with a low upper age limit for surgery, but the average age of patients undergoing such treatment increased markedly during the following decades. This trend was further reinforced by the introduction of PCI, and it has now been proven that the older age groups also benefit greatly from revascularisation (Tegn et al. 2016). There is nevertheless reason to question whether the practice of prioritising younger patients still persists to some extent, particularly in some hospital referral areas.

The treatment rates for pharmacological cancer treatment are very similar for the two age segments, while the incidence of cancer is twice as high among the elderly. The variation between hospital referral areas is moderate (Figure 7.45 page 98). There used to be an upper age limit for pharmacological cancer treatment as well. There is no age limit now, but an individual assessment is to be carried out to determine whether a treatment with serious side effects is suitable for the patient in question. This individual assessment can have consequences at group level since local cultures and norms may develop. The national radiotherapy rate (Figure 7.48 page 101) has a ratio of 1.5 between the oldest and the youngest age group in favour of the elderly, but it varies from 1.1 to 1.8 between hospital referral areas. This variation does not correspond to the geographical distribution of cancer, but rather to the presence of radiotherapy centres in the hospital referral areas. The proximity of services does not appear to have the same influence on radiotherapy in the younger age group.

The most striking result was found when comparing rates for younger and older patients for treatment with biological drugs. These medicines are very expensive and strictly regulated via separate budgets. In all hospital referral areas, the older group receives considerably less treatment with biological drugs than the younger group. Figure 7.54 (page 113) shows that the rate for the elderly is approximately one-third of the rate of the younger group. There is relatively little variation between hospital referral areas. Part of the explanation is probably that some of the diseases for which this form of treatment is used are associated with increased mortality, and these diseases will thereby be less prevalent in the oldest age groups. Many patients find that treatment with biological drugs greatly improves their condition and quality of life. The medication can also have serious side effects, particularly in elderly patients, and this may limit the use of such medication among the elderly. This could explain part of the difference in the treatment rates between the two age groups, but it cannot be ruled out that younger patients are prioritised for treatment with these expensive and strictly regulated drugs. This should be studied in more detail.

Chapter 9

Summary and conclusion

- The number of elderly is expected to start growing around 2020 and to have doubled by 2040. The proportion of elderly people in the Norwegian population is expected to increase from 7% in 2017 to approx. 12% in 2040. This demographic development will represent a serious challenge to the specialist health service, but it will affect hospital referral areas differently.
- Unwarranted variation in health services for the elderly has been found between hospital referral areas. This is particularly true of outpatient consultations and diagnostic assessment, but it also applies to the provision of important treatment for heart diseases, cancer, osteoarthritis, eye diseases and hearing loss. These findings are a strong argument for strengthening the efforts to develop and implement common national guidelines for diagnosis and treatment.
- Elderly patients admitted as emergency cases for strokes, hip fractures, and pneumonia or for deterioration of COPD or heart failure are a patient group with long lengths of stays, frequent readmissions and poor prognoses. Elderly patients account for a high proportion of admissions of this type, and the growing number of elderly in the population will make it necessary to increase the number of suitable beds. This group of elderly admitted as emergency cases represents a challenge during treatment, in relation to coordination in connection with discharge and for the medical reception system in Norwegian municipalities.
- Comparisons between elderly and younger patients may indicate that age is used as a prioritisation criterion in relation to certain services, particularly revascularisation and radiotherapy, and possibly also treatment with biological drugs. It is striking that there is no correlation between the incidence of myocardial infarction and revascularisation treatment among the elderly, unlike among younger patients.

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Appendices

Discipline and patient sample. Number of contacts/patients, age, proportion of women, rates, ratios, hospital referral area with the highest and lowest rates, average per year.

					Rates		Ratios		Hospital referral area	
		Number	Age	Women	lowest	highest	FT	FT2	lowest rate	highest rate
General practitioner service	All consultations	2,089,869	81.7	58%	5,130.2	6,233.0	1.2	1.2	Inner Oslo	Stavanger
	Regular GP, consultations	1,929,011	81.6	58%	4,317.8	5,793.7	1.3	1.2	Finnmark	Stavanger
	Emergency prim. healthcare, cons.	160,471	83.4	59%	335.2	955.5	2.9	1.5	Inner Oslo	Finnmark
Specialist health service	Outpatient services, all	1,117,183	81.6	53%	2,309.1	3,983.6	1.7	1.4	Finnmark	OUS
	Outpatient services, public	774,585	81.5	51%	1,782.7	2,594.4	1.5	1.3	Østfold	M. og Romsdal
	Outpatient services, private	342,598	81.7	58%	223.9	1,449.0	6.5	3.2	Finnmark	OUS
	Admissions, all	178,571	83.3	55%	434.4	578.3	1.3	1.3	Østfold	Finnmark
	Admissions, emergencies	142,202	83.9	56%	345.7	440.2	1.3	1.2	Sørlandet	Bergen
	Admissions, planned	36,369	81.0	51%	69.4	155.3	2.2	1.7	Østfold	Finnmark
Cardiac medicine	Myocardial infarction, adm. patients	6,652	84.5	50%	11.6	31.1	2.7	1.7	Sørlandet	Finnmark
	Revascularisation, PCI and bypass	3,403	80.3	34%	6.6	13.8	2.1	1.8	M. og Romsdal	Finnmark
	Exercise ECG, outpatient serv.	19,600	80.3	49%	22.7	92.0	4.1	3.8	Helgeland	Akershus
	Heart failure, outpatient serv.	8,202	81.6	34%	8.6	41.9	4.9	3.0	Førde	Inner Oslo
	Heart failure, admissions	6,761	85.0	49%	15.0	22.8	1.5	1.4	Stavanger	OUS
	Echocardiography, outpatient serv.	31,813	80.9	50%	56.2	158.1	2.8	2.3	Østfold	Finnmark
	Pacemaker	1,982	83.4	45%	3.3	7.7	2.3	2.0	Stavanger	Helgeland
	Long-term ECG, outpatient serv.	9,040	80.7	52%	10.0	47.7	4.7	3.0	St. Olavs	Fonna
Pulmonary medicine	Pneumonia, emergency admissions	12,477	84.5	48%	26.4	46.1	1.7	1.5	UNN	Stavanger
	COPD, emergency admissions	8,180	82.0	49%	17.3	27.7	1.6	1.4	Førde	OUS
Orthopaedics	Primary hip replacement	2,330	80.3	71%	4.4	7.4	1.7	1.2	UNN	Stavanger
	Primary knee replacements	1,481	79.4	65%	3.4	5.3	1.6	1.4	Telemark	N.-Trøndelag
	Hip fractures, admissions	6,922	86.0	72%	16.9	21.4	1.3	1.2	Helgeland	Østfold
	Femoral neck fractures[‡]	3,900	85.6	70%	–	–	–	–	–	–
	Wrist fractures[‡]	2,741	83.3	87%	–	–	–	–	–	–
Neurology	Strokes, emergency admissions	5,329	84.2	56%	12.6	18.1	1.4	1.3	Stavanger	UNN
	Dementia, outpatient serv.	4,483	82.3	58%	3.4	37.9	11.1	5.7	Telemark	Inner Oslo
	Parkinson's disease, outpatient serv.	4,941	80.1	45%	8.3	19.4	2.3	1.9	St. Olavs	Vestfold
Cancer treatment	Pharmacological treatment, patients	3,252	79.5	50%	6.5	12.0	1.9	1.6	Finnmark	Vestfold
	Radiotherapy, patients	3,056	80.6	36%	5.5	10.9	2.0	1.7	Telemark	Sørlandet
Diseases of the eye	Cataract surgery	20,876	81.4	60%	42.0	85.4	2.0	1.9	Vestfold	Stavanger
	Injection treatment, patients	6,334	83.7	64%	10.5	23.1	2.2	1.6	Førde	UNN
Other	Hearing aids, patients 2015	17,162	82.8	54%	18.3	73.2	4.0	1.8	St. Olavs	Finnmark
	Biological drugs, patients 2015	1,019	79.1	69%	2.0	4.2	2.0	1.8	Østfold	Telemark

[‡] The rates for this patient sample are not presented in this healthcare atlas, and are therefore not included in the table.

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