Indicators for Monitoring
Musculoskeletal Problems and Conditions

Musculoskeletal Problems and Functional Limitation

The Great Public Health Challenge
for the 21st Century

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1 SUMMARY

Troublesome for the patients, problematic for the health care system, and costly for the society

Musculoskeletal conditions (MSC) are extremely common and have important consequences for the individual and the society. Typically around 50% of the population report musculoskeletal pain at one or more sites for at least one week in the last month. Population surveys show that back pain is the most common site of regional pain in younger and middle aged adults, and knee pain in older people. The prevalence of physical disability is higher in women than men. It rises with age, around 60% of women aged over 75 living in the community report some physical limitations.

In individuals of working age, MSC - in particular back pain and generalised widespread pain - are a common cause of sick leave and long- term work disability and hence a big problem for the individuals affected, with huge economical consequences for society. Among older people rheumatoid arthritis, osteoarthritis and osteoporosis are associated with a loss of independence and a need for more support in the community or admission to residential care.

Around 15-20% of consultations in primary care are for MSC. Many of these people are referred to allied health professions such as physiotherapists, occupational therapists or chiropractors; or to medical specialists such as rheumatologists, orthopaedic surgeons or rehabilitation specialists. Total joint replacement (mainly of the hip or knee) is one of the most common elective operations for older people in most European countries. The major consequences for the health services of osteoporosis are forearm and vertebral fractures and hip fractures. There is a significant mortality associated with hip fracture.

A few European countries have performed 'cost-of-illness' studies. In the Netherlands in 1999 around 50% of all disability payments and 6% of total healthcare costs were accounted for these conditions. A Swedish study from 1994 estimated that 90% of the total socio-economic cost of MSC were indirect costs (31.5% for sick leave and 59% for early retirement). 47% of the total costs were attributed to back disorders, 14% to osteoarthritis and 6% to rheumatoid arthrittis. It is difficult to compare costs between countries because of the different ways in which healthcare systems and social services are organised, and the different ways of attributing costs.

Musculoskeletal problems and conditions form a heterogeneous group for a great part with poorly understood causes. The group comprises clear cut diagnoses, biologically and clinically well defined such as rheumatoid arthritis and sciatica; biologically defined, but clinically less well defined diagnoses such as osteoporosis and arthrosis; as well as controversial conditions as nonspecified low back pain, fibromyalgia and myofacial pain syndromes. The common denominators are pain and reduced function resulting from some disturbances in the musculoskeletal system ensuing mainly from inflammation, degenerative processes and trauma.

The term unspecified musculoskeletal problems is a non-diagnostic approach which includes all pain conditions in the musculoskeletal system. This embraces the specific conditions included in this report (rheumatoid arthritis, osteoarthritis, and osteoporosis), as well as malformations, injuries, infections and tumours.

Need for monitoring

This report argues for monitoring these conditions in the Community and describes how the monitoring should be done. The report is a result of a project under the Community's program for health monitoring. The project has been administered by establishing a project group with representatives from 12 member countries of the European Union (EU), the Bone and Joint Decade, and Norway.

There are several reasons why there is a need for agreed indicators and monitoring. Firstly, the fact that the burden and cost of MSC are high, and the reasons for this can be better understood by measuring agreed indicators. In addition, there is a need to establish the baseline situation in Europe. It is unclear at present whether there are true differences between different areas and countries in Europe with regards to the occurrence and impact of MSC, and if such differences exist, whether they are of practical interest. While it is not necessary to gather country-specific data for every aspect of every MSC, there are some significant gaps in our knowledge which need to be filled. The data which are available are often inconsistent. Many differences between studies can be explained by differences in case definition or survey methodology. Nevertheless, there are some patterns which might provide clues to disease aetiology and to unequal provision of services. For example, the incidence of fractured neck of femur shows an increasing gradient from southern to northern Europe. The need to monitor arises because the epidemiology and prognosis of MSC changes over time. One reason is the alteration in the structure of the population: most MSC are more common in women than men, and occur more frequently in older people. Both the number and the proportion of older people are increasing in most European countries. The United Nations Population Division estimates that the overall population in Europe will fall by an average of 0.37% per annum for the next 50 years. During the same time the number of people aged over 60 will increase by 0.81% per annum and aged over 80 by 2.06%. Thus the proportion of the population aged over 65 is predicted to rise from 14.7% in 2000 to 17.6% in 2015. The overall burden of MSC can therefore be expected to rise over the next few decades.

Another reason for the changing MSC epidemiology are the shifting risk profiles such as smoking and alcohol behaviour, nutrition, obesity and lack of exercise. For example, the prevalence and severity of back pain are influenced by socio-economic status, psychological and occupational factors. Smoking is a risk factor for back pain, RA and OP. Obesity is a risk factor for OA in the knee. Immobility, alcohol and falls are all risk factors for osteoporotic fractures.

The occurrence of MSC and their consequences can also be modified by prevention programs. Such public health programmes need to be monitored.

In addition, effective, although sometimes expensive, treatments are becoming available for the destructive MSC, such as RA and OP. These will not only have an impact on functional capacities, but will also slow down the progression. This requires monitoring criteria for different stages of the disease.

In summary, monitoring will firstly allow the identification of changes in the occurrence of MSC and their consequences. Secondly, the association between determinants and conditions may give better insight into the aetiology of these health problems. Thirdly, monitoring MSC will help health policy makers to adapt resource allocation to the changing needs in the society. Finally, it enables meaningful comparisons between countries and regions throughout the EU.

Recommendations

Information on MSC and functional limitation, its determinants and consequences can be obtained from a variety of sources:

Health interview surveys

Health examination surveys

Health care utilisation

Registers

Research projects

In most member states such information is available. The problem is that a variety of methods are used, and the comparability is limited. The great challenge is to harmonize methods to make international comparisons possible, and to follow time trends.

We have divided the indicators into determinants (for the conditions as well as for outcome), the conditions, and the consequences (personal and societal). The report recommends monitoring the following conditions:

Unspecified musculoskeletal conditions (widespread and localized)

Rheumatoid arthritis,

Osteoarthritis,

Osteoporosis

The report will not present recommendations for other musculoskeletal conditions such as malformations and injuries, although those conditions will be included in the question on unspecified pain, and partly discussed as determinants.

DETERMINANTS

The most important determinants for MSC are also established risk factors for other illnesses. For the purpose of monitoring determinants for MSC, factors as weight, smoking, and physical activity should be included according to recommendations made by other groups inside the health monitoring project. Although less strong than earlier assumed, work strain, both physical and psychosocial are determinants for musculoskeletal pain. These risk factors will be covered by the group on work environment.

Socioeconomic status seems to be a determinant for some of the conditions. It is a stronger predictor of the outcome of the conditions. Persons with low socioeconomic status run a dramatically higher risk of ending up with a disability pension for any diagnosis, and even more with musculoskeletal complaints. Again we have no specific recommendations but support the recommendations made by others in the health monitoring project.

All of those risk factors/determinants should best be monitored by health interview surveys using standardised questions and categories of answers.

Other of the determinants mentioned in the report are considered to be of lesser significance, and we will not recommend them to be included in a community based monitoring program.

THE CONDITIONS AND THEIR CONSEQUENCES

Musculoskeletal pain has many dimensions: complaint quality, complaint origin, complaint severity, complaint localisation, start, duration, mode (isolated episodes, recurrent or chronic). For the purpose of including few questions in any health interview study, the group has decided on recommending the following general question on musculoskeletal pain

1. During the last week, have you had any pain affecting your muscles, joints, neck or back which has affected your ability to carry out the activities of daily living? If Yes, please tick the region(s) in the grid (column a)

2. Has this pain (or pains) lasted for 3 months or more? If Yes, please tick the region(s) in the grid (column b)

	a) Pain last week	b) Pain lasted for three months or more
Head		
Neck		
Shoulder(s)		
Upper back		
Elbows		
Wrist(s) / hand(s)		
Low back		
Hip(s) / thigh(s)		
Knee(s)		
Ankles / foot/feet		

This question includes something about time period "the last week", duration "lasted for three months ore more" and something about severity "which has limited your ability to carry out activities of daily living". The latter relates to reduced function as a consequence of the complaint. As an example, the Nordic questionnaire tries to include most musculoskeletal complaints by asking for "any pain or discomfort". Pain intensity in itself is not included.

With the suggested question we will get information on affected regions, and might also define widespread pain as pain reported from at least four different regions.

The limitation of such a combination of time period, duration, severity and location is the lack of indication of what is worst, what is most important for the functional restriction. No instruments for monitoring musculoskeletal problems in health interview surveys have been properly validated in an international setting. There might even be cultural differences in the interpretation of a general question such as the one suggested. The need for standardisation is however very strong.

The following is a summary of recommended monitoring:

1. **Occurrence of self reported musculoskeletal pain**
   Self report in health interview survey of pain and limited function from different regions, using the question above.

2. **Occurrence of rheumatoid arthritis**
   Incidense and prevalence of RA in existing and future regional registers

3. **Occurrence of osteoarthritis in hip and knee**
   Prevalence of OA in research projects based on health examination surveys, including x-ray

4. **Occurrence of osteoporosis**
   Prevalence of bone density monitored in health examination studies

5. **Reduced function**
   Prevalence of persons with reduced function, measured in health interview surveys as recommended by other in the health monitoring project

6. **Work disability**
   Permanent or temporal work disability, according to diagnosis from social security statistics

7. **Occurence of hip fracture**
   Incidence of hip fractures from hospital statistics

8. **Hip and knee arthroplasty**
   Incidence and indicators for hip and knee replacement from hospital statistics

9. **Drugs for treatment and prevention of osteoporosis**
   Defined daily doses of drugs (ATL M 05B) and actual prescription from whole sale statistics and prescription registers

10. **Drugs for treatment of rheumatoid arthritis**
    Defined daily doses of drugs (ATC L 04 A) and actual prescription from whole sale statistics and prescription registers

The table shows recommended sources of information

Recommended sources of information on the occurrence of the index MSCs

	HIS	HES*	Primary Care	Secondary Care	Registers**
Unspecified MSC					
Incidence	++				
Prevalence	++		(+)		
RA					
Incidence			(+)	+	++
Prevalence	(+)	+	(+)		++
OA					
Incidence			(+)		
Prevalence	(+)	+	(+)		+
Osteoporosis Fractures					
Incidence	+	+	(+)	++	++
Prevalence	++	++	(+)		++
Low BMD					
Incidence					
Prevalence		++			++

* ***With the addition of x-ray examination, blood test or bone densitometry as indicated***

** ***Including research surveys***

2 PREFACE

Musculoskeletal problems and conditions (MP&C) and associated functional limitations are the main reasons for sick leave and disability pension in industrialised countries. This report argues for monitoring these conditions in the Community and describing how the monitoring should be done. The report is a result of a project under the Community's program for health monitoring.

The project has been administered by establishing a project group with representatives from 12 member countries of the European Union (EU), the Bone and Joint Decade, and Norway.

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3 GLOSSARY

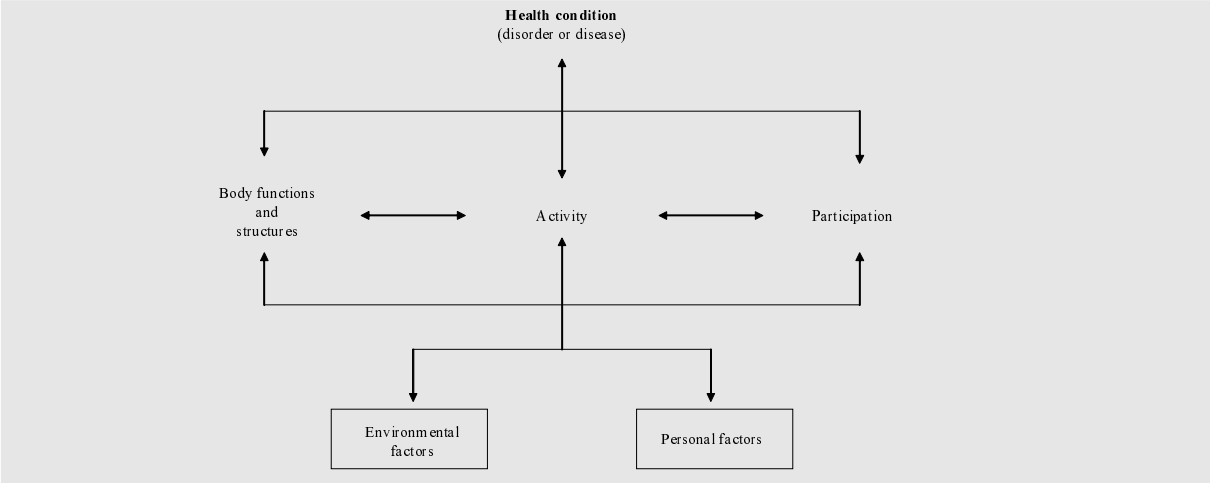
ACR	American College of Rheumatology
BMD	Bone mineral density
CD	Compact disc
ECHI	European Community Health Indicators
EU	European Union
EULAR	European League of Associations for Rheumatology
EVOS	European Vertebral Osteoporosis Study
GP	General practitioner (primary care physician)
HES	Health examination survey
HIS	Health interview survey
HMP	Health monitoring programme
IASP	International Association for the Study of Pain
ICD	International Classification of Diseases
ICF	International Classification of Functioning, Disability and Health
ICIDH	International Classification of Impairment, Disability and Handicap
ICPC	International Classification for Primary Care
ILAR	International League of Associations for Rheumatology
LBP	Low back pain
MSC	Musculoskeletal conditions
OA	Osteoarthritis
OECD	Organisation of Economic Cooperation and Development
OP	Osteoporosis
RA	Rheumatoid arthritis
RF	Rheumatoid factor
SD	Standard deviation
WHO	World Health Organisation
WOS	Web of Science

4 MUSCULOSKELETAL PROBLEMS AND CONDITIONS: CONCEPTUAL FRAMEWORK

The years 2000-2010 have been designated as the Bone and Joint Decade. The Bone and Joint Decade has established a Bone and Joint Monitor Project which task is to document the occurrence of, and the opportunities for primary, secondary and tertiary prevention for a number of key musculoskeletal problems and conditions.

We have elected to set this report within the framework now recommended for classification for function and health, by the WHO (fig. 1). The ICF offers a framework to describe a health condition with all its consequences for the individual including all contextual factors involved. The individual person perceives that he has "a health problem". The two main musculoskeletal health problems are musculoskeletal pain and functional limitation (sometimes called physical disability). These "health problems" may be explained by a variety of "conditions". However, it is often not possible to attribute musculoskeletal problems to a specific underlying disease or disorder. The description of a pain syndrome (for example low back pain) may represent the highest level of diagnostic accuracy possible. Musculoskeletal problems (i.e. musculoskeletal pain or functional limitation) may either be localised to one anatomical region or be more generalised or widespread. Thus, we refer to regional pain syndromes and widespread pain syndromes.

Figure 1. The ICF structure



The WHO recommends that health conditions should be divided into four main categories: diseases or disorders; injury or trauma; congenital abnormalities; and ageing. All four of these categories have relevance for both musculoskeletal pain and functional limitation. This report will consider all four of the categories but deal with musculoskeletal problems, diseases and disorders in the greatest depth. These are referred to as musculoskeletal conditions (MSC). The impact of the MSC on the individual and on society are influenced by "contextual factors". Contextual factors can be divided into personal and environmental factors. Some contextual factors are risk factors (determinants) for the development of MSC. Some contextual factors act as determinants of the outcome of MSC (i.e. its prognosis). Some contextual factors influence the impact of MSC on society.

The WHO has considered the classification of personal and environmental contextual factors. We highlight those which are relevant to MSC, but do not propose any additional classification or data collection beyond that which is already taking place.

5 THE NEED FOR MONITORING AND INDICATORS

Musculoskeletal conditions are extremely common and have important consequences for the individual and the society. Typically around 50% of the population report musculoskeletal pain at one or more sites for at least one week in the last month (1). Population surveys show that back pain is the most common site of regional pain in younger and middle aged adults, and knee pain in older people (2). The prevalence of physical disability is higher in women than men. It rises with age, around 60% of women aged over 75 living in the community report some physical limitations (1).

In individuals of working age, MSC - in particular back pain and generalised widespread pain - are a common cause of sick leave and longterm work disability and hence a big problem for the individuals affected, with huge economical consequences for society (3). Among older people rheumatoid arthritis (RA), osteoarthritis (OA) and osteoporosis (OP) are associated with a loss of independence and a need for more support in the community or admission to residential care.

The costs of healthcare and social support for MSC are very high. Several types of cost are specifically relevant: costs of healthcare services, costs of disability payments, costs of sick leave, costs of informal care.

Around 15-20% of consultations in primary care are for MSC. Many of these patients are referred to allied health professions such as physiotherapists, occupational therapists or chiropractioner; or to medical specialists such as rheumatologists, orthopaedic surgeons or rehabilitation specialists. Total joint replacement (mainly of the hip or knee) is one of the most common elective operations for older people in most European countries. The major consequences for the health services of OP are forearm and vertebral fractures (usually treated on an out-patient basis) and hip fractures (which usually require hospital admission and a prolonged period of rehabilitation). There is a significant mortality associated with hip fracture.

A few European countries have performed 'cost-of-illness' studies. In the Netherlands in 1999 the total cost of work disability payments for MSC was 28.6 million Euros and the total costs of healthcare were 36,032.7 million Euros. Around 50% of all disability payments and 6% of total healthcare costs were accounted for these conditions (http://www.rivm.nl/kostenvanziekten). A Swedish study from 1994 estimated that the total socio-economic cost of MSC was 52.7 billion Swedish crowns. 90% of these were indirect costs (31.5% for sick leave and 59% for early retirement). 47% of the total costs were attributed to back disorders, 14% to OA and 6% to RA (4). It is difficult to compare costs between countries because of the different ways in which healthcare systems and social services are organised, and the different ways of attributing costs.

There are several reasons why there is a need for agreed indicators and monitoring. Firstly, the fact that the burden and cost of MSC are high, and the reasons for this can be better understood by measuring agreed indicators. In addition, there is a need to establish the baseline situation in Europe. It is unclear at present whether there are true differences between different areas and countries in Europe with regards to the occurrence and impact of MSC, and if such differences exist, whether they are of practical interest. There is serious lack of systematic data collection; for some countries and MSC there are no data at all. While it is not necessary to gather country-specific data for every aspect of every MSC, there are some significant gaps in our knowledge which need to be filled. The data which are available are often inconsistent. Many differences between studies can be explained by differences in case definition or survey methodology. Nevertheless, there are some patterns which might provide clues to disease aetiology and to unequal provision of services. For example, the

incidence of fractured neck of femur (an indicator of the prevalence of OP) shows an increasing gradient from southern to northern Europe. The need to monitor arises because the epidemiology and prognosis of MSC changes over time. One reason is the alteration in the structure of the population: most MSC are more common in women than men, and occur more frequently in older people. Both the number and the proportion of older people (in particular older women) are increasing in most European countries. The United Nations Population Division estimates that the overall population in Europe will fall by an average of 0.37% per annum for the next 50 years. During the same time the number of people aged over 60 will increase by 0.81% per annum and aged over 80 by 2.06%. Thus the proportion of the population aged over 65 is predicted to rise from 14.7% in 2000 to 17.6% in 2015. (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. http://esa.un.org/unpp). The overall burden of MSC can therefore be expected to rise over the next few decades.

Another reason for the changing MSC epidemiology are the shifting risk profiles such as smoking and alcohol behaviour, nutrition, obesity and lack of exercise. For example, the prevalence and severity of back pain are influenced by socio-economic status, psychological and occupational factors. Smoking is a risk factor for back pain, RA and OP. Obesity is a risk factor for OA in the knee. Immobility, alcohol and falls are all risk factors for osteoporotic fractures.

The occurrence of MSC and their consequences can also be modified by prevention programs. Such public health programmes and health education can be targeted at these factors and the consequences of such programmes need to be monitored.

In addition, effective, although sometimes expensive, treatments are becoming available for the destructive MSC, such as RA and osteoporosis. These will not only have an impact on functional capacities and participation, but will also slow down the progression. This requires monitoring criteria for different stages of the disease. Finally, strategies for the prevention of musculoskeletal conditions in Europe are being developed in the European Bone and Joint Health Strategies Project and the monitoring of agreed indicators will be necessary to assess the effectiveness of these.

In summary, monitoring will firstly allow the identification of changes in the occurrence of MSC and their consequences. Secondly, the association between determinants and conditions may give better insight into the aetiology of these health problems. Thirdly, monitoring MSC will help health policy makers to adapt resource allocation to the changing needs in the society. Finally, it enables meaningful comparisons between countries and regions throughout the EU.

In order to achieve this goal, harmonisation of indicators across countries is essential.

6 AIMS OF PROJECT

The European Commission`s Health Monitoring Programme (HMP) was established in 1997 to take forward the responsibilities of the EU in the public health field. Its objective is «to contribute to the establishement of a Community health monitoring system», in order to:

A Measure health status, its determinants and trends throughout the Community

B Facilitate the planning, monitoring and evaluation of Community Programmes and actions

C Provide Member States with appropriate health information to make comparisons and support their national health policies

The activities under the HMP have been set out under three «Pillars»:

Pillar A: Establishment of Community health indicators;

Pillar B: Development of a Community-wide network for sharing health data;

Pillar C: Analyses and reporting.

Under these pillars, projects are funded in specific areas to realise HMP's goals. This report is part of the work under pillar A.

The aim of the current project is to identify existing indicators of MSC at the population level, and in primary and secondary care. This includes information on occurrence (overall and detailed for specific problems and conditions), trends (time and regional), determinants (genetic, psychosocial and environmental), and consequences to the individual (body function and structure, functional activity, participation and quality of life) and consequences to the society, (health care consumption and social security expenditures) at a national and community level. The project also makes recommendations on indicators which can be used to monitor MSC at a national and community level. The project gives priority to the, so far, poorly described conditions, missing from the existing international classifications (International Classification of Disease – ICD, International Classification of Primary Care – ICPC and International Association for the Study of Pain – IASP), and to establishing means of distinguishing minor transient episodes from the more significant conditions.

This report suggests how member countries best could monitor determinants, trends and consequences of the MSC and how monitoring of MSC could be included in a permanent Community Health Monitoring System.

7 METHODS

Following a meeting in Luxembourg spring 2000 a project group was established with representatives from Italy, Finland, Germany, The Netherlands, The Republic of Ireland, Greece, Sweden, Portugal, Belgium, France, The United Kingdom, and Norway. A representative from the Bone and Joint Decade Monitor Project was also invited to join the group. A steering group with representatives from Italy, Finland, Germany, Norway, and the Bone and Joint Decade Monitor Project was created.

The project made a sub-contract with the Bone and Joint Decade Monitor Project and its collaborators in Manchester. In Manchester a research assistant was appointed with the main objective of describing the specific musculoskeletal conditions. In Oslo a research assistant was appointed with responsibility for what we have decided to name the " musculoskeletal pain syndromes".

The steering group held a two-day meeting in Manchester, UK, and a one-day meeting near Munich, Germany. The whole group held a meeting in Rotterdam, Netherlands, and in Oslo, Norway, in September 2002. A writing group met in Nice, France, and Ulm, Germany, in 2003 to finalize the report. The final draft was circulated and agreed on in a telephone conference on September 22nd 2003.

The group began by following the agenda of the European Community Health Indicators (ECHI) project focusing on indicators, data sources and availability. Musculoskeletal pain is closely linked to functional limitation, and functional limitation and reduced work ability seem to be one of the greatest public health challenges for the 21st century. Along the way we changed towards focusing on the combination of musculoskeletal conditions and functional limitation. This approach has linked our group's work to the World Health Organisation (WHO) initiative to develop a framework for measuring and monitoring functional ability, and the group has actively participated in the development of the International Classification of Functioning, Disability and Health (ICF) framework.

The project has had close contact with other projects in the EU health monitoring program, other EU bodies such as EUROSTAT and the health promotion program. We have further had close contact with different WHO initiatives, including the ICF, health surveillance in WHO and the group working on the Global Burden of Disease project. The EU Musculoskeletal Indicator Group actively participated in the development of core sets of domains from the ICF for RA, OA, OP and back pain at a workshop held at Kloster Seeon, Germany, in April 2002. The Manchester team have also contributed data on the incidence and prevalence of RA, OA, OP and back pain in different European countries for the Global Burden of Disease project of the WHO.

In the description of the conditions included in this report, various methodologies have been used: for what we have called unspecified musculoskeletal conditions a selective and strategic identification of literature and references was carried out, while for the specific conditions a more extensive literature review for surveys and studies that estimate the prevalence and incidence rates was done.

The searches were conducted on Web of Science (WOS) and Medline. Initially a separate search was conducted for each European country. All studies that were not based in Europe and all studies that did not include a prevalence or incidence rate in the abstract were manually removed. Those remaining were exported into Reference Manager software and obtained as hard copies. Papers were assessed for validity and reliability, and some were removed if they did not meet the other criteria (small sample size, or non-standard disease definitions). The following information was

extracted from each paper: country of origin, sample size, years the survey was conducted, sample type, age group of the population, gender group and the prevalence or incidence. The number of age bands shown in the paper was also noted.

In the few instances in which there was more than one study from a country we used the following selection criteria in order: used recognised classification criteria, sample size more than 500, or most recent. For OP (vertebral deformity) we selected the studies performed as part of the European Vertebral Osteoporosis Study (EVOS) because these studies were conducted using similar methodology in all sites and so provide results which can be meaningfully compared between countries.

8 DESCRIPTION AND DEFINITIONS OF MUSCULOSKELETAL PROBLEMS AND CONDITIONS

8.1 Which problems and conditions?

When identifying people with musculoskeletal problems only in part specific conditions can be identified as a cause of the problems. In others, either because of the ascertainment methods, or because of lack of knowledge, a specific condition can not be defined. Therefore, the following definitions of common problems and conditions have been included:

Musculoskeletal problems, unspecified

- Widespread pain (including fibromyalgia)
- Localised pain (low back, neck, shoulder, knee)

Specific musculoskeletal conditions

- Osteoarthritis (OA)
- Inflammatory arthritis (using RA as the index condition)
- Osteoporosis (OP)

Musculoskeletal malformations and injuries will not be included in this report together with the conditions above. They will however, partly be included among the determinants for musculoskeletal problems.

8.2 Definitions of musculoskeletal problems, unspecified

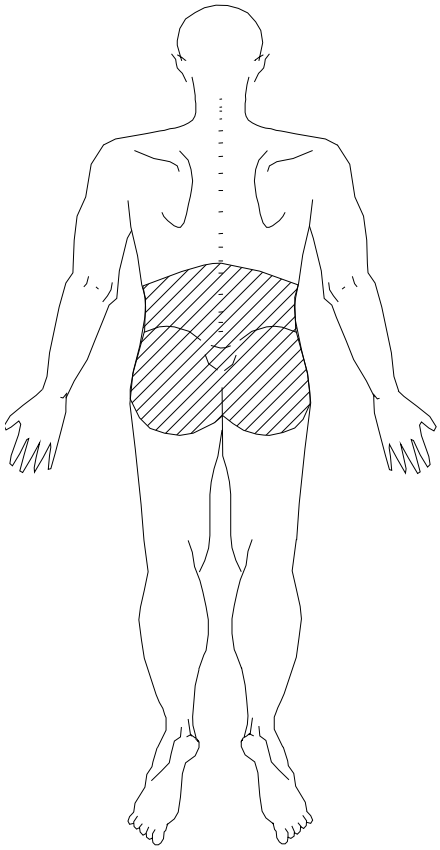
The term 'musculoskeletal problems' includes a diversity of complaints and diseases localised in joints, bones, cartilage, ligaments, tendons, tendon sheaths, bursae and muscles. It is often difficult to establish a medical diagnosis or an anatomical localisation for the complaints. Some complaints are diffuse in localisation, and some individuals complain about pain from many, sometimes almost all, parts of the body.

In this report we use the term 'musculoskeletal problems' for the general and non-diagnostic approach to musculoskeletal complaints. This approach solves the problem of diversity in the field of musculoskeletal complaints by defining the problems according to:

- Localisation
- Time period
- Level of complaints

Localisation can be defined in a variety of ways. The most frequently used definitions combine textual names of the body areas (e.g. neck or lower back) with an illustration on a body manikin (fig 2).

Fig. 2 Body manikin as used to define back pain



An alternative is to present a blank body manikin and, ask the respondents to mark the areas where they experience pain.

A definite time period should always be specified. The time period can range from "just now" to "have you ever in your life experienced". In different surveys time periods such as the previous week, previous three months, and previous year have been used.

Definition of severity of complaints is not always made explicit. Questions like "have you had pain in your neck in the last three months?" is often used. But there are probably large cultural and individual differences in the decision of how much pain or discomfort you need to have before it is regarded relevant to report it as pain. One solution to this problem is to include as much discomfort as possible, with questions like "have you had any pain, discomfort or stiffness in your neck in the last three months?" Alternatively one can focus on neck pain and function by linking the pain to pain behaviour, like "have you been absent from work because of pain in your neck in the last three months?"

WIDESPREAD PAIN

The occurrence of widespread pain has mostly been studied in the context of the ACR (American College of Rheumatology) criteria for fibromyalgia (5) and the revised Manchester-criteria for chronic widespread pain (6).

Table 1: American College of Rheumatology, 1990 criteria for the classification of Fibromyalgia 1.

1. History of widespread pain

Definition:

Pain is considered widespread when all of the following are present:

- pain in the left side of the body
- pain in the right side of the body
- pain above the waist
- and pain below the waist

In addition, axial skeletal pain (cervical spine or anterior chest or thoracic spine or low back) must be present.

In this definition, shoulder and buttock pain is considered as pain for each involved side. "Low back" pain is considered lower segment pain.

2. Pain in 11 of 18 tender point sites on digital palpation

Definition:

Pain, on digital palpation, must be present in at least 11 of the following 18 sites:

- Occiput: Bilateral, at the suboccipital muscle insertions.
- Low cervical: bilateral, at the anterior aspects of the intertransverse spaces at C5-C7.
- Trapezius: bilateral, at the midpoint of the upper border.
- Supraspinatus: bilateral, at origins, above the scapula spine near the medial border.
- Second rib: bilateral, at the second costochondral junctions, just lateral to the junctions on upper surfaces.
- Lateral epicondyle: bilateral, 2 cm distal to the epicondyles.
- Gluteal: bilateral, in upper outer quadrants of buttocks in anterior fold of muscle.
- Greater trochanter: bilateral, posterior to the trochanteric prominence.
- Knee: bilateral, at the medial fat pad proximal to the joint line.

Digital palpation should be performed with an approximate force of 4 kg.

For a tender point to be considered "positive" the subject must state that the palpation was painful.

"Tender" is not to be considered "painful."

* For classification purposes, patients will be said to have fibromyalgia if both criteria are satisfied. Widespread pain must have been present for at least 3 months. The presence of a second clinical disorder does not exclude the diagnosis of fibromyalgia.

The ACR criteria have been widely used. However, these criteria do not define a distinct disease entity. The Manchester-criteria require more genuinely diffuse pain, and associate the pain more strongly with associated features of chronic, widespread pain, like tenderness, fatigue, and psychological distress (7). The Manchester criteria have not been used in many studies up to now. Both these criteria sets select persons at one end of a continuum of musculoskeletal pain. The more widespread the symptoms are, the more other mental and bodily symptoms are reported.

LOCALISED PAIN

In general, localised pain will either be associated with a defined condition or in many cases will not meet any agreed definition. In that instance the pain has to be described according to localisation, duration and severity.

LOW BACK PAIN (LBP)

There is no common definition of low back pain. So far only in a small proportion of people suffering from low back pain a specific cause can be identified (8). Useful definition for LBP for population studies is the one proposed by the International Association for the Study of Pain (IASP) (9;10). Low back pain is defined as "any report of pain that occurs between the gluteal folds inferiorly and the line of the 12th rib superiorly, plus sciatica and cruralgia even if there are no concurrent symptoms in the back" (10). It is recommend, to add "excluding LBP due to pregnancy, menstruation, viral infection and cancer" (11). A simple method in practical monitoring is to use a body manikin showing a spatial definition of low back pain adapted from the cited definitions above (see fig 2).

The further classification of LBP is often based on the duration of pain: acute low back pain (less than 6 weeks), subacute low back pain (between 6 weeks and 3 months), and chronic low back pain (more than 3 months) (12). However, often low back pain is described as recurrent. Different case definitions (of duration or pain intensity) have an impact, not only on prevalence, but also on the sex and age distribution of LBP (13).

NECK PAIN

Definitions of neck pain in the epidemiological literature usually are based on the patient's subjective pain experience in the neck/cervical region. Patients are frequently asked to mark pain drawings to show the areas where they experience pain, stiffness, numbness, or other symptoms (14).

SHOULDER PAIN

The case definition of shoulder pain presents a number of difficulties. Shoulder pain may be the result of many disorders within the shoulder, but it can also be caused by referred pain from internal organs or from the spine. The lack of generally accepted criteria for the classification of shoulder pain adds to the confusion (15; 16). It is probably best to define an area and include all pain from this area for shoulder pain, even though pain from the shoulder can be felt in a wide area outside the shoulder region, and pain from the spine and internal organs can be felt in the shoulder area.

KNEE PAIN

Knee pain can arise from disease in the joint itself or problems in the soft tissues adjacent to the

joint (17). It might be caused by degenerative or inflammatory diseases or mechanical reasons, sometimes related to trauma. Over the age of 50 it is usually attributed to degenerative changes.

The case definition for knee pain without an underlying known cause will be defined as pain in the knee areas in a defined time period. If one focuses more specifically on joint disease, case definitions of osteoarthritis and other joint disease must include radiological and clinical criteria as well. Several studies have investigated knee pain in open population samples. They have differed with respect to case definition and population characteristics such as age and sex distribution (17).

8.3 Definitions of specific musculoskeletal conditions

INFLAMMATORY ARTHRITIS

The term inflammatory arthritis includes all conditions in which one or more joints are inflamed. The classical symptoms and signs of inflammation in a joint are pain, warmth, swelling and loss of function. If the inflammation is intense then the joint may also be erythematous. Typically a joint must be both tender and show soft tissue swelling to be classified as inflamed. There are many causes of joint inflammation including infection, crystal deposition (e.g. due to gout), and inflammation due to immunological reactions. These immunological reactions may occur as a consequence of infection or some other trigger (post-infective or reactive arthritis) or as part of an auto-immune disorder. Systemic lupus erythematosus (SLE) and scleroderma are examples of multi-system auto-immune disorders which include inflammatory arthritis among their manifestations.

RA is an auto-immune disorder which predominantly affects the joints. The majority of RA patients have an auto-antibody called rheumatoid factor (RF), which is directed against immunoglobulin G, detectable in their serum. RA affects predominantly the peripheral synovial joints and spares the cartilaginous joints of the spine. By contrast, the spondarthritides are a family of forms of arthritis which involve both the cartilaginous joints of the spine and the peripheral joints. Members of this family include ankylosing spondylitis, psoriatic arthritis, reactive arthritis and the arthritis associated with inflammatory bowel disease. Many patients with spondarthritis, in particular ankylosing spondylitis, have at least one copy of the HLA-B27 gene. Inflammatory arthritis may also occur as a manifestation of other medical conditions such as malignancy or endocrine disease. In this report we have focused on conditions which affect the joints predominantly.

Rheumatoid arthritis

The definition of RA used in epidemiological studies has changed over time. Currently, the preferred definition is the classification developed by the ACR (18) (Table 2). For epidemiological surveys the onset of RA should be considered as the time at which the ACR criteria are first satisfied. Alternatively the report of a physician report of RA can be used as a case definition. Another approach is the combination of a self-administered self-administered screening questionnaire followed by examination of the positive responders.

Table 2. RA-definition ACR-criteria.

Criterion		Definition
1.	Morning stiffness	Morning stiffness in and around the joints, lasting at least 1 hour before maximal improvement
2.	Arthritis of 3 or more joint areas	At least 3 joint areas simultaneously have had soft tissue swelling or fluid. The 14 possible areas are: right or left PIP, MCP, wrist, elbow, knee, ankle and MTP joints*
3.	Arthritis of hand joints	At least one area swollen in the wrist, MCP or PIP joints
4.	Symmetric arthritis	Simultaneous involvement of the same joint areas (as defined in 2) on both sides of the body (bilateral involvement of PIPs, MCPs or MTPs is acceptable without absolute symmetry)
5.	Rheumatoid nodules	Subcutaneous nodules, over bony prominences, or extensor surfaces, or in juxta-articular regions
6.	Serum rheumatoid factor	Demonstration of abnormal amounts of serum rheumatoid factor by any method for which the result has been positive in less than 5% of normal control subjects
7.	Radiographic changes	Radiographic changes typical of rheumatoid arthritis on posteroanterior hand and wrist x-rays, which must include erosions or unequivocal bony decalcification localised in or most marked adjacent to the involved joints

**** MCP = Metacarpophalangeal joint; MTP = Metatarsalphalangeal joint; PIP = Proximal interphalangeal joint***

A patient is said to have rheumatoid arthritis if he/she satisfies 4 out of 7 criteria. Criteria 1 to 4 must have been present for at least 6 weeks (18).

Other forms of inflammatory arthritis

As mentioned above other types of inflammatory arthritis such as spondarthritis, gout, and Lyme arthritis should also be considered when estimating the burden of musculoskeletal disease. Conditions such as 'probable RA' or undifferentiated polyarthritis, which could be the prodromal stage of different arthropathies, should also be included in epidemiological studies.

Inflammatory arthritis may also occur in childhood. There is no universally accepted definition of childhood arthritis. The three most widely used definitions are those developed by the ACR, the European League Against Rheumatism (EULAR) and, most recently, the International League of Associations for Rheumatology (ILAR) (19). They differ in nomenclature, in the minimum duration of symptoms, and have different inclusion and exclusion demands. Each describes a somewhat different group of patients. The ILAR criteria seek to describe homogeneous groups of patients but have not been validated for epidemiological studies

OSTEOARTHRITIS

A recent definition of OA has been developed 1994 at a workshop sponsored by the American

Academy of Orthopaedic Surgeons (AAOS), National Institut of Arthritis, Musculoskeletal and Skin Diseases (NIAMS), National Institute on Ageing, Arthritis Foundation and Orthopaedic Research and Education Foundation (OREF) (Kuettner 1995):
Osteoarthritis is a group of overlapping distinct diseases, which may have different etiologies but with similar biologic, morphologic, and clinical outcomes. The disease process not only affect the articular cartilage, but involve the entire joint, including the subchondral bone, ligaments, capsule, synovial membrane, and periarticular muscles. Ultimately, the articular cartilage degenerates with fibrillation, fissures, ulceration, and full thickness loss of the joint surface.

This condition is characterised by focal areas of loss of articular cartilage within synovial joints, associated with hypertrophy of bone (osteophytes and subchondral bone sclerosis) and thickening of the capsule. In this sense it is the reaction of synovial joints to injury. This phenomenon can occur in any joint, but is most common in selected joints of the hand, spine, knee, foot and hip.

This pathological change, when severe, results in radiological changes (loss of joint space and osteophytes), which have been used in epidemiological studies to estimate the prevalence of OA at different joint sites. A Kellgren and Lawrence radiological OA score (table 3a-b) of 2-4 is still the most widely used definition of radiological OA in epidemiological studies (20).

Table 3a. Grades of severity of osteoarthritis of the hip (20).

Grade	Definition
Grade 1	possible narrowing of joint space medially and possible osteophytes around femoral head
Grade 2	definite narrowing of joint space inferiorly, definite osteophytes and slight sclerosis
Grade 3	marked narrowing of joint space inferiorly, slight osteophytes, some sclerosis and cyst formation and deformity of the femoral head and acetabulum
Grade 4	gross loss of joint space with sclerosis and cysts, marked deformity of femoral head and acetabulum and large osteophytes

Table 3b. Grades of severity of osteoarthritis of the knee (20).

Grade	Definition
Grade 1	doubtful narrowing of joint space and possible osteophytic lipping
Grade 2	definite osteophytes and possible narrowing of joint space
Grade 3	moderate multiple osteophytes, definite narrowing of joint space and some sclerosis and possible deformity of the bone ends
Grade 4	large osteophytes, marked narrowing of joint space, severe sclerosis, and definite deformity of the bone ends

Some (but not the majority) of people with these pathological (radiographic) changes have joint symptoms (pain, stiffness and loss of function) that are likely to be related to the presence of the joint pathology. Symptoms are not specific, and no clinical definition of OA at any joint site has been properly validated. Symptoms vary with time, as well as between joint sites and individuals, and are dependent on many variables other than the joint damage. There are clinical criteria (table 4) for the classification of OA of hand, hip and knee. Pain is an obligatory symptom in these OA classifications. These criteria have hardly been used in population studies because of the lack of validation.

Table 4. Algorithm for classification of osteoarthritis of the hip, ACR-Criteria

Clinical and radiographic:
Hip pain for most of the days of the prior month 1. Erythrocyte sedimentation rate <20mm/h 2. Radiographic femoral and/or acetabular osteophytes 3. Radiographic hip joint space narrowing 4. Radiographic hip joint space narrowing
Ostearthritis presents if items 1,2,3 or 1,2,4 or 1,3,4 are present

Idiopathic osteoarthritis is divided into a localized or a generalized form, which is involving three or more joint groups. Patients with an underlying disease that appears to have caused the joint destruction (e.g. chronic trauma) are classified as having secondary OA.

OSTEOPOROSIS

Osteoporosis is defined as a systemic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture. In 1994, an expert panel convened by the WHO (WHO 1994) operationalised this concept by defining diagnostic criteria for OP based on measurement of bone mineral density (BMD):

Osteoporosis: a BMD value more than –2.5 standard deviations (SD) below the mean BMD of young adult women (BMD T-score < -2.5).

Osteopenia (low bone mass): A BMD value between –1 and –2.5 SD below the mean BMD of young adult women (-2.5 < BMD T-score < -1).

Clinically, OP is recognised by the occurrence of characteristic low trauma fractures; the best documented of these are hip, vertebral and distal forearm fractures.

Hip fracture

A hip fracture is a fracture of the proximal femur, either through the femoral neck (sub-capital or transcervical fracture; intracapsular) or through the trochanteric region (intertrochanteric or subtrochanteric; extracapsular). Intracapsular fractures are usually classified according to the Garden scale: type I incomplete, type II complete without displacement, type III complete with partial

displacement, and type IV complete with full displacement. Extracapsular fractures are classified according to stability (stable/unstable) and displacement (present/absent). These classification systems have a major influence on the choice of orthopaedic interventions, such as internal fixation and arthroplasty. Whether the aetiology of the two fractures also differs remains contentious. Some, but not all, studies have suggested that osteoporosis plays a greater role in causing extracapsular fractures than intracapsular fractures. The gold standard for fracture definition at the proximal femur is radiological.

Vertebral fracture

Vertebral fracture has been the most difficult osteoporosis-related fracture to define. The deformities that result from OP are usually classified into three forms: crush (involving compression of the entire vertebral body), wedge (in which there is anterior height loss), and biconcave (where there is relative maintenance of anterior and posterior heights with central compression of the endplate regions). The difficulty in deciding whether a vertebra is deformed results from variation in the shape of vertebral bodies both within the spine and between individuals. Initial studies of vertebral OP utilised subjective methods of defining the radiographic appearance of individual vertebral bodies. Such qualitative approaches often led to within- and between-observer disagreements as to the presence or absence of deformity. This difficulty resulted in attempts to quantify deformity using measurements of vertebral dimensions. These morphometric approaches have culminated in algorithms which compare the extent to which ratios between anterior, posterior and mid-vertebral heights (corresponding to wedge, biconcave and crush deformities), differ from vertebra-specific mean values in the general population. The normal ranges for these height ratios are estimated from a radiographic population survey, and cut-off values for each type of deformity are arbitrarily assigned to points on the distribution of these ratios (3 SD or 4 SD).

While these morphometric approaches are widely utilised for research purposes, radiographic criteria for the semi-quantitative assignment of vertebral deformities have also been derived. In the most widely used system, vertebral deformities may be classified as mild (20-25% height loss), moderate (25-40% height loss), or severe (> 40% height loss). Estimates suggest that between 10 and 30% of vertebral deformities reach primary care attention in Europe (21;22).

Distal forearm fracture

The most common distal forearm fracture is Colles' fracture. This fracture lies within one inch of the wrist joint margin and is associated with dorsal angulation and displacement of the distal fragment of the radius often accompanied by a fracture of the ulna styloid process. As with hip and vertebral fractures, distal forearm fractures require radiographic confirmation.

9 MUSCULOSKELETAL PROBLEMS AND CONDITIONS: OCCURRENCE, TRENDS, AND DETERMINANTS

9.1 Introduction

The occurrence of musculoskeletal problems and conditions is measured using incidence and prevalence.

Incidence is defined as the number of new "cases" occurring during a defined time period in a defined population. It is expressed as a rate e.g. four per 100,000 per annum.

Prevalence is defined as the total number "cases" present during a defined time period in a defined population. It is expressed as a proportion e.g. 20 per 100.

Published figures for the prevalence and incidence of musculoskeletal problems and conditions show large variations. The variation is large for both unspecified problems and specific musculoskeletal conditions. Much of the variation is due to methodological differences between studies, especially differences in case definition.

9.2 Musculoskeletal problems, unspecified

Most population studies have focused on musculoskeletal pain from one area of the body, e.g. LBP, neck pain, or knee pain. A few studies have considered the diversity of different degrees and localisation of some or all sorts of musculoskeletal pains in unselected populations.

In one of these, a Norwegian survey among adults aged 20-72 years, only 15% reported no pain during the previous year (23). 58% reported that they had had musculoskeletal pain during the previous week, and 15% had had musculoskeletal pain every day during the previous year. LBP was the commonest musculoskeletal pain, 53% of the population reporting LBP during the previous year. Pain from head (49%), neck (48%), and shoulder (47%) was also experienced by nearly half the population during the previous year. More women reported musculoskeletal pain than men, in all areas of the body. Of the persons who reported musculoskeletal pain, women reported pain from more body areas (mean 4.1) than men with pain (mean 3.3).

In a German Survey of more then 7000 adults aged 18-79 years, 75% reported musculoskeletal pain in the previous 12 months and 52% in the last 7 days. LBP was again the commonest musculoskeletal pain, 57% reporting LBP during the previous year and 34% in the last 7 days. All age bands were affected, already 70% of the population below age 30 reported pain in the 12 months prior (Dreinhöfer 2003, personal communication).

Several studies indicate that the population is largely heterogeneous with respect to musculoskeletal pain. Only a small fraction is free of musculoskeletal pain over time. The group reporting strictly localised pain is also relatively small, as is the group at the other end of the continuum, persons with chronic, widespread pain. Between these groups there are numerous combinations of musculoskeletal pain states, varying in intensity, duration, and extent of distribution.

WIDESPREAD PAIN

Occurrence

Population based three-month prevalence estimates for fibromyalgia and chronic widespread pain (CWP) vary between 0.66 and 11% – most studies range between 2-4%. In female and middle-aged populations fibromyalgia prevalence is around 10%.

Trends

The prevalence of chronic widespread pain increases with age in both sexes until about the sixth decade, and thereafter decreases slightly. CWP is much more common in women. The prevalence of chronic, widespread musculoskeletal pain in women is about double the prevalence in men. The female preponderance in diagnosed fibromyalgia is even more marked, (male:female ration 1:10). CWP seem to be more frequent in individuals with low education (7).

Even though symptoms of muscular rheumatism and tender points were noted at the beginning of the 19th century, common case definitions for fibromyalgia were established first in 1990 with the ACR-criteria. To our knowledge there are no reliable epidemiological data on time or geographical trends during this (in the epidemiological context) short period of time.

Pain in one area of the body increases the risk of pain in other areas, and many types of pain are part of complex pain syndromes (24). There are indications that widespread pain has poorer prognosis than localised pain according to treatment effect and work ability.

Determinants

The aetiology of fibromyalgia is still mostly unknown, although a multitude of possible risk factors are associated with fibromyalgia in cross-sectional studies (8). Female sex is an obvious risk factor, and low education also seems to be a risk factor.

A variety of symptoms other than pain are associated with fibromyalgia and chronic, widespread pain. The temporal relationship between these symptoms (fatigue, physical deconditioning, sleep disturbance, psychological distress, numbness, paraesthesia, irritable bowel syndrome and cognitive dysfunction) cannot normally be determined. However, the relationship between depression and chronic pain has been examined in a large prospective study (25). In this eight-year follow-up study depression predicted chronic musculoskeletal pain (OR = 2.1), and conversely, pain predicted depression (OR = 2.9). Negative major life events have in a prospective study been shown to predict both pain and disturbed sleep at four-year follow-up (26).

LOW BACK PAIN

Occurrence

LBP is the most commonly reported musculoskeletal condition. 53% of the referred Norwegian population reported LBP during the previous year (23). The difference between the genders is small (55% women, 51% men). Life-time prevalence (having ever experienced) of LBP differs between 58 and 84% (10).

LBP may be localised or a part of different levels of widespread pain. In a cross-sectional study demographic, lifestyle, and pain characteristics for these two groups, as well as functional ability differed considerably. 31% of the population reported LBP during the previous week. In this group only one in four had LBP as their only pain, while 32% had LBP together with pain from at least four other areas of the body. LBP was more often reported together with widespread pain in

women, in middle-aged, and in persons with long-lasting and constant pain. Persons with LBP as part of widespread pain rated their pain as more intense and severe, and their overall health as poor, compared with persons with localised LBP. Responders with LBP as part of widespread pain had more frequent sleep problems, and more frequent low or high BMI (Body Mass Index) values (27).

Trends

One of the few studies on time-trends of low back pain was carried out in the UK and showed a rise in the prevalence in the period 1980-2000 (28). The prevalence and incidence of low back pain seems to be moderately increasing, while the functional consequences of low back pain, especially work disability explained by low back pain, are increasing far more markedly than the occurrence.

These UK researchers thought that the most probable reason for this was that "cultural changes have led to a greater awareness of minor back symptoms and willingness to report them. This shift may also have rendered back pain more acceptable as a reason for absence attributed to sickness."

Determinants

Degenerative changes such as osteochondrosis or narrow spinal canal as well as congenital (scoliosis) or posttraumatic deformities can cause LBP. Individual life style factors and work-related and non-work related physical and psychosocial factors can play a role in the development of LBP. All these factors can also affect prognosis of LBP and the functional ability of persons with LBP. Several reviews of risk factors are available for work-related factors (29;30), risk factors in general (31;32), specific life style factors (33-38), and psychological factors (33;38). The results of these reviews are summarised in table 5.

Table 5. Risk factors for occurrence and chronicity flow back pain (adapted from 39)

	Occurrence	Chronicity
Individual factors	Age Physical fitness Strength of back and abdominal muscles Smoking	Obesity Low educational level High levels of pain and disability
Psychosocial factors	Stress Anxiety Mood / emotions Cognitive functioning Pain behaviour	Distress Depressive mood Somatization
General factors	Manual material handling Bending and twisting Whole-body vibration Job dissatisfaction Monotonous tasks Work relations / social support Control	Job dissatisfaction Unavailability of light duty on return to work Job requirement of lifting for ¾ of the day

Established risk factors for low back pain are lifting, carrying, pushing, pulling, heavy work, working in awkward postures and dissatisfaction about work. However, most LBP cases are not due to these work-related physical factors. Increasing research has been done for psychosocial factors, and these data reveal the risk factors depression, fear, psychological stress, attitudes, cognitions (catastrophising), and fear-avoidance. In the search for new factors that are associated with the development of chronic LBP and related disability, a new promising concept is 'fear-avoidance'. This concept refers to an unhealthy coping strategy. Certain persons have such a high level of fear of pain, that in case of a pain period, avoidance behaviour (in particular avoidance of movements and physical activity) is generated that will lead to continuation of the pain and disability. This results in a vicious circle leading to chronic pain. In rehabilitation, successful treatments have been developed based on this model and trials in primary care are underway. These prevention initiatives should target beliefs about low back pain, in particular coping strategies (40;41).

NECK PAIN

Occurrence

Point prevalence estimates for neck pain vary from 9.5% - 35%, most studies range from 10-15% (14). In Norway, pain from the neck was experienced by nearly half the population during the previous year (23). The difference between the genders was large (58% women, 37% men). The same is true for Germany, where 50% of women and 30% of men experienced neck pain in the last 12 months (Dreinhöfer 2003)

Trends

Neck pain is more common in women. Reports results of the age distribution of neck pain are sparse, but neck pain seems to be more frequent in young and middle-aged. In a Swedish survey the point prevalence of neck pain was highest in the middle-aged groups (42), while a Norwegian survey found one year-prevalence of neck pain to be higher in the young and middle-aged, especially among women (23). Probably chronic neck pain is more frequent in middle-aged, while the younger age-groups more often experience transient or recurrent neck pain. The differences in methodology, especially case definitions, are so large that we cannot spot any reliable time-trends or geographical differences.

Determinants

According to a systematic review on physical risk factors (43;44) there is some evidence that long duration of sedentary posture and twisting or bending of the trunk are risk factors for neck pain. For most other factors the evidence is inconclusive mostly due to low methodological quality of many studies. Probably also neck flexion, arm force, hand-arm vibration and workplace factors play a role in neck pain. There is some evidence for the following psychosocial risk factors: high quantitative job demands, low social support, low job control, high as well as low skill discretion and low job satisfaction. The results of these reviews are summarised in table 6.

SHOULDER PAIN

Occurrence

One-year prevalence estimates for shoulder pain vary between 6.7% and 61%. This variation is probably mostly due to very different case definitions, 6.7% is the prevalence of persons with

subacromial shoulder pain lasting more than 6 weeks, while 61% had pain, tenderness and stiffness in the shoulders at least once during the past year (15).

Trends

Shoulder pain seems to be a little more frequent in women than in men. Chronic shoulder pain is more often experienced by the middle-aged or elderly. The one-week prevalence (23) shows a slight female preponderance for shoulder pain, and a rather even age distribution with slightly increasing tendencies until the mid sixties. The difference in case definition and study methodology is so large that we cannot spot any reliable time-trends or geographical differences.

Determinants

Both physical load and the psychosocial work environment seem to be associated with shoulder pain, although the available evidence was not consistent for most risk factors. The most established risk factors for shoulder pain are repetitive movements, vibration, duration of employment and job satisfaction (45). The results of these reviews are summarised in table 6.

Table 6. Overview of potential risk factors for neck and shoulder pain and the judgement of proof. (Adopted from 46)

Risk factor/indicator	Proof*
Life style factors	
Overweight	+
Smoking	+
Alcohol	0
Driving cars	+
Physical inactivity	+
Sports activities	+
Work-related physical strain	
Lifting, carrying, pushing, pulling	++
Often bending and twisting trunk	+
Heavy work	++
Static work postures)	+
Sitting at work	0
Awkward postures (e.g. bent truck posture of more than 60°)	+
Work related psychosocial strain	
Mental stress	+
Dissatisfied about work	++
High working speed	+
Lack of social support	++
Lack of development in work/monotonous work	++
Lack of autonomy or control	?
Psychosocial factors (general)	
Social support	?
Abuse	?
Psychological factors	
Depression, fear, psychological stress	++
Pain hypersensitive personality	0
Personality characteristics	?
Attitude, cognitions (catastrophising), fear-avoidance beliefs	++

0 = relationship unlikely,
+ = relationship probable,
++ = relationship proven;
? = unknown or conflicting results

KNEE PAIN

Occurrence

Studies of knee pain prevalence give rather consistent figures of around 19% for one month prevalence and 25-28% for one-year prevalence (17). These figures are consistent despite of differences in methodology (case definition, age groups, and inclusion criteria), a somewhat surprising finding.

Trends

There is more knee pain in younger men and in older women (17). In one study knee pain showed a clear gradient across socio-economic groups, with the more socially deprived groups having higher pain prevalence (1). Knee injuries and soft tissue problems are more frequent in young age and among males, while osteoarthritis is more common in the elderly, especially elderly women. In the age 20-29 years 27% of men and 21% of women reported in the German survey knee pain in the last 12 month, between 60-69 years there were 46% of women and 36% of men.
Knee pain is reported from all cultures. A person's evaluation of their knee pain varies with social and ethnic groups.

Determinants

One risk factor for knee pain is sports injuries, especially in younger age. Other possible risk factors are obesity, social class, occupational lifting, bending or squatting (17).

9.3 Specific musculoskeletal conditions

INFLAMMATORY ARTHRITIS

There are no data on the prevalence of all forms of inflammatory arthritis combined. A UK study of incident cases of inflammatory polyarthritis (two or more inflamed joints) showed that around half the cases satisfied the ACR criteria for RA at the time of presentation to primary care and the proportion satisfying these criteria rose to 75% after 5 years of follow-up (47). This suggests that the overall burden of inflammatory arthritis in Europe may be up to twice as high as that estimated from prevalence studies of RA.

RA is the most common form of inflammatory arthritis in Europe. The second most common form is spondarthritis (considering all members of this family together). However, there is very little information about the occurrence of the spondarthritides as a whole, especially at the population level and so we have not included this as a main topic in the report.

RHEUMATOID ARTHRITIS

Methods

Prevalence studies were identified from 16 countries and incidence studies from five countries (table 7). The majority (15 out of a total of 21 studies) used the 1987 ACR criteria for the classification of RA.

Occurrence

Estimates of the annual incidence of RA range from 4–13 per 100,000 for adult males and 13-

36 per 100,000 for adult females. Estimates of the prevalence of RA range from 1-6 per 1000 for men and 3-12 per 1000 for women. In all studies the prevalence was higher in women than men (the ratio varied from 1.7 to 4.0).

Trends

For both men and women there appears to be a gradient in the prevalence of RA going from south (lowest) to north (highest). For example the prevalence of RA in men in Finland is reported as 0.6%, in France it is 0.32% and in Italy 0.13%. In women the prevalence in the same three countries is 1%, 0.86% and 0.51%. These figures are not directly comparable because they are not age standardised but nevertheless, the pattern seems clear.

There is evidence from a number of sources that the incidence of RA in women fell between the 1960s and 1980s and has since stabilised. This fall is now reflected in recent prevalence figures for RA from the UK which show that, since the 1960s, there had been an approximate 25% fall in RA prevalence in women aged 16-74. The prevalence in women aged 75 and over rose slightly and that in men aged 45 and over rose by around 25% (48).

Determinants

RA tends to cluster in families. In all European studies there is a consistent association between RA and the highly polymorphic HLA-DR1 gene of the HLA Class II region. All the DRB1 alleles which are associated with RA share a similar amino-acid sequence in the third hypervariable region of the gene. This is called the RA shared epitope. The specific shared epitope bearing allele varies in different European populations. However, the shared epitope is not the only gene involved in RA susceptibility and severity.

There are a number of non-genetic risk factors for RA. Some cases of RA appear to be triggered by common infections or by immunisation. There is a very complex relationship between RA and a variety of reproductive factors. The fall in the incidence and prevalence of RA in younger women observed since the 1960s has been attributed to a protective effect of the oral contraceptive pill (or to some other factor associated with its use). The onset of RA during pregnancy is rare and pre-existing RA usually goes into spontaneous remission during pregnancy. By contrast RA onset is more common than expected by chance immediately following childbirth, and women with RA often experience flares in the post-partum period. Lifestyle determinants of RA include smoking and possibly obesity. It is likely that the risk factors for RA act in a cumulative fashion.

Table 7. Prevalence and incidence of rheumatoid arthritis from individual studies across Europe

Country North to South	Years	Sample Size (to nearest 10)	Sample Type	Age Group	Gender	Classification Criteria used	Prevalence %	Incidence /100,000	Age bands (yrs)
Iceland	1974-83	13.860	Random	39-67	Both	1958	0.238		0
Finland	1989	13.000	Insurance Register	≥16	Men	1987	0.6		7
					Women		1		
Finland	1974-5	1million	Population, Insurance Register	≥16	Both	1987		42	0
	1980-5							39	
	1990							<39	
Norway	1988-93	356.480	County Register	20-79	Men	1987		13.75	6
					Women			36.73	
Norway	1994	10.000	Population	20-79	Men	1987	0.19		6
					Women		0.67		
Sweden	1965-67	15.270	Population	31-74	Both	1987	0.27		0
Russia	1998	380	Population	≥20	Both	1987	1.42		6
Denmark	?	19.100	?	≥15	Men	?	0.3		
					Women		1.2		
UK	2000	6.590	GP Register	≥16	Men	1987	0.44		4
					Women		1.16		
UK	1991	2.800	Population	≥15	Men	1987		12.7	8
					Women			34.3	
Czech Republic	1965	1.420	Population	≥15	Men	1958	0.3		6
					Women		0.5		
Germany	1990	11.530	Population	≥20	Both	1987	0.83		0
France	1996	1.670	Population	≥18	Men	1987	0.32		0
					Women		0.86		
France	1986-9	529.510	Population	20-70	Men	1987		4.7	10
					Women			12.7	
Slovakia	1970's	951		≥35	Both	1958	1.3		
Italy	1991-2	4.460	Population	≥16	Men	1987	0.13		0
					Women		0.51		
Yugoslavia	1990-1	2.180	Cross-sectional	≥20	Men	1987	0.09		7
					Women		0.29		
Bulgaria	1965	4.320	1/10 Random Sample of population	≥15	Men	ROME	0.3		6
					Women		1.2		
Spain	2000	2.190	Poly-stage random sampling	≥20	Both	1987	0.5		7
Greece	1987-95	128.920	Population	≥16	Men	1987	0.21	15-36	7
					Women		0.48		

Treatment is one of the most important determinants of outcome in RA. In recent decades the range of drug therapy and the strategies for using existing therapies have improved, and the outlook for patients with RA, providing that they have access to the appropriate expertise, is significantly better now than it was two decades ago.

CHILDHOOD ARTHRITIS

Methods

We have only included studies which encompassed the whole age range of childhood (i.e. up to the 15th or 16th birthday).

Occurrence

Studies of the incidence of childhood arthritis from a variety of European countries (table 8) give results of 3 - 20 per 100,000 children per year.

There are two different approaches to studying the prevalence of childhood arthritis. One aims to identify children with current arthritis (point prevalence) and the second type aims to identify all children who, up to the point of the survey, have had arthritis (cumulative prevalence). Since childhood arthritis has a high spontaneous remission rate these two approaches give quite different results. There have been prevalence studies for childhood arthritis from 9 countries (table 5). Although the results differ, the similar incidence rates in different countries suggest that the variation in prevalence reported can be attributed to methodological differences rather than a true difference between countries.

Trends

There is no evidence of any geographical variation in the occurrence of childhood arthritis within Europe, nor of any time trends (see data from Finland in table 5).

Determinants

There are a number of different sub-types of childhood onset arthritis. Each has a different set of genetic associations. There have been very few studies of non-genetic risk factors. Breast-feeding may reduce the risk of childhood arthritis. There is some evidence of a cyclical pattern to the incidence of childhood arthritis which suggests an infectious trigger. However, no single infection has been implicated

Table 8. Prevalence and incidence of juvenile onset arthritis from individual studies across Europe

Country	Years	Sample Size (to nearest 10)	Sample Type	Age group	Gender	Classification Criteria used	Prevalence /100,000	Incidence /100,000	Age bands (yrs)
Norway	1985-94	48220	Population	<16	Males	EULAR	97	16.1	4
					Females		202	29.4	
Scotland	1986-87	35250	Population	<15	Males	Other	20		0
					Females		60		
Sweden	1983	400600	Population	<16	Both	EULAR	56	12	8
Denmark	1970-77	100000	Clinic	<16	Both			6-8	
Finland	1980	275190-264230	Registry	<16	Both	Other		13.8	
	1985							15.1	
	1990							13.5	
Germany	1980-88	247900	Population	<16	Males	EULAR	17	2.7	0
					Females		23	4.3	
UK	1990-94	60960	Registry	<16	Both	EULAR		10	
		92280						10	
France	1981-82	964280	Practitioner survey	<16	Both	EULAR	8	19	
		618140					10	13	
Turkey	1997	46810	Field Survey	<16	Both	Other	64		

OSTEOARTHRITIS

Methods

There are very few studies which have looked at the occurrence of generalised OA or of the prevalence of 'OA at any site'. This is because the most widely accepted classification criteria for OA require radiographic evidence of the disease and it is considered unethical to X-ray more than one or two joints in an individual participant in a survey.

Occurrence

We have identified prevalence studies of OA at a variety of anatomical sites from 7 European countries (table 9). The largest European study was conducted in Zoetermeer in the Netherlands in the mid 1980s. There are too few comparable studies to draw any conclusions about geographical variation in prevalence. The prevalence of radiological osteoarthritis rises with age so that, for example, in people age 55-74 the prevalence of OA of the hand is 70%, foot OA 40%, knee OA 10% and hip OA 3% (49). Below the age of 45 men are affected more often than women. Over the age of 45 women are affected more often. The burden of OA on the health service may be measured by the number of GP consultations with this diagnosis and by the number of large joint replacements performed. Variations in the age and sex-standardised number of joint replacements may be due to underlying differences in the epidemiology of OA between countries, but are more likely to be due to differences in health service provision (50).

Trends

There is no evidence as to whether the age and sex specific incidence of OA has changed over recent decades. However the population burden of OA will increase over the next years for two reasons. The first reason is the ageing of the population. All studies have shown that the prevalence of OA at all sites continues to rise into extreme old age. Therefore, as the population ages, so will the proportion of people experiencing pain and physical disability as a consequence of OA. Secondly, the principal non-genetic risk factor for OA (in particular OA knee) is obesity and the prevalence of obesity in Europe is also rising.

Determinants

Some types of OA are hereditary. This applies particularly to the type of OA which affects the finger joints. There are four main categories of non-inherited risk factor for OA. These are congenital abnormalities (OA hip may be a late complication of congenital dislocation of the hip or hip dysplasia); trauma (OA often develops in a joint which has previously experienced a serious injury such as a fracture; or been operated on); overweight (being overweight is the strongest risk factor for developing OA of the knee – particularly when bilateral, it is also a risk factor for OA hip – again particularly bilateral hip OA) and occupation (e.g. involves a lot of bending and squatting).

Table 9a. Osteoarthritis Incidence

Country	Location	Years	Sample size	Sample type	Age group	Gender	Classification Criteria used	Coxarthrosis Incidence /100.000	Gonarthros Incidence /100.000
Finland	Orivesi	1985-1986	13700	Population	0+	Men Women	Clinical defined OA		599 (469 – 7
Sweden	Malmö	1950-1954	500 453	population	35 – 84	Men Women Both	Clinical defined OA	11 (9 - 13) 10 (8 - 12) 10 (9 - 11)	
Sweden		1981-1983	207 638 42 579 250 217	registry	36 – 76	Men Women Both	Clinical defined OA	200 (189 – 211) 173 (150 – 196) 195 (185 – 205)	36 (31 – 41) 89 (73 – 105 45 (40 – 50)

Table 9b. Osteoarthritis Prevalence Clinical Criteria

Country	Location	Years	Sample size	Age group	Gender	Classification Criteria used	Coxarthrosis prevalence /100.000	Gonarthrosis prevalence /100.000	OA of the h prevalence /100.000
Finland	Orvesi	1985	13 700	0+	Men Women Both	Clinical defined OA		0,5 (0,3 – 0,6) 1,7 (1,5 – 1,9) 1,1 (0,9 – 1,3)	
Finland	MFHS	1993	7 220	30+	Men Women Both	Clinical defined OA	4,1 (3,6 – 4,6) 6,0 (5,5 – 6,6) 5,1 (4,6 – 5,6)		
UK	Wensleydale and Leigh	1954	570 1550	55+	Men Women	Clinical defined OA K&L + pain	5,2 (2,5 – 8,0) 5,4 (2,9 – 7,9)	10,0 (7,8 –12,1) 17,9 (15,3–20,0)	
UK	Chingford	1992	990	45 – 64	Women	Clinical defined OA K&L + pain		5,8 (4,3 – 7,3)	
Spain	Various	2000	2190	20+	Both	American College of Rheumatology		10,2 (8.5 11.9)	6,2 (5.9 – 6.5
Iceland	Nursing Home	1994	150 97	59–101 62-103	Men Women	American College of Rheumatology			3,3 6,8

Table 9c. Osteoarthritis Prevalence Radiographic Criteria

Country	Location	Years	Sample size	Age group	Gender	Classification Criteria used	Coxarthrosis prevalence /100.000	Gonarthrosis prevalence /100.000
Bulgaria	Sofia	1964	4320	15+ 55+	Men Women Men Women	Kellgren and Lawrence	0,9 (0,4 – 1,4) 0,6 (0,3 – 0,9) 2,0 (0,9 – 3,1) 0,8 (0,1 – 1,5)	6,1 (4,9 – 7,3) 5,8 (5,8 – 7,8)
UK	Leigh	1954	501	35 – 74 55 – 64	Men Women Men Women	Kellgren and Lawrence	25,0 (19,5–30,5) 15,0 (10,7–19,3)	21,0 (17,5–24,5 31,0 (27,2–34,8
UK	Wensleydale	1958	630	34 – 74 55+	Men Women Men Women	Kellgren and Lawrence	22,0 (14,0–30,0) 16,0 (10,1–21,9)	14,0 (10,0–18,0 28,0 (23,3–32,7
UK	Chingford	1988	985	45 – 64	Women	Kellgren and Lawrence		12,0 (10,0–14,0
Netherlands	Zoetermeer	1975	2600	35+	Men Women	Kellgren and Lawrence		12,2 (10,4–14,0 19,7 (17,5–21,9
Czechoslovakia	Piestany	1962	800	35+ 55+	Men Women Men Women	Kellgren and Lawrence	17,0 (11,5–22,5) 10,0 (5,8–14,2)	17,0 (13,2–20,8 23,0 (19,0–27,0
Germany	Oberhörlen	1960	120	55+	Men Women	Kellgren and Lawrence		16,0 (5,8–26,2) 10,0 (2,9–17,1)
Switzerland	Azmoos	1970	220	55+	Men Women	Kellgren and Lawrence	17,0 (9,4–24,6) 7,0 (2,6–11,4)	
Iceland	Population	1998	1520	35+	Men Women	Kellgren and Lawrence	12 10	

OSTEOPOROSIS

Methods

We examined the prevalence of vertebral deformity as recorded in the EVOS (European Vertebral Osteoporosis Study) study (table 10). EVOS is a Europe wide monitoring study involving 36 centres from 19 countries. It was conducted between 1990 and 1993. Each centre was asked to recruit an age and sex stratified random sample of 600 subjects (300 women and 300 men) aged 50 years and over from a population based sampling frame, with the aim of recruiting 50 individuals of each sex in each of five year age bands from 50-54 to 75 years and over. Subjects were invited by letter to attend for an interviewer administered lifestyle questionnaire, and radiographs of the thoracic and lumbar spine.

Lateral thoracic and lumbar spine radiographs were taken according to a standard protocol. Prior to the study each centre forwarded sample radiographs to the radiology co-ordinating centre in Berlin for quality assessment and to check compliance with the protocol. All study radiographs were evaluated morphometrically using a translucent digitizer and cursor. Six points were marked on each vertebral body from T4 to L4 to describe vertebral shape. Using these six points, anterior (Ha), middle (Hm), and posterior heights (Hp) were determined for each vertebral body. The McCloskey-Kanis method was used to define vertebral deformity. In this method a predicted posterior height (H-pred) is calculated for each vertebra from the posterior heights of up to four adjacent vertebra. Vertebral deformity is present if any of the following criteria are met:

Ha/Hp decreased and Ha/H-pred <3 standard deviations (SD) below reference mean;

Hm/Hp decreased and Hm/H-pred <3 SD below reference mean;

Ha/H-pred decreased and Hp-H-pred <3 SD below reference mean. (51)

Information on the incidence of fractured neck of femur was taken from the EUROSTAT and OECD websites and is based on hospital discharge rates. The great majority of cases of fractured femur require hospital admission.

Table 10 Prevalence and incidence of vertebral deformity from EVOS study across Europe

Country	Location	Group	Prevalence%
Norway	Oslo	Men	21.6
		Women	23.7
Sweden	Malmø	Men	26.7
		Women	27.8
Austria	Graz	Men	25.1
		Women	20.3
Belgium	Leuven	Men	25.2
		Women	27.7
France	Montceau	Men	21.9
		Women	20.5
Germany	Berlin	Men	15.5
		Women	22.9
Germany	Bochum	Men	18.8
		Women	19.1
Germany	Heidelberg	Men	16.4
		Women	16.4
Germany	Lubeck	Men	22.1
		Women	15.5
Netherlands	Rotterdam	Men	23.1
		Women	21.9
UK	Aberdeen	Men	21.1
		Women	16.3
UK	Bath	Men	11.1
		Women	16.1
UK	Cambridge	Men	23
		Women	16.5
UK	Harrow	Men	21.5
		Women	19.2
UK	Sheffield	Men	
		Women	21.2
UK	Truro	Men	22.8
		Women	14.9
Croatia	Zagreb	Men	30.4
		Women	21.7
Czech Republic	Prague	Men	12.7
		Women	18.6
Slovakia	Piestany	Men	15.1
		Women	16.3

Table 10 continued

Country	Location	Group	Prevalence%
Germany	Berlin	Men	17.3
		Women	21.3
Germany	Berlin	Men	16.9
		Women	18
Germany	Erurt	Men	16.9
		Women	15.3
Germany	Jena	Men	18.4
		Women	21.2
Hungary	Budapest	Men	20
		Women	19.3
Poland	Szcecin	Men	17.5
		Women	19
Poland	Warsaw	Men	22.3
		Women	18.7
Russia	Moscow	Men	10.3
		Women	12.7
Greece	Athens	Men	20.4
		Women	24.4
Italy	Milan	Men	
		Women	40.3
Italy	Sienna	Men	14.9
		Women	15
Portugal	Oporto	Men	34.3
		Women	20.2
Spain	Barcelona	Men	21.7
		Women	26.6
Spain	Las Palmas	Men	25.1
		Women	22.7
Spain	Madrid	Men	19.8
		Women	14.9
Spain	Oviedo	Men	20.2
		Women	23.5
Turkey	Istanbul	Men	16

Occurrence

In the EVOS study the overall prevalence of vertebral deformity in both genders aged 50-79 was 12%. Prevalence increased with age in both genders but the rise was steeper in women. Around 90% of all hip fractures occur over the age of 50. One French study reported that 21% of hip fracture patients died within three months of their fracture and mortality was twice as high in men as in women (52).

Trends

The incidence of fractured neck of femur (as measured by hospital discharge diagnosis) shows a sharp gradient from north (Sweden - highest) to south (Spain - lowest). There is an almost seven-fold difference in the incidence between these two countries. There is also a clear difference between countries for vertebral deformities. Again the highest rates are in the Scandinavian countries. However this does not follow such a clear north-south gradient and there are likely to be other differences in life-style and health which underlie this pattern.

In the three decades up to 1983, the age-specific incidence rates of hip fracture doubled for those aged over 65. The reason for this change in incidence is not known. One possible explanation may be the lower amount of physical activity undertaken by present-day women. Recent analysis from the UK (53) indicates an increase in age-sex standardised admission rates for hip fracture rates between 1978-81 and 1993-95 (from 190 to 263 per 100,000 per year for men and from 570 to 770 per 100,000 per year for women). Kanis has argued that, if current trends continue, the number of hip fractures occurring each year will more than double during the 20-year period following 1993 (54). The impact of osteoporotic fractures is also set to rise in the future because of the ageing population. Hip fractures occur more frequently in the winter months. However, the majority of hip fractures occur indoors. Colles' fractures are also more common in the winter months but they occur more often following falls outdoors.

Determinants

There is a genetic influence on bone density and fracture risk. Non-genetic risk factors include body build (thin body build is a risk factor); reproductive variables (loss of ovarian function either naturally at the menopause or surgically; older age at the start of menstruation); other diseases (thyrotoxicosis, rheumatoid arthritis, Cushing's disease, partial gastrectomy, stroke and others) and drugs (steroids, anticonvulsants). Thiazide diuretics are protective against bone loss.

Lifestyle risk factors for OP include cigarette smoking. The lifetime risk in postmenopausal women who smoke is increased by around 50%. There is also a doubling of fracture risk in women with an alcohol consumption of more than eight units weekly. Physical inactivity has also been found to be a risk factor for hip fracture in a number of studies. This may be because physical activity influences bone density, because those who are less active are more at risk of falling, or both. It is not clear whether dietary intake of calcium and vitamin D in the general population affects fracture risk. However, it is clear that dietary supplementation with vitamin D and calcium in nursing home residents reduces fracture risk.

9.4 Determinants for specific musculoskeletal conditions in general: occurrence and trends

Some determinants, in particular those related to lifestyle, such as smoking, obesity and exercise are risk factors for more than one musculoskeletal condition. A literature search was

conducted using one of the terms: alcohol, contraceptive pill, exercise, obesity, occupational physical activity, physical activity, smoking or trauma: plus one of the terms: arthritis, osteoarthritis, osteoporosis or rheumatoid arthritis. The titles and abstracts of the papers were reviewed to select those of relevance (i.e. case control or cohort studies which examined risk factors for the development of musculoskeletal conditions). Each of the selected papers was then classified according to which determinant, which musculoskeletal condition, whether the determinant was protective or predictive, and the study design. The results are summarised in table 11.

Table 11. Overview of potential risk factors for rheumatoid arthritis, osteoarthritis and osteoporosis and the judgement of proof

	RA	OA	OP
Lifestyle factors			
Obesity/overweight	?	++ (especially strong for knee moderate for hip equivocal for hand)	- -
Smoking	++	-	++
Alcohol	0	0	+
Physical activity	?	+ (high levels – elite athletes)	- -
Personal/medical factors			
Family history	++	++	++
Age	++	++	++
Female gender	++	++	++
Use of oral contraceptive	- -	?	+
Use of hormone replacement	?	+	++
Physical trauma	?	++	0

++	relationship proven (at least 10 studies support hypothesis)
+	relationship probable (some controversy but the balance in favour)
0	relationship unlikely
?	unknown or conflicting results
-	protection probable (some controversy but the balance in favour)
- -	protection proven (at least 10 studies support hypothesis)

10 CONSEQUENCES

10.1 Introduction

The European Community Health Indicators project (ECHI), in its report February 2001, divided the indicators into four categories (table 12).

Table 12. The ECHI classes

Main categories for the ECHI indicator set
Class 1
Demographic and socio-economic factors Population Socio-economic factors
Class 2
Health status Mortality Morbidity, disease-specific Generic health status Composite health status measures
Class 3
Determinants of health Personal and biological factors Health behaviours Living and working conditions
Class 4
Health systems Prevention, health protection and health promotion Health care resource Health care utilisation Health expenditures and financing Health care quality/performance

In this report we followed the approach of presenting the conditions, their occurrence, determinants and trends, and in this chapter we will present the consequences. Consequences of the disorders are of special importance for MSC; but the ECHI indicator set does not include a separate class for consequences, it is included both under the chapter on generic health status as well as on composite measures of health status and partly health systems such as health care utilisation and health expenditures. All the proposed factors classified under generic health status and composite measures of health in the ECHI report are hence relevant:

- Perceived health
- Chronic disease general
- Functional limitations

- Activity limitations
- Global activity limitations indicator
- Short-term activity restrictions
- General mental health
- General quality of life
- Absenteeism from work
- Appropriate inequality measure
- Disability free life expectancy
- Other health expectancies

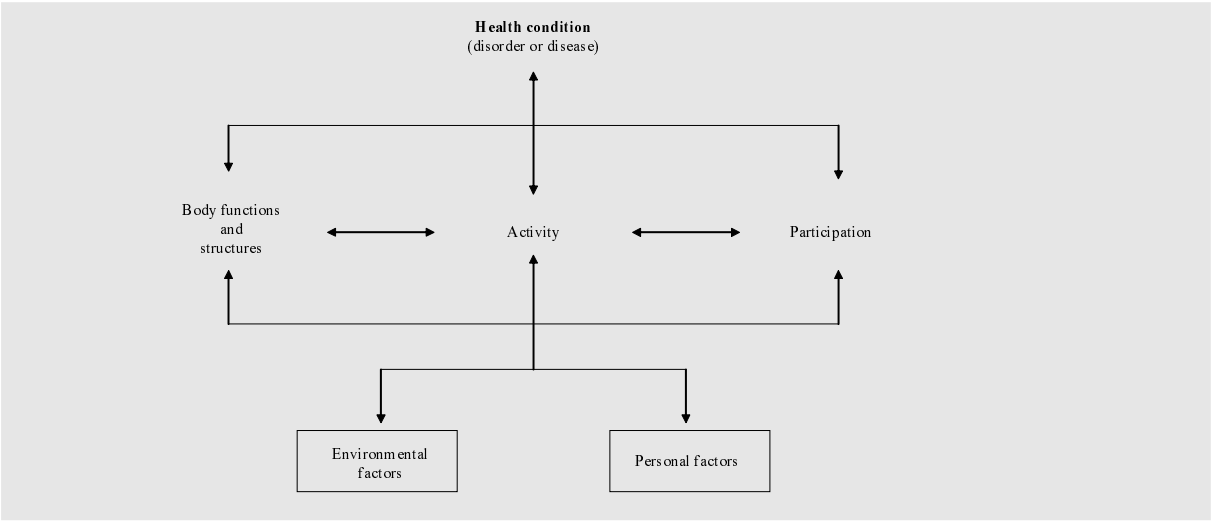
The WHO has adopted another approach in the Global Burden of Disease Project. The 'burden' of a disease is expressed in terms of disability adjusted life years. A longitudinal perspective is taken. Information is required on incidence, prevalence, mortality and case fatality, and severity for each global region. Disability weights are estimated which take into account the proportion of prevalent cases which fall into mild, moderate and severe categories, and the degree of disability associated with each of these categories. This information can then be used to calculate years lived with disability, years of life lost, and disability adjusted life years. This approach enabled the comparison of the burden of a particular disease in different regions of the world, and the ranking of different diseases by disability within a region.

Another WHO initiative, the ICF (International Classification of Functioning, Disability and Health; formerly ICIDH-2) is designed to record and organise a wide range of information about health and health-related states. The ICF forms a comprehensive instrument for measuring of functional ability, it covers almost all human functions and activities. In the clinical context, the ICF is intended for use in needs assessment, matching interventions to specific health states, rehabilitation and outcome evaluation. The ICF components and their interactions are showed in figure 3 (earlier presented in figure 1).

The ICF system in its full extent is not easy or fast to use in clinical situations and in daily medical practice, the ICF will have to be tailored in order to suit these specific uses. WHO is working with "core sets" of ICF specifically tailored for common health conditions. These core sets are intended to be "short forms" of the ICF with special relevance to diseases and conditions. The joint use of the ICF and the International Classification of Diseases ICD-10, needs to be addressed when applying the ICF to rehabilitation medicine.

In this chapter consequences are divided into mainly personal consequences such as life expectancy, pain, reduced function, and reduced quality of life, (categorised under ECHI Class 2, Health status), and societal consequences such as health care utilisation (in- and outpatient, surgical interventions, drug utilisation), mainly categorised under ECHI Class 4, Health systems. For musculoskeletal problems and conditions, days lost from wage earning activities because of sick leave and disability pension is the most important consequence. This is briefly mentioned in the ECHI report under Class 2, Health status, (2.3 Absenteeism from work), and Class 4, Health systems, (4.4.6 Health expenditure by fund source).

Figure 3. The ICF structure



10.2 Personal consequences

We will under this heading follow the ICF structure with sub-chapters on body functions and structures (impairments), activities (limitations), and participation (restriction).

BODY FUNCTIONS AND STRUCTURES

Pain at any localisation of the musculoskeletal system is one of the ways to define certain MSC (e.g. low back pain) but is also at the same time an important consequence of MSC. Besides pain; stiffness, loss of muscle strength and coordination, damage and deformity are consequences of MSC. These are parts of ICF and are covered in great detail by the chapter body function and structure. These areas, not covered by the ECHI domains, are problems that could be described by HIS, HES and imaging, first of all x-ray of the bone and joints.

Although musculoskeletal problems and conditions often are a great and chronic problem for the living, it may also affect life expectancy. Life expectancy may be reduced in people with a number of the specific musculoskeletal conditions. For example, RA shortens life expectancy by an average of six years (55) and fractured neck of femur is associated with significant mortality in the ensuing few months (56). Hence mortality, often as a consequence of co-morbidity, should not be forgotten even when monitoring consequences of MSC. Mortality is covered by ECHI, but is not included in ICF, although it may be considered as the ultimate negative score on body function and activity limitation.

ACTIVITIES AND PARTICIPATION

Activity limitation and restricted participation are the main consequences of MSC. This can be measured with generic instruments eg. SF-36, NHP and SIP. For the specific rheumatic disorders a series of instruments have been developed such as HAQ, WOMAC, and EFFO-QOL (www.who.int/ncd/cra).

Measurement of generic health status, often containing function, is included under ECHI 2.3.

Reduced quality of life is mentioned several times as an important consequence of MSC, this is also included under ECHI 2.3.

According to ICF "Well-being is a general term encompassing the total universe of human life domains, including physical, mental and social aspects, which make up what can be called "a good life". Health domains are a subset of domains that make up the total universe of human life" and is included in ICF as the sum of all consequences and hence not as a separate entity.

Limitations of daily life functions and reduced work ability are consequences of MSC for the individual as well as the society. ICF in the joint chapter on activities and participation includes mobility, changing body position, carrying, walking, self care, working and engaging in community life. For a similar severity of pain, these consequences might vary from very mild to severe disability. The reasons for this variability in response to pain are poorly understood though a high correlation between structural damage and function exists.

In most welfare states, MSC cause more functional limitations in the adult population than any other group of disorders. In the Ontario Health Survey (57), MSC accounted for 40% of all chronic conditions, 54% of all long-term disability, and 24% of all restricted activity days. In surveys carried out in Canada, US, and Western Europe, the prevalence of physical disabilities due to MSC has repeatedly been estimated to be 4-5% of the adult population (58). The prevalence is higher in women, and increase strongly with age. MSC are the main cause of disability in older age groups.

In a Canadian study, the prevalence of disability due to arthritis/rheumatism was 2.7%, disability due to back disorders 1.6%, trauma 0.4%, bone disorders 0.1%, and disability due to «other» MSC was 0.5% (58). Although it seems reasonable, on basis of these and other studies, to assume that a large part of musculoskeletal-related disability is caused by OA, RA, and low back disorders, chronic widespread pain causes disability in a considerable number of individuals, but the precise magnitude remains to be settled.

Disability is more severe in patients with chronic widespread pain conditions than in patients with other localised musculoskeletal conditions or in controls (59). Nevertheless, the degree of disability shows large variations. Studies have demonstrated considerable limitations of function and work ability in the more severely affected, but also that a majority of patients with chronic widespread pain may have fair functional level, and manage to stay at work.

In addition to functional limitations in everyday life, work disability is a major consequence of disease for the individual. The ability to work is linked with self-realisation, more secure social position and improved quality of life. Work disability will be dealt with in more detail under societal consequences.

10.3 Societal consequences

SICK LEAVE AND DISABILITY PENSION

When examining studies on the consequences of MSC on work disability, one is struck by the variation in published results. The explanations for this variation are several. First of all, disability benefit schemes have different levels of compensation, and rates are higher in welfare states that give more generous benefits. National or local criteria for pensions and sick leave, e.g. minimum length of employment, also vary greatly, and affect the rates. A second main hindrance lies in the fact that subgroups of MSC are not uniformly defined in the literature.

For society as a whole, the utilisation of health services and health care costs are the most

studied consequences of disease. MSC are a strain to public economy, and cause great controversy with respect to the awarding of disability benefits.

MSC have a major influence on the rates of sickness absence everywhere, as shown from Scandinavia (60), the UK and The Netherlands. In Germany 6.7 Mio. persons with sick leave caused by MSC were reported in 2000, accounting for 18% of all sick leave cases. In regard to sick leave days 130 Mio. were caused by MSC, representing 28% of all. Injuries accounted for additional 64 Mio. or 12,9% of all sick leave days (61).

In short term sickness absence (less than 1-2 weeks), musculoskeletal health problems are second only to respiratory disorders (62). In long-term absence, which is more important than short-term absence for the individual in terms of consequences, and for society in terms of costs, MSC are the most common medical causes. Musculoskeletal injuries and disorders cause more than half of all sickness absence longer than two weeks, eg. in Norway (63) (table 13) and Germany (61).

Table 13. Distribution (in per cent) of persons with sick leave longer than 14 days due to musculoskeletal and connective tissue disorders by diagnosis and gender. Norway, 1994

Diagnosis	Men N=75 228	Women N=81 416	Total N=156 644
Low back disorders	35	31	33
Neck and shoulder disorders	16	23	20
Musculoskeletal injuries	23	12	17
Tendinitis, epicondylitis, ganglion	6	7	7
Rheumatoid arthritis	3	3	3
Osteoarthritis	2	2	2
Muscle pain/fibromyalgia	0.5	2.4	1.5
Other musculoskeletal disorders	15	19	17
Total	100	100	100

As for temporary benefits, MSC are also common reasons for disability pensions. In Norway, among persons with disability pensions for MSC in 1997, 44% were awarded for low back pain, 18% for muscle pain /fibromyalgia, 12% for OA and 9% for RA. (64) (table 14). These figures are similar with those of the Netherlands.

Table 14. Distribution (in per cent) of persons on disability pensions due to musculoskeletal and connective tissue disorders by diagnosis and gender. Norway 1997

Diagnosis	Men N=26 623	Women N=54 034	Total N=80 657
Low back disorders	59	36	44
Rheumatoid arthritis	6	10	9
Osteoarthritis	13	12	12
Muscle pain/fibromyalgia	7	24	18
Other musculoskeletal disorders	15	18	17
Total	100	100	100

10.4 Trends for disability

A study of cohort patterns in disability and disease in adults born 1915-59, based on the National Health Interview Survey, found more disabling MSC in cohorts born after World War II (65). We might anticipate higher rates of disabling MSC as these cohorts enter old age, compared with earlier cohorts.

In the period 1986-1993, the number of awards for Social Security disabled-worker benefits grew by 37% in the US, and the share of MSC increased from 18% to 21% of the beneficiaries (66). In Norway, the proportion of disability pensions due to MSC have increased in the period 1980-1997, from 26% to 41% for women, and from 18% to 27% for men (National Insurance Administration, 1998).

Thus, the prevalence of disabling MSC is increasing, not only because the absolute numbers increase because of aging, but also the MSC seem to become more disabling. If these findings can be confirmed, one must ask the intriguing question why this occurs. Are MSC now more aggressive and causing more disability, or, are the consequences increasingly difficult to live with in a more complex and demanding work environment?

Functional limitation and work disability due to MSC are more frequent in women than men. In a Canadian study, the prevalence of disabling MSC was 6.1% in women, and 3.9% in men (58).

While relatively rare among younger persons, MSC is a dominant cause for functional limitation and work disability in higher age groups. Prevalence rates of disabling MSC increased from 0.6% among Canadians 15-24 years, to 26% in persons aged 85 years and older (58).

UTILISATION OF HEALTH CARE SERVICES

Patients with MSC are frequent attenders to primary health care centres and paramedical institutions (e.g. physiotherapy and chiropractic).

In the UK 19% of the adult population consult their primary care physician each year for a MSC, this figure is similar for The Netherlands (67). 5% consult for OA, 4% for various forms of inflammatory arthritis and 6% for back pain. Some consult their GP for more than one of these conditions (4th RCGP morbidity survey). People with chronic widespread pain have high GP consultation rates, high rates of medication use and high rates of contact with other health professionals (MacFarlane et al, 1999).

10-20% of consultations in general practice in the UK are for musculoskeletal conditions, injuries included (the musculoskeletal chapter in International classification for primary care, ICPC). 31% of patients presenting to a GP in Germany complain about MSC problems.

There is a general impression that patients with musculoskeletal problems are becoming more frequent in general practice. A Swedish study showed that an increasing number of individuals with pain-related diagnoses consulted primary care physicians (from 156/1000 per year in 1987 to 193/1000 per year in 1996) (68).

MSC constitute also a large proportion of secondary health care, both in – and outpatient care. Fracture treatment, joint replacements and back surgery are important hospital tasks. 1.2 Mio. patient with MSC and 1.6 mio. with injuries were treated in hospitals in Germany 1999, representing 10,1% resp. 7.3% of all inpatient cases. Rehabilitation of patients with MSC varies throughout Europe with traditions for in-patient treatment in Central Europe, whilst in-patient rehabilitation is less common in other countries. In Germany 42% of all inpatient rehabilitation care was provided for patients with MSC (61).

Secondary health care utilisation varies significantly throughout Europe. Available OECD statistics shows dramatic inter country variations of such a magnitude that it is reason to believe that it reflects different methodology, more than real differences (table 15). Total hip replacemen rates in OECD countries vary between 50 and 140 procedures/100,000 population (50). They may be due to various causes, including different coding systems, country-specific differences in the healthcare system, in total expenditure on health per capita, in the population age structure, and in different indication criteria for THR.

Table 15. Secondary healthcare utilisation (Source: OECD Health data 2001)

Country	Year	Number of hospital discharges for MP&C/100,000 population	Number of hip replacements/100,000 population
Austria	1998	2601.4	-
Belgium	1998	1348.1	183.5
Denmark	1999	1022.5	140.0
Finland	1999	2315.0	92.0
France	1998	1505.2	-
Germany	1997	1307.6	-
Hungary	2000	625.6	75.5
Iceland	1990	-	860.6
Ireland	1999	767.5	112.8
Italy	1999	941.7	112.7
Netherlands	1999	679.0	-
Norway	1996	980.9	1260.0
Portugal	1999	272.5	67.1
Spain	1998	630.0	-
Sweden	1998	894.2	-

COSTS

While MSC consists of a heterogeneous group of conditions, the calculation of total expenditures for health care and social security is difficult. The health care costs that are generated by MSC are stunning. In the Netherlands musculoskeletal conditions ranked second as a health care cost in 1994 (69), accounting for 6% of total health care costs compared to 8.1% for mental retardation. Coronary heart diseases and other circulatory diseases accounted for 4.8%. This study only considered medical costs and the inclusion of the costs of informal care would have greatly increased the costs related to chronic disabling conditions such as musculoskeletal diseases. The costs were considerable at all ages, ranking fifth at age 15 – 44 years, second at age 45 – 64 years and third age at age 65 – 84 years after dementia and stroke.

The total healthcare costs for diseases of the musculoskeletal system were in The Netherlands were 1976 million euros. OA accounted for 304 million euros, RA for 91.6 million euros. OP 62 million euros and back disorders 549 million euros. The 45-64 year age group incurred the highest costs. (www.rivm.nl/kostenvanziekten). In addition to the direct health care costs that include institution care, out-patient treatment and drug use, disability also generates considerable indirect costs, i.e. lost productivity and wage loss. For MSC, indirect costs appear to be substantially greater than the direct costs. While about 20% of the direct costs in Germany 1999 were related to MSC and injuries (30 bill. euros), 42% of all sick leave days, 42 % of all rehabilitations and 30% of all pensions caused an enormous burden of indirect causes. Loss of production caused by MSC related sick leave days alone are calculated to amount to 19.1 bill. euros, equalling 1% of the GNP (70).

10.5 Determinants for consequences of MSC

We have in chapter 8 presented determinants for the selected conditions. In this part we will focus on factors determining the personal and societal consequences of MSC.

The effects of musculoskeletal conditions on body function or structure is predominantly determined by the severity of the condition itself influenced by pathogenic and genetic factors.

The effect of musculoskeletal conditions on activities and participation is determined by personal and environmental factors. Age, comorbidity, obesity and physical activity can all affect the outcome of the various specific musculoskeletal conditions. The association between high prevalence of disabling MSC and low social status, measured as income level, educational level, or social class, is usually strong (71). Disabling MSC is more frequent among unmarried persons, indicating that lack of social support might be a risk factor for the development of disability in persons with MSC.

Musculoskeletal disability is frequently associated with physical stress in the work place, such as heavy lifting, repetitive movements, and work paced by a machine (72). Depression may influence musculoskeletal disability. Psychosocial work stress, e.g. work monotony tight time schedules, and lack of self regulation of working pace is also significantly associated with disabling MSC.

The question whether MSC should elicit welfare payments has caused great controversy. Their benefit and their effect on the consequence of musculoskeletal conditions are debatable. After a period with frequent awards of disability claims in the 1970's, the US Social Security Administration terminated disability benefits for more than 500,000 persons in 1981-1983. Chronic pain syndromes were over-represented among these terminations. This change in policy brought about numerous legal appeals and adverse publicity. Policy was again reverted, and 290,000 persons were reinstated as beneficiaries. Similar inconsistencies in disability benefit matters have occurred in other countries. For the patients, such political ambiguity is clearly unsatisfactory. Their applications for social benefits are handled and decided upon in a seemingly haphazard and random manner. It might also appear as

unjust that they are denied benefits, when persons with similar loss of function and work ability, but with more acceptable diagnoses are granted benefits. Due to the skewed distribution of MSC, the denials of benefit have had negative consequences mostly for women. Denials have also been more frequent for persons with low education (73). Thus the consequences of restricting disability benefits have struck unevenly.

The increase of disability benefit applicants with MSC have been a problem for the social security systems. Basically, the problem can be traced back to a dilemma in all modern welfare societies, how to balance the distribution of goods, according to work or according to needs. In most countries, certain needy groups, e.g. children, elderly, and sick persons, are exempt from the general rule of working. Children and elderly are easily defined by simple age limits, but the definition as to who is sick and who is not has caused continuous tension as the welfare systems have developed. The medical profession has been given the task to decide in these matters.

To guide decisions, «work disability due to disease or injury» has commonly been used as a criterion. Initially, this was interpreted as being recognisable impairment in bodily organs, i.e. visible signs, laboratory tests or other "objective" results from medical examination. However, some disorders, such as MSC, cause disability without giving clear signs of organ impairment.

In this situation, various means to ease the tension have been recommended. In a US report on "Pain and disability" (74), it was suggested to focus more on work ability, and less on the underlying disease, illness or complaints. Thus, patients with chronic pain should be tested for functional level and work capacity as early as possible. Benefit evaluation should seek evidence not only of underlying disease processes, but also consider serious functional limitations and other effects on the claimants' lives. Similar suggestions to focus on disability, rather than on the underlying disease, have been suggested in other countries.

10.6 Conclusion

The consequences of MSC on functional limitations and work ability are profound in most countries, and incur substantial costs to the individual and to society. MSC are more frequent in women, increase with age, and are associated with low social status, manual labour, and physical and psychological stress at the work place. Some MSC have been rejected as a reason for benefits, and continue to cause tension in social benefit systems.

Musculoskeletal complaints as seen in epidemiological studies comprise a heterogeneous group of conditions with varying aetiology and prognosis. There is no simple continuum from short-term localized complaints to chronic widespread conditions. In the clinical setting we are able to diagnose some diseases with accepted criteria, for example RA and sciatica. However, both in the population and among the patients consulting GPs and specialist clinics we meet a large group of persons with complaints we do not understand, and where the medical establishment disagrees as to what it is, and what to do with it.

11 SOURCES OF INFORMATION

11.1 Introduction

Information on musculoskeletal health can be obtained from a wide variety of sources. Data on disease (or symptom) occurrence and mortality are important, but do not reveal the 'depth' of the impact of MSC on the individual and society. From the individual perspective we also need information on physical function and quality of life. From the society perspective we need information on the use of healthcare resources, social care (including residential care) and impact on employment. Such information can be obtained from a variety of sources.

- Health interview surveys and health examination surveys
- Health and social care utilisation
    - General practice (primary care)
    - Hospital outpatient (ambulatory care)
    - Hospital admissions/discharge
    - Social care utilisation
    - Health and social care costs
- Social security
    - Work absenteeism
    - Disability pensions
- Registers
    - Mortality registration
    - Disease register
    - Other registers
- Research projects

Studies whose aim is to identify the burden of illness within a community should be population (rather than clinic or hospital) based, except for conditions such as fractured neck of femur which lead more or less inevitably to hospital attendance. However studies of symptoms are not the same as studies of diagnoses. Almost all specific musculoskeletal diagnoses require a clinical examination (and/or X-rays and blood tests). Only the most common diagnoses can be studied in the context of population studies. Information on less common disorders (certainly those which affect less than 1% of the population studied) has to be obtained in the context of primary or secondary care.

11.2 Health interview and health examination surveys

A substantial fraction of the population affected by conditions defined by pain or disability does not regularly attend professional health care providers. To get reliable data on a condition and its incidence, prevalence, and risk factors we should therefore primarily focus on representative samples of the population. To gather data from a population there are two main methods: Health Interview Surveys (HIS) and Health Examination Surveys (HES).

HIS are based either on personal interviews or self-completed questionnaires. HIS are simpler and cheaper to perform than HES, but only give data on self-reported symptoms and not on medical

diagnoses. The advantage of HIS methods is the possibility of collecting data from a large number of persons within limited budgets.

To gather data on incidence and prevalence of clinical diagnoses in a population it is usually necessary to incorporate some sort of health examination. The reliability of self-reporting of diagnoses is dubious, although varying between diseases. The advantage of HES methods is that they can be combined with HIS methods as a second-stage and offer an opportunity to improve the quality of HIS-sampled data. Furthermore, HES surveys can extend the focus of the investigation to clinical diagnoses.

There are several sources which list the questions used in national surveys, mostly HIS but also some HES, in EU countries, as well as in the rest of the world. They include:

European Health Surveys Database

Labour Market and Social Policy – An Inventory of Health and Disability-related surveys in OECD countries

WHO World Health Survey

We have searched these sources for questions that could be recommended as indicators for monitoring different aspects and outcomes of musculoskeletal conditions. Some questions relevant for our purpose are reviewed, and a section with questions from the most comprehensive national survey (Mini-Finland "Health 2000") is also added.

Two additional sources of HIS/HES-information have been investigated, but have not been reviewed in this report:

The report from the European Foundation for the Improvement of Living and Working Conditions: "Quality of work and employment in Europe. Issues and challenges", reviews some questionnaires and results on work-related musculoskeletal problems (backache, neck and shoulder pain). However, there is a separate EU working group on work health indicators, and the report mentioned above does not go into detail about exact wording of questionnaires (European Foundation 2002, Ireland).

The report "Coverage of Health Topics by Surveys in the European Union" was published by the European Commission's Statistical Office in November 1997. This report has a good review of the methodological challenges in international comparisons of health surveys, and gives recommendations very much in line with the recommendations in this report. The actual health questionnaires reviewed in this report are however all included in the European Health Surveys Database version January 2002, the latter naturally being far more up-to-date.

EUROPEAN HEALTH SURVEYS DATABASE, VERSION JANUARY 2002

This is a CD released by the Scientific Institute of Public Health in Brussels in cooperation with the Finnish National Public Health Institute, based on a project funded by the Health Monitoring Programme of the European Commission. The aim of the project was to develop an inventory of all Health Surveys in Europe.

The database contains data from 56 HIS, five of which were extended with HES. Detailed information on methodology (such as design, sample, frequency, response rate and used interview instruments) is provided for each of these surveys. All questions used are listed, in the National language as well as a translation into English. The list comprises just under 8000 different questions used in national HIS in Europe. For HES the database contains information on the kind of personnel that conducted the examinations, and how they were trained, as well as where the examination took

place, and the average duration of the examination. There are also some data on standardised instruments used in the examinations.

We have searched the database specifically for questions about musculoskeletal conditions and questions about functional ability.

Musculoskeletal conditions

HIS: A variety of questions, with varying focus on musculoskeletal problems, has been used. HES: The two Finnish HES-surveys "Finriski 97" and "Health 2000" included examinations and testing for musculoskeletal disease. The "Health 2000" is most extensive, covering all adult age groups.

Functional ability

HIS: The SF-36, or an adaptation of the SF-36, has been used in some countries (Belgium 97, Denmark 94, Germany 98, Italy 99 and Norway 98). Other standardised instruments for monitoring functional ability and quality of life used are SCL-90 (Iceland 99 and Finland 00) and EuroQol (Ireland 98 and Finland 00). For mental health status a variant of the GHQ (General Health Questionnaire) has been used in many countries (Belgium 97, Denmark 96, Finland 00, France 99, Ireland 00, Spain 95, United Kingdom 95 and 98).

In addition to the standardised instruments the database includes a variety of different questions on different domains of functional ability. As an example we found 17 questions on health-related work absenteeism.

HES: The two Finnish HES-surveys "Finriski 97" and "Health 2000" both included examinations and testing for functional ability. The "Health 2000" is most extensive, testing for psychomotor reaction time, hand grip strength, standing balance, back endurance test (only for those below 55 years). For those aged 55 years and over also: joint function test, timed chair stands, walking speed (6.1 meters).

Most EU countries have some data on the prevalence of musculoskeletal problems and conditions, specific rheumatic disorders as well as data on musculoskeletal pain in general. We have found some data on functional ability in all countries.

Table 16 summarises from the European Health Surveys Database the European countries that have some data from at least one of their National Surveys on unspecified musculoskeletal problems, specific musculoskeletal conditions, musculoskeletal pain and functional ability.

Table 16 Available data on musculoskeletal problems and functions (European health surveys database)

Country	Musculoskeletal data	Specific rheumatic disorders	Generic data on musculoskeletal pain	Functional ability
Austria	+	+	+	+
Belgium	+	+	+	+
Denmark	+	+	+	+
Finland	+	+	+	+
France	+	+	+	+
Germany	+	+	+	+
Greece	0	0	0	+
Iceland	+	+	+	+
Ireland	+	+	+	+
Italy	+	+	0	+
Luxembourg	0	0	0	+
Norway	+	+	+	+
Portugal	+	+	+	+
Spain	+	+	+	+
Sweden	+	+	+	+
Switzerland	+	+	+	+
The Netherlands	+	+	+	+
United Kingdom	+	+	+	+

LABOUR MARKET AND SOCIAL POLICY – AN INVENTORY OF HEALTH AND DISABILITY-RELATED SURVEYS IN OECD COUNTRIES

This report from the OECD, Employment, Labour and Social Affairs Committee, published in 2000 summarises surveys on health and disability. The main conclusion is that: "Beside a few items related to the prevalence of chronic conditions (both generally and for a few important diseases) and general activity limitations, current differences in measurement instruments limit the comparability of data only to those countries that are using the same instruments (e.g. SF-36, EuroQol-5D, HUI-3 or the WHO-Europe long-term disability list). The main problem is not "what" is being measured in various surveys (since the health dimensions and activity limitations tend to be fairly common) but rather "how" specifically these health conditions and limitations are measured. Unless progress is achieved in using some common instrument(s) to measure these health and disability dimensions, cross-survey (and cross-country) comparisons will remain limited".

The report summarises national surveys on these dimensions of health and disability:

- **Health Conditions:**
  - General questions about prevalence of a chronic condition
  - Lists with certain specific conditions/illnesses
  - Mental health questions including cognitive ability
  - Pain questions
- **Activity Limitations:**
  - Self-care and ADL

Mobility

Sensory function and communication abilities

Instrumental activities of daily living (IADL)

Work ability and participation in social activities

General items on limitations in usual activities

31 surveys on health and disability were included in this overview.

The report found that "different approaches to defining and measuring disability obviously result in different prevalence rate estimates. These different results highlight the importance of specifying how disability is defined and measured." There are at least three sources of variation in the item formulation:

1. Response formulation (qualifiers)
2. Number of questions and degree of specificity of questions
3. Reference period

The report suggests three ways of improving surveys on health and disability in the future, numbered by priority:

1. Development and administration of international surveys
2. Encourage the use of common instruments in national surveys
3. Application of post-harmonisation methods on national surveys with differences in methodology

The instruments most commonly used in the surveys reviewed were the five-item quality of life scale (EuroQol-5D) and the SF-36 (MOS 36-item Short Form General health survey).

Some surveys contain questions on musculoskeletal problems and conditions. These questions are mostly rather non-specific, like "rheumatism/arthritis" (Austria 1995), but in some surveys they are more specific, like in Germany 1998 "Arthrosis of the hip or knee joint or of the spinal column? Inflammatory disease of the joints or spinal column (e.g., chronic polyarthritis, rheumatoid arthritis, Morbus Bechterew)?". In the United Kingdom in 1995 and 1996 conditions were reported using various ICD chapters including the chapter "musculoskeletal system".

Many surveys use pain question from the SF-36 "How much bodily pain have you had during the past 4 weeks? None/Very mild/Mild/Moderate/Severe/Very severe" and/or the corresponding question from EuroQol-5D "Which statement best describes your own health state today: I have no pain or discomfort/I have moderate pain or discomfort/I have extreme pain or discomfort". Some surveys are more specific, Germany 1998 is the most detailed: "Have you had any of the following aches and pains in the last 12 months? Yes/No. Headache? Facial pain, in the jaw muscles, jaw joint or in the ear area? Pain in the neck? Pain in the shoulder? Pain in the upper arms, elbows or fore-arms? Pain in the fingers or hands? Pain in the chest? Backache? Pain in the hips? Pain in the thighs, knees or lower legs? Pain in the feet or toes?".

In the monitoring of disability, the SF-36, or the even shorter SF-12, is used in quite a few of the surveys. Also EuroQol-5D contains questions on disability:

Mobility:

- I have no problems in walking about
- I have some problems in walking about
- I am confined to bed

Self-Care:

- I have no problems with self-care
- I have some problems washing and dressing myself
- I am unable to wash and dress myself

The questions in the SF-36 on function and disability are more detailed and specific:

Does your health limit you in these activities (Yes, limited a lot/Yes, limited a little/No, not limited at all):

- Vigorous activities (such as running, lifting heavy objects, participating in strenuous sports)?
- Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf?
- Lifting or carrying groceries?
- Climbing several flights or stairs?
- Bending, kneeling or stooping?
- Walking more than a mile?
- Walking half a mile?
- Walking 100 yards?
- Bathing or dressing yourself?

There are also a variety of different questions about specific functions. The SF-36 generates scores for physical functioning, role limitation (physical), social functioning, mental health, energy and vitality, role limitation (emotional), bodily pain and general health. The International Quality of Life Assessment (IQOLA) project has collected SF-36 scores for the following European countries since 1990: Denmark, France, Germany, Italy, Netherlands, Norway, Sweden and UK.

WHO WORLD HEALTH SURVEY

The WHO World Health Survey is a comprehensive and detailed HIS. Each interview takes approximately 90 minutes and the interview protocol covers nearly 400 pages. In this interview protocol there are questions about education, household assets, income and expenditure. There are one or more questions about:

- Overall health
- Mobility
- Self-Care
- Usual activities
- Pain and discomfort
- Cognition
- Personal relationships or participation in the community
- Vision
- Hearing
- Breathing
- Energy and vitality
- Sleep
- Affect
- Impact

The interview also records a lot of risk factors that might be relevant for musculoskeletal conditions. This is followed by extensive lists of chronic conditions, "During the last 12 months, have you experienced any of the following…, including arthritis and injuries.

The respondents are then asked to imagine how much difficulty persons with certain health problems will meet in daily living in the country in which they live. Two of these health problems are arthritis and amputation below the knee. The World Health Survey then ends with new descriptions of persons with different types of health problems, and the respondents are asked to rate their problems according to dimensions like:

- Cognition
- Energy and vitality
- Mobility
- Affect
- Usual activities
- Hearing
- Pain
- Personal relationship
- Self-care
- Breathing
- Vision
- Sleep

The World Health Survey differs from other surveys in its use of clinical vignettes describing health problems and disability. Respondents are asked to imagine how it will be to live with these health problems and disabilities in their community.

This original approach might be interesting in research, but probably demands to much time and resources to be a realistic alternative in routine monitoring.

MINI-FINLAND ("HEALTH 2000")

Among the national surveys the Finnish Surveys, and especially the Mini-Finland ("Health 2002), are the most comprehensive and methodologically impressive.

In Finland it was concluded in the 1970s that repeated national health examination surveys were needed to monitor morbidity from musculoskeletal conditions (as well as other health conditions). The main results from Health 2000 will be published in 2002-2004.

From former Finnish surveys there has been published a variety of international publications on the epidemiology of back pain, arthritis , neck pain, fibromyalgia, and coxarthrosis.

Health 2000 is a combined HIS and HES Survey. In the HIS - Health 2000 there are 377 questions in total. Of these six questions are about musculoskeletal conditions (rheumatoid arthritis, osteoarthritis, other joint disease, back pain, neck pain and persistent traumatic injury).

Health 2000 also contains questions about injuries, health care utilisation, and risk factors. There are many detailed questions about function and functional ability (29 questions), as well as self-care and cognition (14 questions), and rehabilitation needs (12 questions).

The Health 2000 also used a symptom questionnaire (different from the HIS-questionnaire). There were 25 questions about musculoskeletal symptoms. The HES-Health 2000 included a standardised physical examination of the musculoskeletal system. It was carried out by specially trained physicians and included testing for tenderness and mobility of the lower back, neck and shoulders, and limb joints. Uniform diagnostic criteria were applied throughout by all the ten physicians. Since a general aim was to develop instruments for HIS, the HIS and HES were independent of eachother.

11.3 Health and social care utilisation

Data obtained from attendance in the health care system (in hospitals, specialist clinics or GPs) are based on selected groups of persons, and not representative of the whole spectrum of disease in the community. Hospitals and specialist clinics will only see the "tip of the iceberg", and probably the majority of the more complex and severe cases. GPs will see, and care for, a larger proportion of persons with MSC, but also in the GP's office only those who consider their symptoms to be disturbing or to have consequences for function and work ability will attend. In countries where GPs have responsibility for a defined population through list or district systems, primary care data can be used to provide a rough estimate of incidence and prevalence rates.

The usefulness of health care registrations as a source of information for the prevalence of health problems is determined by what is registered, whether or not it covers the total population and the consultation threshold for the health problem we are interested in. Hip fractures almost always lead to health care consultation and complete registrations are sufficient to provide incidence and prevalence figures on hip fractures.

Care in nursing homes are rarely linked to specific diagnoses, but is a costly resource that is often at least partly needed due to MSC. Table 17 shows the availability of data from primary and secondary care that is collected across Europe. The international comparability of the data can however be questioned.

Table 17. Availability of information from HIS, HES, and secondary care from various European countries

Country	Source	Mortality	Discharge by diagnostic category	Average length of stay by diagnostic categories	Average length of stay by case mix	Register for MSC	Health Survey including MSC	
							Interview (HIS)	Examination (HES)
Austria	Statistics Austria	Y	Y	Y	Y	N	Y	N
Belgium	Eurostat and INAMI	Y	Y	Y	Y	N	Y	N
Czech Republic	General Health Insurance	Y	Y	Y	N	N	N	N
Denmark	Statistics Denmark	Y	Y	Y	Y	N	Y	N
Finland	Ministry of Health and Social Affairs	Y	Y	Y	Y	?	Y	Y
France	Ministere De La Sante	Y	Y	Y	Y	N	Y	N
Germany	Bundesministerium für Gesundheit und Soziales	Y	Y	Y	Y	N	Y	N
Greece	National statistical service of Greece	Y	N	Y	N	N	Y	N
Hungary	National Health Insurance Fund Admin	Y	Y	N	Y	N	N	N
Iceland	National economic institute	Y	N	Y	Y	Y	Y	N
Ireland	Central statistics office	Y	Y	Y	Y	N	N	N
Italy	Istituto Centrale Di Statistica	Y	Y	Y	Y	N	Y	N
Luxembourg	Inspection generale de la securite sociale	Y	N	Y	Y	N	Y	N
Netherlands	Centraal bureau voor de statistiek	Y	N	Y	Y	N	Y	N
Norway	Central bureau of statistics	Y	Y	Y	N	?	Y	N
Portugal	National Statistical Institute	Y	Y	Y	Y	N	Y	N
Slovak Republic	IHIS	Y	Y	Y	N	N	N	N
Spain	INE	Y	Y	Y	Y	N	Y	N
Sweden	Statistics Sweden	Y	Y	Y	Y	?	Y	N
Switzerland	Veska	Y	N	Y	Y	N	Y	N
Turkey	Ministry of Health	Y	N	Y	Y	N	N	N
UK	DOH	Y	N	Y	N	N	Y	N

PRIMARY CARE

An increasing number of general practitioners now have computerized files. The World Organization of Family Physicians (WONCA) recommends the use of International Classification of Primary Care as the diagnostic system. This system is today used in several of the countries in the Community. It consists of 17 chapters, L: musculoskeletal includes 23 components of complaints and symptoms, and 30 components of diagnosis/disease with reference to the corresponding ICD numbers.

Several of the diagnoses are further explained briefly with criteria, inclusion and exclusion. L03 Low back symptom/complaint includes back pain (lumbar or sacroiliac); coccydynia; lumbago, lumbalgia, but excludes thoracic back and sciatica. L84 Back syndrome without radiating pain has as criteria: back pain without radiation plus limitation of movement confirmed at medical examination. L88 Rheumatoid arthritis includes allied conditions as ancylosing spondylitis and juvenile arthritis, but has so far no criteria.

Monitoring MSC based on routine registration from general practitioners might be useful for the musculoskeletal chapter as a whole, the validity of the different diagnoses are however less. For more valid information and more uniform diagnostic criteria special sentinel stations are established in several countries partly based on continuous registration, partly on time limited ad hoc or recurrent registrations.

Monitoring of MSC could be as the proportion of consultations with a musculoskeletal diagnosis or, in countries with listed patients, number of musculoskeletal diagnoses per 100 persons on the list.

SECONDARY CARE

For specific procedures, registration might give an accurate picture of the occurrence of different conditions, first of all hip fractures as an indicator of osteoporosis. Registries, like the Scandinavian hip and knee replacement databases, offer population-based documentation of health resource utilisation.

Discharge diagnoses, number of persons treated as out- or inpatients in secondary care are available. However, these are considered of limited interest as a cross-national monitoring tool, since traditions as to treatment and rehabilitation of MSC vary throughout Europe. The Health Monitoring group on specific diagnoses and the group on hospital data have hence concluded that hospital data are of limited value for monitoring unspecified conditions.

COSTS

Cost generated by MSC should be gathered from a variety of sources. There are a large number of cost items that can be used in the estimation of the cost of illness. They fall under the categories of direct, indirect and intangible costs as described (table 18).

Hospital in and out patient, primary care including general practitioners and physiotherapists, home care, drug costs, nursing homes all count for the direct cost. In addition measures of the economical burden of indirect costs, like reduced working capacity, early pensions etc. need to be collected. Such complicated calculations have been carried out only in a few countries, showing the tremendous economical burden from MSC.

Table 18 Domains of health economic impact relevant to musculoskeletal conditions (from Woolf 2003)

Category	Domains	How to identify costs
Direct costs		
Health care costs		
Outpatient costs	Visits to physicians (primary care and specialist)	Hospital or insurer activity data of visits
	Outpatient surgery	
	Emergency room	
	Rehabilitation service utilisation (physiotherapist, occupational therapist, social worker etc)	
	Medication (prescription and non-prescription)	Pharmacy records
	Diagnostic / therapeutic procedures and tests	Radiology activity Laboratory tests,
	Devices and aids	Provision of equipment
Inpatient costs	Acute hospital facilities (without surgery)	Hospital or insurer activity data of admissions, lengths of stay, procedures
	Acute hospital facilities (with surgery)	
	Non acute hospital facilities	Rehabilitation activity Nursing home activity
Personal costs	Transportation	Transportation distance, frequency, methods
	Patient time	Time spent in healthcare
	Carer time	Time spent giving care
Other disease related costs	Home health care services	Home health care activity
	Environmental adaptations	Home, work and transportation adaptations
	Medical equipment (non-prescription)	Equipment provision
	Non-medical practitioner, alternative therapy	Therapist activity
Indirect costs		
Change of living status	Nursing home or residential home	Nursing and residential home activity,
	Home care services	Formal and informal home care activity
Productivity costs	Loss of productivity in employed patients or their carers Opportunity costs – reduced employability at present or higher level	Sick leave, lost wages, work disability benefits, number no longer working, disabilities leading to impaired housekeeping or activities of daily living, loss of productivity
Out of pocket	Out of pocket expenses	Survey
Intangible costs		
	Deterioration in quality of life of patient, family, carers, friends	Difficult to quantify

11.4 Social security

Social security statistics have increasingly been used as an indicator of the magnitude of MSC inside the countries. Statistics of work absenteeism and disability are partly gathered by companies and industry, partly centrally by social security organisations. Number of days lost pr. person at risk because of MSC is an important indicator of consequences of the conditions, but has also been used as a proxy for the conditions as such. Social security systems vary however considerably across the Union. International comparisons are hence difficult. Harmonisation inside the Community will in the future make social security statistics increasingly important as a means of monitoring consequences of MSC.

11.5 Registers

MSC are usually considered as problems that reduce quality of life without increased mortality. Those conditions might as earlier mentioned be co-morbidity, resulting also in premature death. In such situations the conditions will be invisible in mortality statistics. Hence mortality statistics will be of limited value for the monitoring of MSC. No national morbidity registers exist as to MSC or any of the more specific conditions. There are however some regional registers of RA that might serve as sentinel stations for the overall trend in incidence and prevalence.

However, there are also some malignant cancers of musculoskeletal origin, bone and soft tissue tumours, that are recorded in National Cancer Registries (Bauer 1999). Since the tumours are quite uncommon, a registration is of importance to document changes in incidence or prevalence.

Joint replacements are very effective procedures to treat degenerative joint diseases and hip fractures. Scandinavian countries have long experience with national registers for frequent operative procedures such as hip and knee replacement (Malchau 2002, Robertson 2000, 2001). These register allow to analysis outcome, to document changing trends in surgery and to improve quality of care by documenting early failures of certain implants. The European Federation of National Associations of Orthopaedics and Traumatology (EFORT) is considering to coordinate a European Implant Register.

The high number of patients with hip fractures and the tremendous treatment cost have, during the last few years, resulted in an increased awareness of the magnitude of this problem. A national registration of the outcome after hip fractures in the elderly started in 1988 in Sweden to compare different methods of surgery, mobilization and rehabilitation. This project has attracted great international interest and several centres have participated with prospective registration. With support from the European Commission a project was started in 1995 called Standardized Audit of Hip Fractures in Europe (SAHFE). The project aims to encourage centres in Europe to participate in a hip fracture audit with a defined data set consisting of a core of 34 questions which includes outcome measures at 4 months from operation.

In addition there is one European register for documentation of congenital abnormalities, EUROCAT (European Registration of Congenital Anomalies and Twins), every third congenital abnormality relates to MSC problems.

Drugs have been increasingly important in the treatment of RA and similar conditions, and for the prevention of osteoporosis. As dealt with in another EU project, there are some national registers of drug utilisation that might serve as a tool for monitoring interventions based on defined daily doses (DDD). Whole sale monitoring for disease specific drugs is a valuable tool for monitoring. Prescription based registers, as are at present introduced in several countries, linked with age, sex

and diagnosis, give better information.

Availability of care could roughly be measures by the number of beds in rheumatological and orthopaedic wards per population and the number of rheumatologists, orthopaedic surgeons and physiotherapists. We question the use of such data for a valid international comparison of availability.

11.6 Research projects

Most of our knowledge of the incidence and prevalence of MSC is a result of ad hoc research projects. For the more specific conditions, accepted definitions exist, but for the unspecified conditions a variety of definitions have been used.

11.7 Conclusion

Musculoskeltal conditions and problem are a heterogeneous group, some well defined, some not. The conditions are often invisible as the main importance is as co-morbidity, as a cause of death, as a cause of limited function, and length of hospital stay.

In some countries there has been some attempt to monitor by using similar instruments over time. So far, these instruments are not good enough for international comparison. There is a great need for standardized procedures to get reliable information on the incidence and prevalence as well as the consequences of the conditions. Existing data are of limited value as an international monitoring tool, and the variation of methodology makes it almost impossible to do post harmonisation of existing data.

12 RECOMMENDED INDICATORS FOR MONITORING MUSCULOSKELETAL PROBLEMS AND CONDITIONS, THEIR DETERMINANTS AND CONSEQUENCES

12.1 Introduction

Musculoskeletal problems and conditions form a heterogeneous group for a great part with poorly understood causes. The group comprises clear cut diagnoses, biologically and clinically well defined such as rheumatoid arthritis and sciatica, biologically defined, but clinically less well defined diagnoses such as osteoporosis and arthrosis, as well as controversial conditions as nonspecified low back pain, fibromyalgia, and myofacial pain syndromes. The common denominators are pain and reduced function resulting from some disturbances in the musculoskeletal system ensuing mainly from inflammation, degenerative processes and trauma.

In this final chapter we will present our recommendations under the headings of the occurrence of the conditions, the determinants and the consequences, as can be monitored in:

Health interview surveys
Health examination surveys
Health care utilisation
Social security
Registers
Research projects

Although health care utilisation and social security data can be used as indicators for the occurrence, they will mainly be treated under the section on consequences.

The term unspecified musculoskeletal problems is a non-diagnostic approach which includes all pain conditions in the musculoskeletal system. This embraces the specific conditions included in this report (RA, OA and OP), as well as malformations, sequelae after injuries, infections and tumours if they are symptomatic.

12.2 Monitoring of unspecified musculoskeletal problems

A EUROSTAT committee has recommended, and EUROBAROMETER 2002 has used what is called the Minimum European Health Module. This consists of the three following questions:

Minimum European Health Module

1. How is your health in general?
   Very good / good / fair/ bad / very bad.

2. Do you suffer from (have) any chronic (long-standing) illness or condition (health problem)? Yes/ No.
3. For the past 6 months or more have you been limited in activities people usually do because of a health problem ?
   Yes, strongly limited / Yes, limited / No, not limited.

These questions are highly relevant for musculoskeletal problems at an unspecific level. Although pain is not included, bodily pain is the self reported complaint most strongly associated with question 1, "How is your health in general". In addition the questions cover longstanding conditions and functional limitations. There is however no direct linkage between the longstanding condition and the limited activity.

As pain is a common feature of most musculoskeletal problems and conditions, the main way of monitoring these is in health interview surveys. Theoretically we have a complicated matrix to characterise unspecified musculoskeletal condition (where identifiable), a time perspective and linking.

- **The Condition**	- **Time dimension**	- **Linking**
- Diagnosis	- Start	
- Complaint quality	- Incidence and prevalence	
- Complaint origin	- Mode	
- Complaint severity		
- Complaint localisation		

THE CONDITION

Diagnosis

Some health interview surveys include specific questions on diagnosis, as "have a doctor ever told you that you have osteoporosis?". Such questions are not considered relevant for monitoring unspecified musculoskeletal problems and will not collect information about injuries.

Complaint quality

Although most questionnaires ask for pain, other complaint qualities are also relevant and has partly been used, as swelling, discomfort, stiffness, reduced mobility. One of the earlier instruments, the so called Nordic questionnaire asks for "any pain or discomfort".

Complaint origin

This report is about musculoskeletal conditions, in real life we ask for complaints, and SF-36 asks for pain in general. Most questionnaires ask for complaint in the musculoskeletal system, although persons answering might not be able to distinguish between complaints in the musculoskeletal system from those coming from other structures and organs, or referred pain.

Complaint localisation

In a musculoskeletal perspective we need information on where the complaint is. Two methods have been used, either a body manikin with the possibility to tick relevant body areas, or specific question like "Have you had low back pain", or a combination of both.

Complaint severity

Severity might be monitored with questions on the intensity of complaint/pain, the duration of the complaint and the consequence of the complaint, mainly reduced function. Attempts have been made to construct severity indexes based on such questions.

THE TIME DIMENSION

Start

Normally one aims at defining the start of any condition. As we know that bodily pain is frequently reported among schoolchildren, and as it is often recurrent, there are obvious problems with defining a starting point, nevertheless many questionnaires include questions on for how long the person has had the complaint.

Incidence and prevalence

The usual way of describing the occurrence of chronic conditions is by prevalence and incidence. As an exact start is often difficult to define, incidence is a problematic term for many musculoskeletal conditions, particularly the unspecified. In trying to define the prevalence, choice of time window is essential; today, all last week, during last week, all last year, during last year. Seemingly small differences in question formulation will give dramatic differences in answers. "Today" includes all the chronic conditions, the broader the time window, the more isolated episodes will be included.

Mode

Musculoskeletal conditions might be chronic, frequently recurring, seldom recurring and isolated episodes. From a public health perspective, musculoskeletal complaints are to be considered almost a normal situation. It is therefore important to make a distinction between insignificant, time limited complaints and chronic or frequently recurrent complaints. Whether the situation is stable or has deteriorated is also of interest.

LINKING

Many respondents in health interview surveys report complaints from different sites. To make the matrix even more complicated, there is a need for relating the different locations to the different time dimensions and the complaint characteristics. This could be done by separate questions for the different locations.

A possible solution could be starting out with a question like: Have you ever had pain in or around any of your bones, joints or muscles? If yes, where was that pain (respondent completes a manikin).

Then for each area of pain the respondent is asked "Do you have pain in this region now?" If no, when did you last have pain in this region (offer choices – e.g. in the last week, in the last month, in the last year, more than one year ago).

For the last episode ask how long it lasted (e.g. at least one day, at least one week, at least one month, at least three months, at least one year)

Then for each area of pain ask "Did this pain prevent you from carrying out your normal activities (offer choices e.g. leisure activities, household activities, employment), and finally, mark on a scale from one to 10 the intensity of the pain.

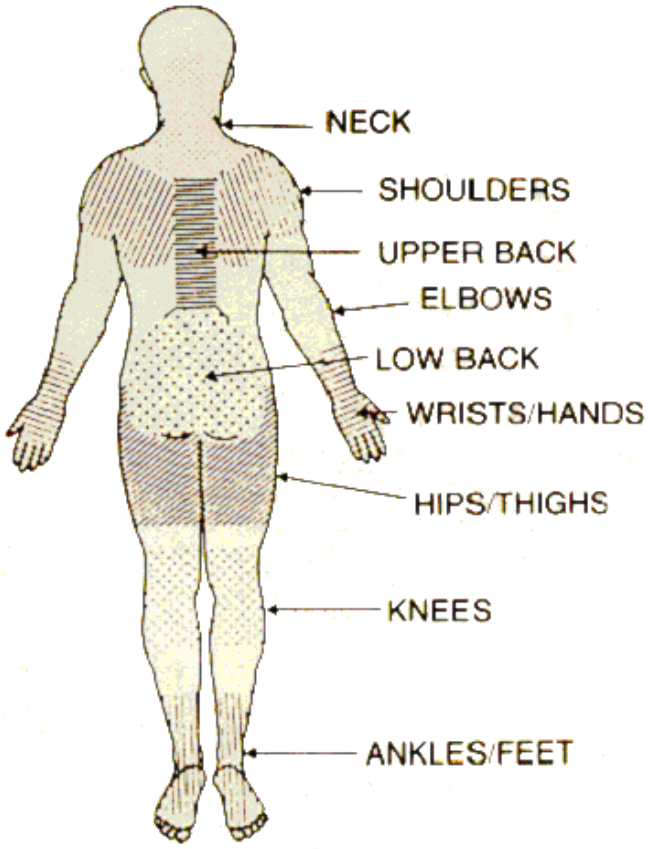
For international monitoring purposes, it would be difficult to ask such a comprehensive range of questions.

SF-36 is a widely used and acceptably validated instrument including health in general, mental health, physical health, pain, fatigue and function. It has been recommended for generic monitoring of mental health in the HMP. For our purpose SF-36 includes pain in general, not musculoskeletal pain. The distinction between bodily pain and musculoskeletal pain in epidemiological surveys might in the future show up to be more problematic in epidemiological surveys than considered at the moment. We prefer to use the indicator of musculoskeletal pain, or more correctly pain considered by the respondent, to be of musculoskeletal origin.

The greatest problem with SF-36 for our task is that it does not include any information on location. To monitor musculoskeletal pain, one needs information on location.

The so called Nordic questionnaire uses a manikin to illustrate the different locations, altogether 9 (figure 4).

Figure 4. The Nordic manikin



A recent Dutch study has used the questions shown in table 19:

Table 19 Dutch questionnaire on musculoskeletal pain

During the past 12 months have you had pain in:		Do you still have pain?	If YES, do you have pain longer than 3 months?
neck	YES →	YES → NO	YES NO
shoulder(s)	YES →	YES → NO	YES NO
high in back	YES →	YES → NO	YES NO
elbow(s)	YES →	YES → NO	YES NO
wrist(s) or hand(s)	YES →	YES → NO	YES NO
lower back	YES →	YES → NO	YES NO
hip(s)	YES →	YES → NO	YES NO
knee(s)	YES →	YES → NO	YES NO
ankle(s) or foot/feet	YES →	YES → NO	YES NO

RECOMMENDATIONS

We suggest a compromise with the following set of core questions to be included in all HIS questionnaires.

1. During the last week, have you had any pain affecting your muscles, joints, neck or back which has affected your ability to carry out the activities of daily living? If Yes, please tick the region(s) in the grid (column a)

2. Has this pain (or pains) lasted for 3 months or more? If Yes, please tick the region(s) in the grid (column b)

.	a) Pain last week	b) Pain lasted for three months or more
Head		
Neck		
Shoulder(s)		
Upper back		
Elbows		
Wrist(s) / hand(s)		
Low back		
Hip(s) / thigh(s)		
Knee(s)		
Ankles / foot/feet		

These questions include something about time period "the last week", duration "lasted for three months or more" and something about severity "Has this limited your abilities to carry out activities of daily living". The latter relates to reduced function as a consequence of the complaint. As an example, the Nordic questionnaire tries to include most musculoskeletal complaints by asking for "any pain or discomfort". Pain intensity in itself is not included.

With the suggested method we will get information on affected regions, and might also define widespread pain as pain reported from at least four different regions.

The limitation of such a combination of time period, duration, severity and location is the lack of indication of what is worst, what is most important for the functional restriction. Another limitation is recall bias. By asking for problems of a certain duration and severity, recall bias should be reduced.

No instruments for monitoring musculoskeletal problems in health interview surveys have been properly validated in an international setting. There might even be cultural differences in the interpretation of a general question as the one suggested. The need for standardisation is however very strong, although some countries will argue for continuing their own method in order to be able to compare national data over a time period.

Health examination surveys will give no additional information on unspecified musculoskeletal problems.

Hospital data are not considered valid for this purpose. Routine data from general practice might be a proxy for the occurrence of unspecified musculoskeletal problems. A more valid method is to include unspecified musculoskeletal problems in ad hoc registrations from GP networks (ICPC category L), but even this is not considered a practical tool for international monitoring at present.

Social security data give number of persons on sick leave and with disability pension with musculoskeletal diagnoses. Such data have been used as a proxy for the occurrence of unspecified musculoskeletal problems. They are however mainly a measure of consequences of musculoskeletal problems and will hence be mentioned later.

As our understanding of unspecified musculoskeletal problems is still scarce, in particular the less well defined conditions, we need more research projects, seeking a consensus, not only for monitoring in HIS, but also for research projects. This is a challenge for the research community.

A set of core questions such as we have recommended could be used both for routine health interview surveys and for research projects.

Indicator's name

Occurrence of self reported musculoskeletal pain

Operational definition

Self report in health interview survey of pain and limited function from different

Technical criteria

HIS is the simplest method of measuring the occurrence of musculoskeletal pain.

Data sources

Health interview survey

Data availability in the MS

Every member country is running some form of HIS at varying intervals.

12.3 Monitoring of specific musculoskeletal conditions

A simple possibility is to include specific questions about diagnoses in HIS, «have you, or have you ever had the following diseases», or «have you ever been told by a doctor that you have the following diseases». This has been done and partly validated.

RHEUMATOID ARTHRITIS

It is possible to measure the prevalence of RA by following up a HIS with a HES. The following steps would be required. Question: "Have you ever had joint swelling which has lasted for at least four weeks – please indicate on the manikin which joints were affected". Subjects who have had swelling of two or more joints (excluding the ankles) are asked to attend a HES for an examination of the joints. Those who satisfy three or more of the ACR criteria (table 2) are then asked to have X-rays of their hands and a blood test for rheumatoid factor. This method has been validated and successfully used in research projects. This approach needs trained persons for the clinical examination.

As RA is handled differently in different health care systems, even diagnoses from primary and hospital care are considered of limited value for international monitoring purpose.

Specific registrations by general practice networks with defined diagnostic criteria might however be a possibility in the future.

The condition is usually progressive with increasing joint damage and loss of function. Staging of the condition according to functional status or by joint damage on radiography is an important part of monitoring.

RA is treated with a variety of drugs used for different purposes. Lately drugs have been developed which are almost exclusively used for RA and related conditions. Wholesale registration of the use of these drugs will reflect more on treatment routines, and if and how the expenses are reimbursed in different countries, as it is a proxy for occurrence. However, an increasing number of national and regional prescription registers will give even better information with linking to age, sex and sometimes diagnoses.

The group recommends supporting the existing and planned regional registers of the incidence and prevalence of RA using agreed classification criteria at least the 1987 ACR criteria such as have been established in some places as the best way of monitoring this serious disease.

The registers are based on the assumption that the majority of RA cases will be handled by specialists in rheumatology, and/or at rheumatological departments. Some patients, mainly old ones will however often be treated by general practitioners, and some patients with moderate symptoms might well be undiagnosed. The magnitude of underreporting (which again might vary between countries and health care systems) might be measured in ad hoc research projects. As shown in previous chapters, research projects, even with internationally accepted criteria, are showing inter study variation of a magnitude that is obviously greater than what is the real occurrence. Meta analyses might however give some indications of crude differences as the mentioned north-south gradient in Europe.

Indicator's name

Occurrence of rheumatoid arthritis

Operational definition

Incident and prevalent cases of RA according to age and sex.

Justification for selection

Disabling condition with great consequences for the individual and society

Technical criteria

Based on clinical diagnoses according to international criteria using HES with additional laboratory tests and X-rays

Data sources

Existing and future regional registers

Data availability in the MS

Existing registers in e.g. Norfolk, U.K., Oslo, Norway

OSTEOARTHRITIS

Osteoarthritis is a very frequent condition among elderly. The diagnosis or case definition is based on criteria related to cartilage loss and joint pain. It is associated with a great burden to patients, the health care system and society.

OA can not easily be monitored by HIS, although joint pain in someone over 50 years is likely to be due to it. The question "have you ever been told by a doctor that you have osteoarthritis" will give some information of value.

A three step HIS/HES combination including x-ray is recommended to monitor osteoarthritis. 1) The core question suggested above can be used as a screen. 2) Subjects who report pain in the hands, hip, knee or spine which limits their activities are asked to attend for a clinical examination. 3) Those or a sample of those who have signs of bony enlargement, crepitus and/or reduced range of movement in the affected joints are asked to have an X-ray of that joint.

It is however not possible to estimate the prevalence of OA in all joints because it would be unethical to X-ray all the joints in the body including the spine. As a monitoring tool this approach is also much too complicated, time consuming, and expensive.

The most reliable data on occurrence of OA are obtained from research surveys using radiological OA criteria in combination with clinical symptoms (pain and limited function).

Hospital admission or discharge diagnoses are hardly comparable, because of different approaches to these patients as well as different diagnostic categories and the possible selection bias.

An increasing number of countries have national data on joint replacement surgery, sometimes divided by indication (trauma, inflammatory conditions, and degenerative conditions). As joint replacement is a method under rapid development, the number of OA-related replacements, for a monitoring purpose, will more be an indicator of national policy or priority (health care availability), than being an indicator of occurrence.

As for the other conditions, routine data from general practice will be of limited value. Specific ad hoc or recurrent registration by GP networks might in the future be a way of monitoring.

We do not know of any running updated national or regional registers of OA.

In the near future ad hoc research projects among the oldest part of the population might still be the best way of getting information of the occurrence of osteoarthritis. Harmonising of methods and questions will increase the value of research projects as a monitoring tool.

Since knee and hip OA, in terms of disability and need for care, are much more important than OA in other locations, OA in those joints merits major attention.

Indicator's name

Occurrence of osteoarthritis in hip and knee

Operational definition

Prevalence of OA according to localisation, age and sex

Justification for selection

Frequent and disabling condition among the elderly

Data sources

Research projects based on HIS and HES

Technical criteria

Diagnosis preferably based on radiographic criteria with the addition of consequences of pain and limited function.

Data availability in the MS

No known routine monitoring in any MS

OSTEOPOROSIS

Osteoporosis used to be considered an unavoidable result of ageing with limited interest from the research community. The clinical manifestation of fracture following low energy trauma is now recognised as a major burden in the elderly. It is today a theoretical and practical challenge to research, prevention, treatment and care. Promising advances in prevention and treatment have been made in recent years. The occurrence may be measured by fractures (actually a consequence) and low bone density (an important structural change defining the condition).

The extensive European study (EVOS) has shown that it is possible to run big, international comparative studies of OP. Monitoring is however a greater problem. The occurrence of fractures following low energy trauma in those over 50 years can be monitored by a HIS with manikin or question to establish fracture site. A HES which includes DEXA of the hip and spine is the best way of estimating the prevalence of low bone density. Bone densitometry of the distal arm or the heel is a simpler, but also less valid method. As shown in the EVOS study, cross-calibration of equipment is necessary. Further technological development might make measurement of bone density easier in the future. Biochemical bone markers are according to studies so far of limited value, but also here, further development might give better tools for monitoring.

Health care utilisation data, admission or discharge data are not valid for monitoring OP in general. OP is more often a co-morbidity, increasing the need for care, than the specific diagnosis made at admission or discharge. Admission for fractures at older age, in particular hip and fore arm fractures, are however a proxy measure of occurrence of OP.

Data from primary care will not be of any interest in monitoring OP.

To our knowledge no national or regional registers exist. Hospital, drug sales and prescription registers will be an indicator of the treatment of OP, with the same limitations as a monitoring tool as mentioned for RA.

Indicator's name

Occurrence of osteoporosis

Operational definition

Prevalence of bone density according to age and sex

Justification for selection

Frequent and disabling condition among the elderly with a potential for reduced prevalence because of preventive efforts

Data sources

Research projects based on HES

Data availability in the MS

No known national routine monitoring in any MS

12.4 Monitoring of determinants

The most important determinants for MSC are also established risk factors for other illnesses.

For the purpose of monitoring determinants for MSC, factors as weight, smoking, and physical activity should be included according to recommendations made by other groups inside the Health Monitoring Project. Although less strong than earlier assumed, work strain, both physical and psychosocial are determinants for musculoskeletal pain. These risk factors will be covered by the group on work environment.

Socioeconomic status seems to be a determinant for some of the conditions. It is a stronger predictor of the outcome of the conditions. Persons with low socioeconomic status run a dramatically higher risk of ending up with a disability pension for any diagnosis, and even more with musculoskeletal complaints. Again we have no specific recommendations but support the recommendations made by others in the HMP.

All of those risk factors/determinants should best be monitored by health interview surveys using standardised questions and categories of answers.

Injuries are strong determinants for musculoskeletal, not only temporary, but also chronic. The group has however decided not to recommend ways of monitoring injuries.

Other of the determinants mentioned under chapter 8 are considered to be of lesser significance, and we will not recommend them to be included in a community based monitoring program.

The group hence recommends specific indicators for monitoring determinants and risk factors for development of musculoskeletal problems and conditions which in general are in accordance with those already known for other health conditions.

12.5 Monitoring of consequences

The high burden of disease and the high costs to society generated by MSC are the most important reasons for monitoring these conditions.

We will divide consequences into personal and societal and will consider personal consequences within the framework of the ICF.

PERSONAL CONSEQUENCES

The most important personal consequence of MSC is pain. Pain has been defined as the main definition in the unspecified approach, and it is considered earlier.

MSC are also associated with structural changes. There is cartilage loss in osteoarthritis, erosions of joints in rheumatoid arthritis and loss of bone mass, microarchitecture and fractures in osteoporosis. However the monitoring of these would require investigative procedures such as a x-ray or bone densitometry.

Reduced function is the other major consequence of MSC, and the main reason for the enormous expenses for the society.

The reduced function has several components such as reduced muscle strength, coordination and mobility which in fact are, according to the ICF, consequences of MSC in the domains of body function and structure. Reduced function can result in reduced ability to perform tasks such as self care, care for others, leisure activity and wage earning. It can also restrict participation such as social role, as well as in work, social and leisure participation.

Function, activities and participation can be measured using generic or disease specific instruments. The SF-36 is the most widely used instrument for measuring function. 20 of the questions are directly related to function. 12 questions cover function in general, five questions relate to reduced function because of physical health problems and three on reduced function because of mental health problems. From a MSC perspective the value of a distinction between physical and mental reason for reduced function is questionable.

A theoretical problem is that if a person has more than one conditions, including a musculoskeletal condition, the questions in most questionnaires will not make it possible to make any distinction between the conditions. We argue however both from a theoretical and practical viewpoint that function should be considered a global state, not specifically linked to a special condition.

Quality of life is an important factor for people with MSC. For our purpose measuring function is more important than measuring quality of life. Knowing the limited space in any health interview study, we will hence not recommend specific questions on quality of life to be included. If it should be recommended from the HMP as a whole, from a MSC perspective loss of quality of life mainly include bodily pain, loss of physical function, loss of social role fulfilment and – to a lesser extent – emotional and psychological problems.

The generic quality of life instrument SF-36 has been used widely. This covers all domains considered important for MSC. Currently, comprehensive deduction of the SF-36, the SF6D, is being tested as an utility tool allowing this instrument to calculate DALY's.

For the specified MSC, disease specific instruments on functional limitation are recommended, such as the HAQ.

A number of the health monitoring programme projects have worked with personal consequences of disease. The Euro REVES project has dealt with this at a generic level; and they recommend the following five instruments:

1. a general question about activity restrictions
2. a general question about perceived health
3. a set of specific questions on physical and sensory functional limitations
4. a set of specific questions on personal care activities
5. a set of specific questions on mental health

To supplement these they propose six further indicators:

6. a general question about chronic morbidity
7. a set of specific questions on chronic morbidity
8. a set of specific questions on cognitive functional limitations
9. a set of specific questions on household activities
10. a set of specific questions on other activities of daily living
11. a set of specific questions on perceived health

They will provide a coherent set of 11 instruments leading to many health state expectancies covering the totality of the conceptual framework of the measurement of population health. Making it possible at the same time to measure the extent of the differences in health between the European Union countries, to appreciate the causes, to specify the profile of each country and the differences between the various concepts of health: chronic disease, functional limitations, activity restrictions, mental health and perceived health.

Euro REVES recommend the following instruments:

A. On functional limitations:

1. Seeing clearly newspaper print
2. Seeing clearly the face of someone from 4 metres (across a road)
3. Hearing distinctly what is said in a conversation with one person
4. Keeping balance
5. Walking 500 metres
6. Going up and down a flight of 12 stairs
7. Speaking clearly to others
8. Biting and chewing on hard foods such as a firm apple
9. Reaching out an arm to shake someone's hand
10. Using fingers to grasp or handle a small object like a pen
11. Turning a tap
12. Bending down or kneeling down
13. Lifting and carrying a full shopping bag of 5 kilos

B. On Activity restriction.

In everyday life, ignoring temporary problems, do you usually without any difficulty, without

(human / technical) help:

1. feed yourself
2. transfer in and out of bed
3. dress and undress yourself
4. use toilets
5. bath or shower yourself.

In addition the use of personal help or aids or adaptations are collected separately allowing two main types of health expectancy to be computed: activity restriction-free life expectancy and dependence-free life expectancy (including or not severity levels).

C. On global activity limitations:

The wording of the proposed instrument is: for the past 6 months or more have you been limited in activities people usually do because of a health problem ?
Yes, strongly limited / Yes, limited / No, not limited.

Indicator's name

Reduced function

Operational definition

Prevalence of persons with reduced function according to age and sex

Justification for selection

After a period which focused on reduced life expectancy and mortality as a measure of disease severity, we suggest that reduced function should now be viewed as a major dimension in public health work for the future

Data sources

Questions on function as recommend in Euro REVES

Data availability in the MS

Many national HIS and research projects include questions on function

SOCIETAL CONSEQUENCES

In health statistics the burden of MSC is often hidden behind other diagnoses. They are often the co-morbidity resulting in greater need for care and longer stay in hospitals. Total costs for society are hence difficult to calculate. How important is a non-registered osteoarthrosis of a knee for the need for care in a nursing home for a patient categorized with moderate heart failure and reduced vision?

The societal consequences are considered under the headings of costs, health systems, social security and registers.

COSTS

As seen from the Dutch data, it should be possible to make calculations of the total economical burden to society generated from different conditions. Such estimates would be of special importance for the visualising of the enormous costs of MSC, conditions that, as previously mentioned, often are hidden in e.g. social security costs.

It should be a challenge for health economics to make indicators for total costs suitable for use in international comparisons. We have not gone deeper into this important part of visualising and monitoring the societal burden of MSC.

Important is, however, that the costs can be linked to the MSC. The most relevant social costs for MSC are: paid days lost because of condition, disability pension, work adaptation, home adaptations, payment to care, nursing homes and the costs of health care utilisation (hospital, specialists, drug use, etc.).

HEALTH SYSTEMS

Treatment of the unspecific musculoskeletal complaints shows significant inter-country variations. Conditions such as low back pain and widespread pain are in some countries treated and rehabilitated as in-patients, but in other countries mostly in primary health care. The number of admissions and length of stay for MSC as a group is hence of limited value as a monitoring tool internationally. For other conditions such as hip fractures and joint replacements most patients are hospitalised. Hip fractures might be considered a measure of the occurrence of osteoporosis, joint replacements according to diagnosis is a measure of consequence of both RA and OA. Existing national hospital data are, even for such a clearly defined condition as fracture of the neck of femur, not trustworthy because of inter-country variations that far exceed what is found in specific research projects.

Quality assurance has to be done before such routine data could be used for valid and meaningful international comparisons.

Health personnel statistics could be used as an indicator of availability (number of orthopaedic surgeons, rheumatologists, and physiotherapists), as well as number of beds in rheumatological departments and rehabilitation clinics. For the purpose of monitoring MSC, their determinants and consequences it is considered of limited interest.

SOCIAL INSURANCE

Publication of social security expenditures according to medical diagnoses is one of the reasons why MSC have got increasing attention among administrators as well as politicians.

Social security systems vary considerably from country to country both for coverage (who are eligible for benefits), and for definition of different states. Different persons are included under terms as sick leave, rehabilitation, early retirement, and disability pension.

Many of the member states are using ICD in classifying persons given social security benefits. On going, although slow harmonisation of social security systems will make social security statistics increasingly interesting in international monitoring of consequences of MSC.

Even today there might be a possibility to do post-harmonisation to make existing data comparable. Numerous attempts to make comparable international social security statistics on sick leave and disability pension are not convincing, however.

Indicator's name

Work disability

Operational definition

Permanent and temporal work disability according to diagnosis

Justification for selection

High societal costs for MSC

Data sources

National statistics, insurance registers

Data availability in the MS

National statistics on social security available in most MS

REGISTERS

MSC are conditions affecting function and quality of life, more than shortening life. Current musculoskeletal problems are dominated by the demands from the elderly and the community, to live an independent, mobile and pain free life. Fractures in the elderly, particularly hip fractures constitute one of the major problems. The increasing number of elderly persons during the next few decades in the western world as well as an increasing age specific incidence give extra importance to this already large problem

Indicator's name

Occurrence of hip fracture

Operational definition

Incidence of hip fractures

Justification for selection

Frequent, expensive and disabling condition among the elderly with a potential for improving surgical care and rehabilitation

Data sources

Hospital data

Data availability in the MS

National system in place in some MS

Joint replacements, especially of the hip and knee, have improved the quality of life of many people with degenerative or inflammatory joint diseases or hip fractures. However, there is so far no uniform agreement about the indications and the timing for the operation and the rehabilitation. The outcome after surgery varies, partly related to the operation and the implant, partly related to intrinsic patient factors. There is also a continuous development process to improve the implants. Failures of implant design are often only seen after years, so that a register could also provide consumer protection in form of an early warning.

Indicator's name

Hip and knee arthroplasty

Operational definition

A) Incidence of hip and knee joint replacements

B) Indications for hip and knee joint replacements

Justification for selection

Frequent and expensive procedure

Data sources

Hospital data

Data availability in the MS

National joint replacement registers exist in some MS

Drug sales statistics and even better, prescription registers, including age, sex, and diagnosis is a valid measure of how the health care system reacts to the conditions. There is at the moment huge interest in new and more costly drugs for RA and OP. How these are introduced in different countries should be of interest, mostly as a way of monitoring availability. The Commission are at the moment running another project on drug utilisation, which we recommend to include drugs for RA and OP.

Indicator's name

Drugs for treatment and prevention of osteoporosis

Operational definition

Defined daily doses of drugs (ATC M 05 B)

Justification for selection

Expensive and effective drugs are introduced which might influence the prevalence of osteoporosis and osteoporotic fractures

Data sources

Whole sale statistics/prescription registers

Data availability in the MS

Whole sale statistics available in many MS. Prescription registers introduced in an increasing number of regions and countries.

Indicator's name

Drugs for treatment of rheumatoid arthritis

Operational definition

Defined daily doses of drugs (ATC L 04 A) used for rheumatoid arthriti

Justification for selection

Expensive and effective drugs are introduced which might influence the consequences of rheumatoid arthritis

Data sources

Whole sale statistics/prescription registers

Data availability in the MS

Whole sale statistics available in many MS. Prescription registers introduced in an increasing number of regions and countries.

Under RA we have recommended supporting existing and planned registers of RA as the most valid and realistic way of monitoring, together with ad hoc research projects.

12.6 Concluding remarks

Table 20 summarises the recommendations on how to monitor the occurrence of the selected index conditions of MSC

Table 20. Recommended sources of information on the occurrence of the index MSCs

	HIS	HES*	Primary Care	Secondary Care	Registers**
Unspecified MSC					
Incidence	++				
Prevalence	++		(+)		
RA					
Incidence			(+)	+	++
Prevalence	(+)	+	(+)		++
OA					
Incidence			(+)		
Prevalence	(+)	+	(+)		+
Osteoporosis Fractures					
Incidence	+	+	(+)	++	++
Prevalence	++	++	(+)		++
Low BMD					
Prevalence		++			++

* with the addition of x-ray examination, blood test or bone densitometry as indicated

** including research surveys

The main objective of the group has been to focus on MSC as a major challenge to societies and health care systems.

For monitoring purposes musculoskeletal problems and conditions should always be included as conditions with an important effect on health.

Use of existing data on morbidity and use of health and social care resources is dependent on a critical and broad quality assessment of the data sources in the different countries.

The most important priority is to get recognition for the magnitude of the problem and the tremendous costs for society. This will force the Community to establish harmonised means for monitoring. The need for such an approach will be even greater in the future when the Community will be extended with countries with other traditions in gathering routine statistics.

The big challenge is that the burden of MSC has not really been taken seriously neither by clinicians, researchers nor politicians.

13 REFERENCES

(1) Urwin M, Symmons D, Allison T, Brammah T, Busby H, Roxby M et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. Ann Rheum Dis 1998; 57:649-655.

(2) Papageogiou AC, Croft P, Ferry S, Jayson MIV, Silman A. Estimating the prevalence of low back pain in the general population. Evidence from the South Manchester Back Pain Survey. Spine 1995; 20:1889-1894.

(3) McAlindon TE, Cooper C, Kirwan J, Dieppe P. Knee pain and disability in the community. Br J Rheumatol 1992; 31:189-192.

(4) Reisine S, Fifield J, Walsh SJ, Feinn R. Factors associated with continued employment among patients with rheumatoid arthritis: A survival model. J Rheumatol 2001; 28:2400-2408.

(5) Jonssen D, Husberg M. Socioeconomic costs of rheumatic diseases: implications for technology assessment. Int J Technol Assess Health Care 2000; 16:1193-1200.

(6) Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL et al. The American College of Rheumatology 1990 Criteria for the Classification of Fibromyalgia. Report of the Multicenter Criteria Committee. Arthritis & Rheumatism 1990; 33(2):160-172.

(7) Macfarlane GJ, Croft PR, Schollum J, Silman AJ. Widespread pain: is an improved classification possible? Journal of Rheumatology 1996; 23(9):1628-1632.

(8) Macfarlane GJ. Generalized pain, fibromyalgia and regional pain: an epidemiological view. Best Practice & Research in Clinical Rheumatology 1999; 13(320023792):403-414.

(9) Crombie IK, Croft PR, Linton SJ, Le Resche L, Von Korff M. Epidemiology of pain. 1 ed. Seattle: IASP Press, 1999.

(10) Dionne CE. Low Back Pain. In: Crombie IK, Croft P, Linton S, Le Resche L, Von Korff M, editors. Epidemiology of pain. Seattle: IASP Press, 1999: 283-297.

(11) Anderson JA. Epidemiological aspects of back pain. J Soc Occup Med 1986; 36:90-94.

(12) McKinnon ME, Vickers MR, Ruddock VM, Townsend J, Meade TW. Community studies of the health service implications of low back pain. Spine 1997; 22:2161-2166.

(13) Spitzer WO, LeBlanc FE, Dupuis M, Abenhaim L, Belanger AY, Bloch R et al. Scientific approach to the assessment and management of activity-related spinal disorders. A monograph for clinicians. Report of the Quebec Task Force on Spinal Disorders. Spine 1987; 12:S1-S59.

(14) Ariens GAM, Borghouts JAJ, Koes BW. Neck pain. In: Crombie IK, Croft PR, Linton SJ, LeResche L, Von Korff M, editors. Epidemiology of pain. Seattle: IASP Press, 1999: 235-255.

(15) Van der Windt DAWM, Croft PR. Shoulder pain. In: Crombie IK, Croft PR, Linton SJ, LeResche L, Von Korff M, editors. Epidemiology of pain. Seattle: IASP Press, 1999: 257-281.

(16) Pope DP, Croft PR, Pritchard CM, Silman AJ. Prevalence of shoulder pain in the community: the influence of case definition. Ann Rheum Dis 1997; 56:308-312.

(17) McCarney R, Croft PR. Knee pain. In: Crombie IK, Croft PR, Linton SJ, LeResche L, Von Korff M, editors. Epidemiology of pain. Seattle: IASP Press, 1999: 299-313.

(18) Arnett FC, Edworthy SM, Bloch DA, MCSHANE DJ, Fries JF, Cooper NS. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. Arthritis Rheum 1987; 31:315-324.

(19) Ramsey SE, Bolaria RK, Cabral DA, Malleson PN, Petty RE. Comparison of criteria for the classification of childhood arthritis. J Rheumatol 2000; 27:1283-1286.

(20) Kellgren JH, Lawrence JS. Radiological assessment of rheumatoid arthritis. Ann Rheum Dis 1957;485-493.

(21) Oleksik A, Lips P, Dawson A, Minshall ME, Shen W, Cooper C et al. Health-related quality of life in postmenopausal women with low BMD with or without prevalent vertebral fractures. Journal of Bone and Joint Surgery 2000; 15:1384-1392.

(22) Oleksik A, Ewing SK, Duong T, Shen W, Lips P. Three years of health related quality of life assessment in postmenopausal women with osteoporosis: Impact of incident vertebral fractures, age and severe adverse events. Journal of Bone and Mineral Metabolism 2000; 15:1118.

(23) Natvig B, Nessiøy I, Bruusgaard D, Rutle O. Musculoskeletal symptoms in a local community. Eur J Gen Pr 1995; 1:25-28.

(24) Waddell G. The back pain revolution. Edinburgh: Churchill Livingstone, 1998.

(25) Magni G, Moreschi C, Rigatti-Luchini S, Merskey H. Prospective study on the relationship between depressive symptoms and chronic musculoskeletal pain. Pain 1994; 56:289-297.

(26) Wigers SH. Fibromyalgia outcome: the predictive values of symptom duration, physical activity, disability pension and critical life events. A 4,5 year prospective study. J Psychosom Res 1996; 41:235-243.

(27) Natvig B, Bruusgaard D, Eriksen W. Localised low back pain and low back pain as part of widespread musculoskeletal pain, two different disorders? Scand J Rehabil Med 2001; 33:21-25.

(28) Palmer KT, Walsh K, Bendall H, Cooper C, Coggon D. Back pain in Britain: comparison of two prevalence surveys at an interval of 10 years. BMJ 2000; 320:1577-1578.

(29) Vingård E, Nachemson A. Work-related influences on neck and low back pain. In: Nachemson A, Jonsson S, editors. Neck and back pain. The scientific evidence of causes, diagnosis, and treatment. Philadelphia: Lippincott, Williams and Wilkins, 2002: 97-126.

(30) Bernard BP, Fine LJ. Musculoskeletal disorders and workplace factors. A critical review of epidemiologic evidence for work-related disorders of the neck, upper extremity, and low back. CDC/NIOSH: US Department of Health and Human Sciences, 1997.

(31) Hoogendoorn W, van Poppel M, Bongers P, Koes B, Bouter L. Physical load during work and leisure time as risk factors for back pain. Scand J Work Environ Health 1999; 25:387-403.

(32) Hoogendoorn WE, van Poppel MNM, Bongers PM, Koes BW, Bouter LM. Systematic review of psychosocial factors at work and private life as risk factors for back pain. Spine 2000; 25(16):2114-2125.

(33) Bongers P, de Winter CR, Kompier MA, et al. Psychosocial factors at work and musculoskeletal disease. Scand J Work Environ Health 1993; 19:297-312.

(34) Hartvigsen J, Leboeuf-Yde C, Lings S, Corder EH. Is sitting-while-at-work associated with low back pain? A systematic, critical literature review. Scand J Public Health 2000; 28:230-239.

(35) Leboeuf-Yde C. Body weight and low back pain. A systematic review of 56 journal articles reporting on 65 epidemiologic studies. Spine 2000; 25:226-237.

(36) Leboeuf-Yde C. Smoking and low back pain. A systematic literature review of 41 journal articles reporting on 47 epidemiologic studies. Spine 1999; 24:1463-1470.

(37) Leboeuf-Yde C. Alcohol and low-back pain: a systematic literature review. J

Manipulative Physiol Ther 2000; 23:343-346.

(38) Linton SJ. A review of psychological risk factors in back and neck pain. Spine 2000; 25(9):1148-1156.

(39) M. van Tulder, B. Koes, C. Bombardier. Low back pain. Best Practice and Research Clinical Rheumatology 2002; 15.1: 761 - 775.

(40) Crombez G, Vlaeyen J, Heuts P, Lysens R. Pain-related fear is more disabling than pain itself: evidence on the role of pain-related fear in chronic back pain disability. Pain 1999; 80:329-339.

(41) Vlaeyen JW, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. Pain 2000; 85(3):317-332.

(42) Andersson HI, Ejlertsson G, Leden I, Rosenberg C. Chronic pain in a geographically defined general population: studies of differences in age, gender, social class, and pain localization. Clinical Journal of Pain 1993; 9(3):174-182.

(43) Ariens GA, van Mechelen W, Bongers PM, Bouter LM, van der Wal G. Physical risk factors for neck pain. Scand J Work Environ Health 2000; 26:7-19.

(44) Ariens GA, van Mechelen W, Bongers PM, Bouter LM, van der Wal G. Psychosocial risk factors for neck pain: a systematic review. Am J Ind Med 2001; 39:180-193.

(45) van der Windt DA, Thomas E, Pope DP, de Winter AF, Macfarlane GJ, Bouter LM et al. Occupational risk factors for shoulder pain. Occup Environ Med 2000;433-442.

(46) Natvig B., Picavet HSJ. Epidemiology of soft tissue rheumatism. Best Practice and Research Clinical Rheumatology 2002; 15.1: 777 - 793.

(47) Wiles NJ, Symmons DP, Harrison B, Barrett E, Barrett JH, Scott DG et al. Estimating the incidence of rheumatoid arthritis: trying to hit a moving target? Arthritis & Rheumatism 1999; 42:1339-1346.

(48) Symmons D, Turner G, Webb R, Asten P, Barrett E, Lunt M et al. The prevalence of rheumatoid arthritis in the United Kingdom: new estimates for a new century. Rheumatology 2002; 41:793-800.

(49) Lawrence RC, Helmick CG, Arnett FC, Deyo RA, Felson DT, Giannini EH et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. Arthritis Rheum 1999; 41:778-799.

(50) Merx H., Dreinhöfer KE., Schrader P., Sturmer T., Puhl W., Gunther KP., Brenner H. International variation in hip replacement rates. Ann Rheum Dis, 2003; 62-3:222-6.

(51) Silman AJ. European Vertebral Osteoporosis Study (EVOS). Medizinische Klinik 1998; 93:4-5.

(52) Baudoin C, Fardellone P, Bean K, OstertagEzembe A, Hervy F. Clinical outcomes and mortality after hip fracture: A 2-year follow-up study. Bone 1996; 18(3):S149-S157.

(53) McColl A, Roderick P, Cooper C. Hip fracture incidence and mortality in an English region: a study using routine National Health Service data. J Publ H Med 1998; 20:196-205.

(54) Kanis JA. The incidence of hip fracture in Europe. Osteoporosis International 1993; 3(S1):10-15.

(55) Kvalvik AG. Mortality in Europe 1996; 25: 9-14.

(56) Walker-Bone K, Dennison E, Cooper C. Osteoporosis. In Epidemiology of the Rheumatic Diseases edited by Silman AJ, Hochberg MC 2nd Ed. OUP 2001.

(57) Badley EM, Wang PP. Arthritis and the aging population: projections of arthritis prevalence in Canada 1991 to 2031. J Rheumatol 1998; 25:138-144.

(58) Reynolds DL, Chambers LW, Badley EM, Bennett KJ, Goldsmith CH, Jamison E et al.

Physical disability among Canadians reporting musculoskeletal diseases. J Rheumatol 1992; 19:1020-1030.

(59) White KP, Speechley M, Harth M, Ostbye T. Comparing self-reported function and work disability in 100 community cases of fibromyalgia syndrome versus controls in London, Ontario: the London Fibromyalgia Epidemiology Study. Arthr Rheum 1999; 42:76-83.

(60) Tellnes, G., Svendsen, K.-O., Bruusgaard, D., & Bjerkedal, T. (1989). Incidence of sickness certification. Proposal for use as a health status indicator. *Scand J Prim Health Care, 7*, 111-117.

(61) Dreinhöfer KE, Merx H., Puhl W. In Schwerpunkbericht Decade of Bone and Joint Diseases. Hrsg. Statistisches Bundesamt , 2003 (in print).

(62) Stansfeld, S., Feeney, A., Head, J., Canner, R., North, F., & Marmot, M. (1995). Sickness absence for psychiatric illness: the Whitehall II study. *Soc Sci Med, 40*, 189-197.

(63) Brage, S., Nygård, J. F., & Tellnes, G. (1998). The gender gap in musculoskeletal-related long term sickness absence in Norway. *Scand J Soc Med, 26*, 34-43.

(64) National Insurance Administration. (1998). *Yearbook of social insurance statistics 1997*. Oslo: Rikstrygdeverket.

(65) Reynolds, S. L., Crimmins, E. M., & Saito, Y. (1998). Cohort differences in disability and disease presence. *Gerontologist, 38*, 578-590.

(66) Ferron, D. T. (1995). Diagnostic trends of disabled social security beneficiaries, 1986-93. *Soc Secur Bull, 58*, 15-31

(67) Landelijk Instituut Sociale Verzekeringen. Ziektendiagnosen bij uitkeringen voor arbeidsongeschiktheid. Statistische informatie over medische classificatie in WAO, WAZ en Wajong 1999, LISV, Amsterdam, 2001.

(68) Andersson, H.I., Ejlertsson, G., Leden, I., & Scerstén, B. Musculoskeletal chronic pain in general practice. Studie of health care utilisation in camparison with pain prevalence. Scand J. Prim Helath Care, 1999, 17, 87 - 92.

(69) Meerding, W.J., Bonneux, L., Polder, J.J., Koopmanschap, M.A., & van der Maas, P.J. Demographic and epidemiological determinants of health care cists in Netherlands: Cost of illness study. Br. Med. J., 1998, 317, 111 - 115.

(70) Dreinhöfer KE. Prävention und Management effektiver gestalten - Bone and Joint Decade. Deutsche Ärzteblatt 2000, 50/51: A-3478 - 3481.

(71) Badley, E. M., & Ibanez, D. Socioeconomic risk factors and musculoskeletal disability. *J. Rheumatol, 1994, 21*, 515-522.

(72) Mäkelä, M., Heliövaara, M., Sievers, K., Knekt, P., Maatela, J., & Aromaa, A. Musculoskeletal disorders as determinants of disability in Finns aged 30 years or more. *J Clin Epidemiol, 1993, 46*, 549-559.

(73) Claussen, B. Restricting the influx of disability beneficiaries by law: experiences in Norway. *Scand J Prim Health Care, 1998, 26*, 1-7.

(74) Osterweis, M., Kleinmann, A., & Mechanic, D. (Eds.). *Pain and disability. Clinical, behavioral, and public health perspectives*. Washington D.C.: National Academy Press, 1987.