

Introduction to health care statistics

- classification and international compatibility

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Semantic Interoperability and Data Mining in Biomedicine,
Summer School, July 8, 2004, Balatonfüred, Hungary



Outline of presentation

- Introduction – statistics & classification
- Hospital Data Project (HDP)
 - Project description
 - Results
 - Analysis of selected data
 - Areas for further development
 - Comments by Expert Group HDP
- Some statistics from Sweden
- Validation of coding – some results
- Primary & secondary care statistics
- Conclusions

Health care statistics ...

- Death statistics
- Inpatient care
- Day care
- Outpatient care
 - Hospital doctors/specialists
 - GPs
 - Nurses
 - ???



Classifications

- **ICD (International Classification of Diseases and Health Related Problems), WHO 1992**
 - ICD-10
 - ICD-9 / ICD-9-CM
- **ICF (International Classification of Functioning, Disability and Health), WHO 2001**
- **Procedures – no international classification !**
- **ICPC-2 (International Classification of Primary Care – second edition), WONCA 1998**



Health Statistics – for what use?

- Information about
 - Infrastructure
 - Activity
 - Personnel
 - Costs
- A variety of purposes
 - Supporting activity monitoring
 - Performance measurement
 - Casemix-based funding
 - Service planning
 - Epidemiological analysis
- Within countries
 - Analyse regional performance
 - Identify areas that may require action



Hospital Data Project (HDP)

- A project of the European Union Health Monitoring Programme (**HMP**)
- HDP is one of the first data loaded onto the Commission's pilot system for the telematic exchange of health information (**HIEMS**)
 - demonstrated the **feasibility of hospital activity data** dissemination at the level of raw aggregated data sets
 - but also highlighted **the very low level of comparability** between the national data sets !!

Source: Hospital Data Project. Final Report. European Union Health Monitoring Programme (HMP), Ireland, June 2003.
(File: HDP Final Techn Report.doc)



Objectives of HDP

- **Methodology** for the collection of comparable hospital activity data across Europe
 - Production of a **pilot data set**
 - Focus on **inpatients** and **day cases**
 - **Excluded:**
 - Areas of infrastructure (e.g. beds)
 - personnel
 - outpatients
- (because of need of alternative approaches)

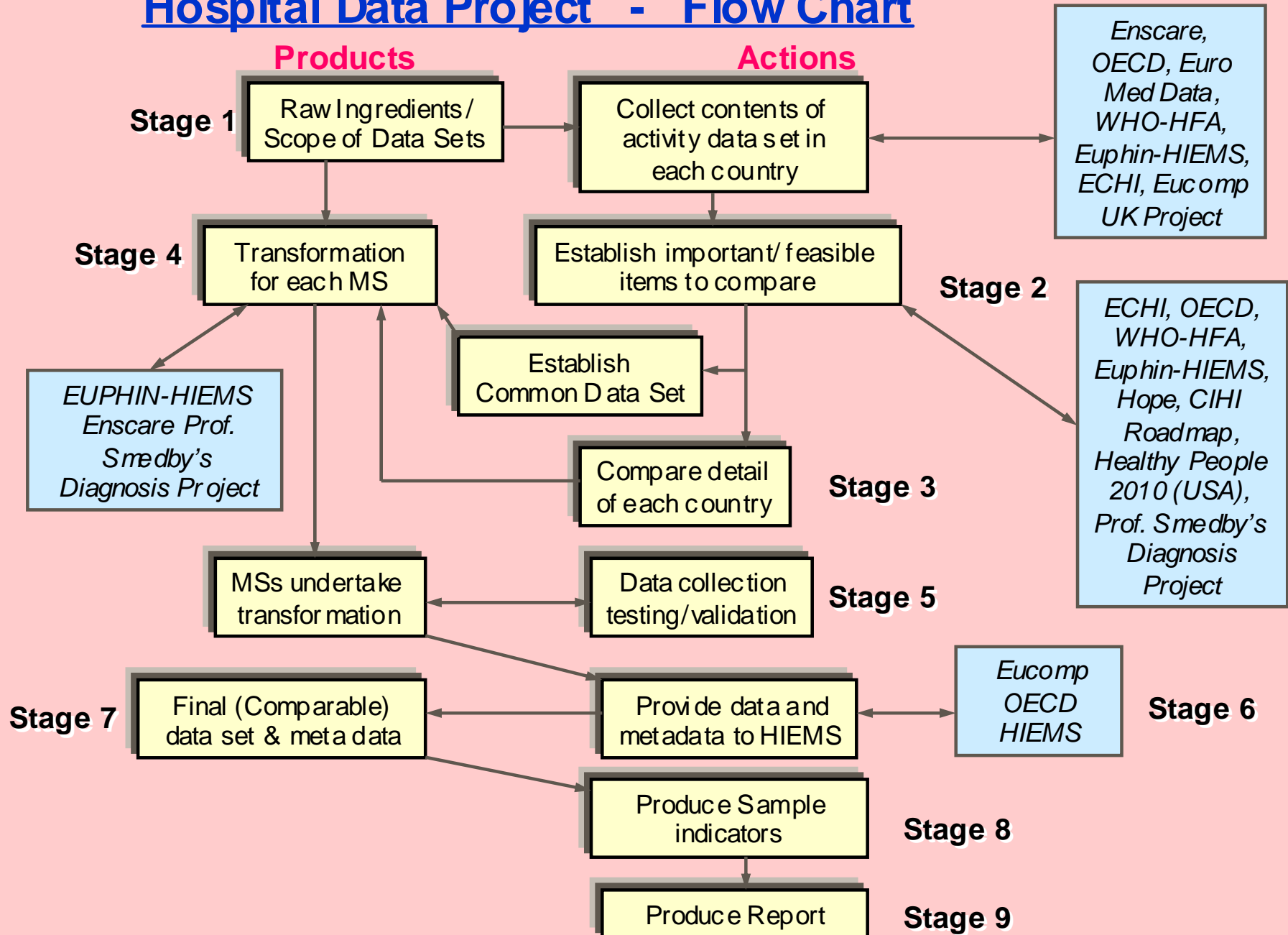


Organisation

- All Member states (MS)
- Iceland
- WHO



Hospital Data Project - Flow Chart



Applying the methodology

- **Inventory** of national hospital activity data sets
- **Prior initiatives and current projects**
- **Defining coverage**
 - inpatient, day cases
 - Excluded: outpatient care, palliative care, healthy babies
 - Included: psychiatric, maternity and geriatric patients; all hospitals
- **Collecting metadata** (i.e. information about the data)



Prior Initiatives and Current Projects

- ENS-Care.
- EUCOMP: Towards Comparable Health Care Data in the European Union.
- Euro-Med-Data: Clinical Information in Europe.
- Validity and Comparability of Nordic Hospital Discharge Statistics.
- System of Health Accounts, OECD.
- ECHI: The European Community Health Indicators (ECHI) Project (1 & 2).
- OECD Health Data 2001.
- WHO Health for All.
- HIEMS: Health Information Exchange and Monitoring System.
- EU Diabetes Indicator Project.
- HOPE (Standing Committee of the Hospitals of the European Union): The European Health Care Data Project.
- Canadian Institute of Health Information: Roadmap initiative. Health Indicators Project.
- Healthy People 2010 (USA).
- FNORS ISARE project: Health Indicators in the European Regions.

Selected Data Items for inclusion in the common data set (CDS)

- Country
- Year
- Type of admission
- Age
- Gender
- **Diagnosis/External Cause/Procedure category**
- Numbers of **inpatient discharges**
- Numbers of **bed days**
- Mean length of stay
- Median length of stay
- Numbers of **day case** discharges



Steps when working with data ...

- Shortlists
 - Diagnosis
 - External causes of injury
 - Procedure shortlist
- WHO Working Group on Hospital Data
- Data transformation at national level
- Producing test common data set
- Software for data validation and display of data and metadata
- Data and metadata validation



Results

- All 15 EU member states plus Iceland participated, but
 - **Spain** was not able to provide any data, largely due to staff changes
 - **Greece** was not able to provide data in a format that could be used in the HDP common data sets



Coverage

- Fully complete
 - Austria, Finland, Iceland, Italy, Luxembourg
- Missing data from private hospitals
 - England 5%
 - Scotland, Portugal 2 %
- France 33% missing data (psychiatric care mostly)
- Other countries – not able to estimate the data missing
- Only 8 countries could supply data on patients from psychiatric hospitals



Important areas of non-compliance

- **Austria, France, Germany and Luxembourg** could not define data according to **type of admission** (planned or not planned).
- **France, England and Wales** could not provide **data for the 95+ age category**. This data has been included in the 90-94 age category and should thus be interpreted as 90+ category.
- **Sweden** was not able to provide **data on day cases** for 1999 and thus Swedish data on the CD-rom submitted with this report does not have day case data.



Definitions for inpatient and day cases are problematic

- Some countries only include patients who have **stayed at least one night as inpatients**
 - Thus inpatients who die on date of admission are included as day cases (**Finland, Germany, Luxembourg and Portugal**)
- **Denmark** do not **distinguish between day case and outpatient activity**
 - Thus Danish day case activity looks very high in comparison to other countries
- For patients, who are discharged on the same day, **Denmark and Iceland give these patients a length of stay of one day**
 - This again affects the calculation of number of bed days, mean length of stay and median length of stay.



Diagnosis shortlist worked well (130 specified groups)

- ICD-10 (Austria, Denmark, Finland, France, Iceland, Luxembourg, Sweden and the UK countries)
- ICD-9-CM (Belgium, Ireland, Italy, Portugal)
- ICD-9 (Germany, the Netherlands)



External causes of injury (9 groups)

- Only **11 countries** could supply data
 - out of them, Denmark, Iceland and Italy only on a limited number of cases
- Comments that the coverage and coding was poor
- Exemple:
 - The results showing code 9 (unknown) were high for Belgium (**73%**), Iceland (**82%**) and Italy (**60%**)

**More work have do be done on
external causes of injury !!**



Procedures short list (18 selected procedures)

- No international procedure list was available
- **ICD-9-CM sentinel list** was agreed upon
- **ICD-9-CM** (Belgium, Ireland, Italy and Portugal)
- **NCSP** (Nordic Classification of Surgical Procedures) (Denmark, Iceland, Sweden, Finland)
- **OPCS-4** (The four UK countries)

**More work have do be done on
the procedure short list !!**



Analysis of selected data

- These analyses will also **raise questions** as to whether observed differences are
 - true reflections of **national differences** in hospital utilization, or
 - whether they are **artefacts of coverage**
 - **coding** differences
 - **definitional** differences

Reference to metadata is essential in understanding potential differences between countries

Total Inpatient Discharges per 1,000 Population by Country

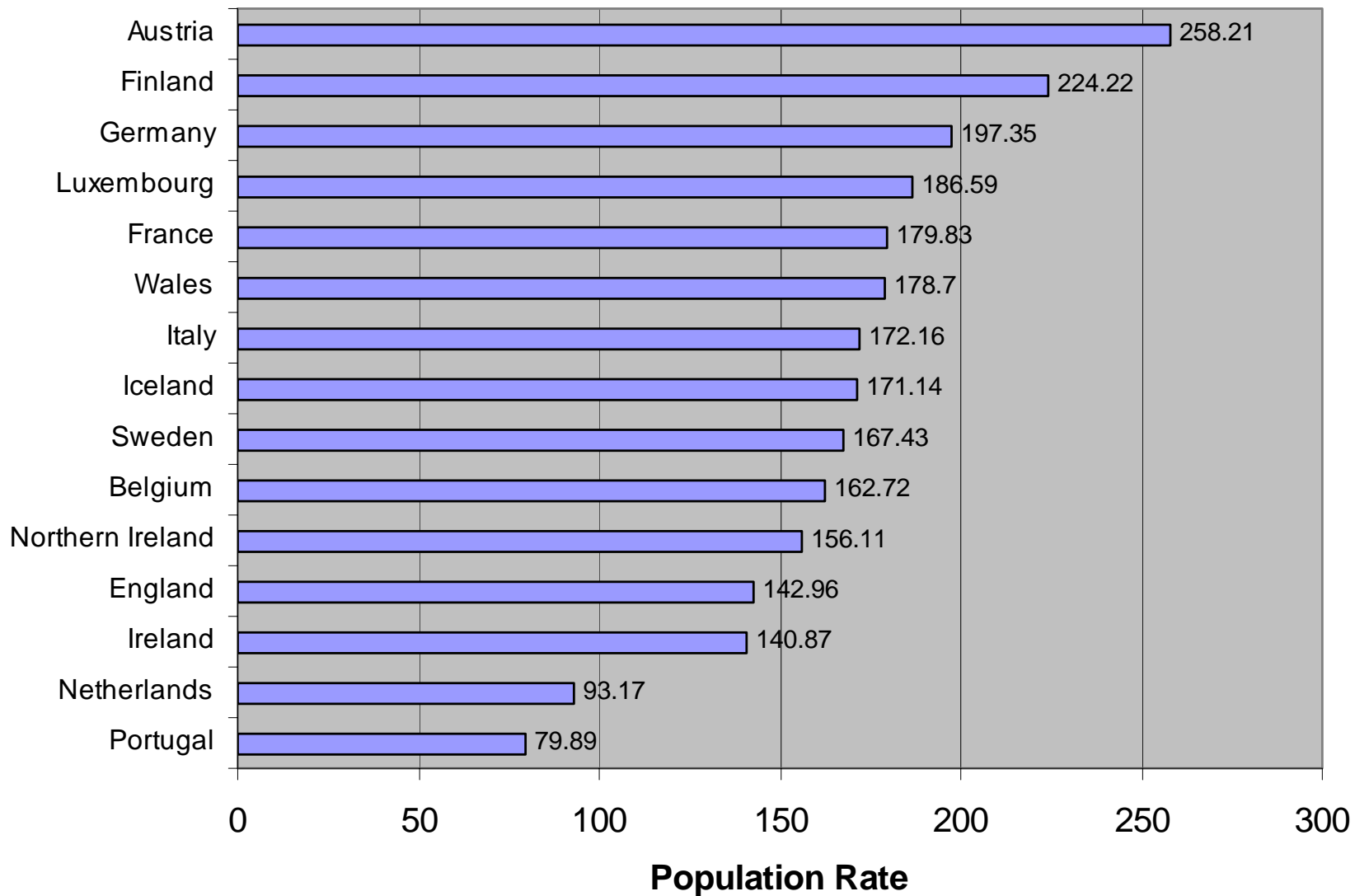


Figure 4.1 below shows reported inpatient discharges by country for all causes expressed as a rate per 1,000 total population

- **Eleven out of the 15** countries displayed
 - are clustered between values of approximately **140 and 195** discharges per 1,000 population
- There are, however, **outliers**
 - **Austria** has significantly higher reported discharge rates than the other countries while **Portugal** is significantly lower
 - The higher levels activity in Austria may be a function of hospital usage issues in Austria or other health care system specific issues
 - Portugal consistently shows lower population rates in comparison to other countries

Acute Myocardial Infarction (AMI): Inpatient discharges per 1,000 Population by Country

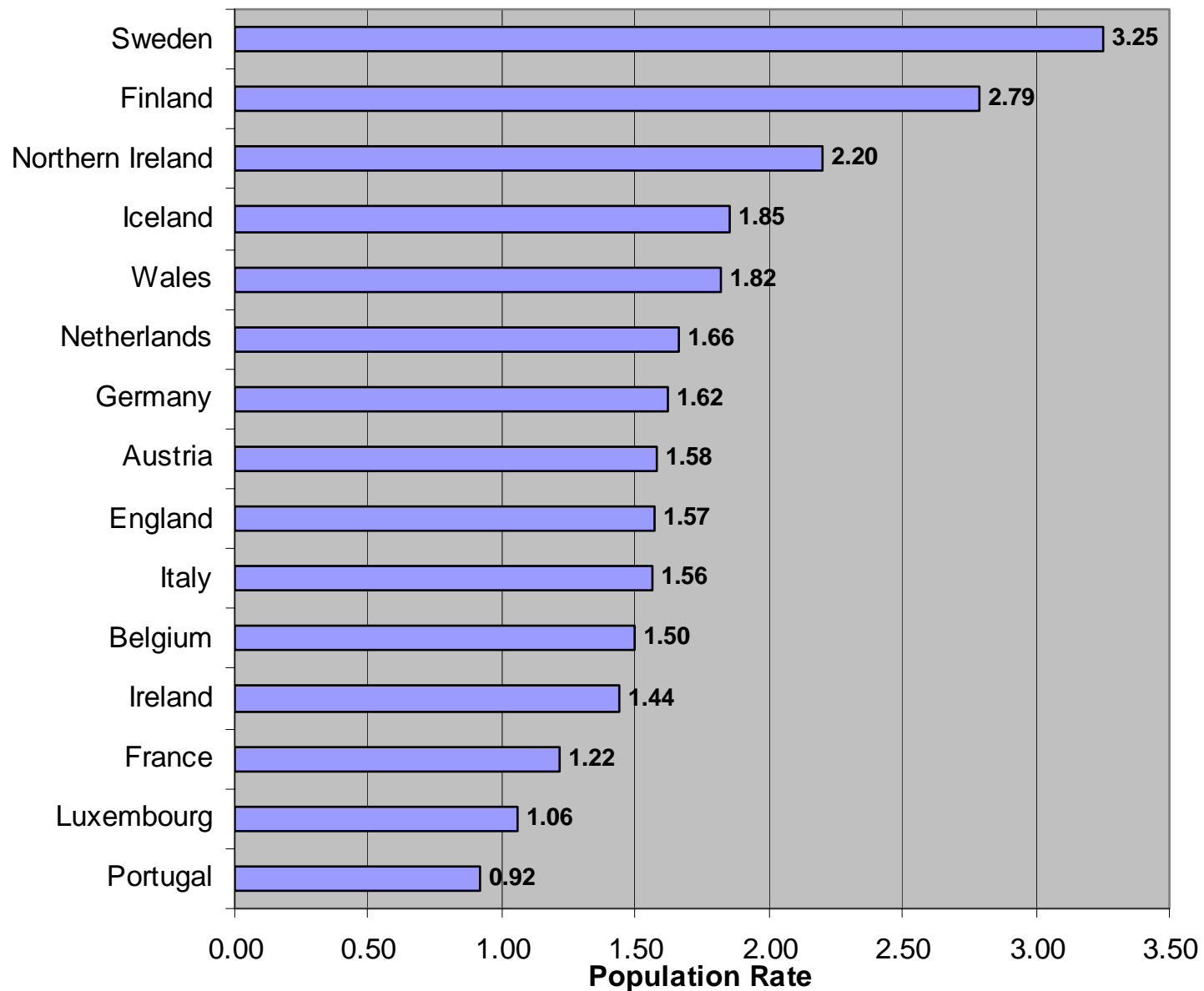


Figure 4.2 below shows inpatient discharge rates for acute myocardial infarction (AMI)

- The majority of countries are clustered around values between **1.4 and 2.0** AMI discharges per 1,000 population.
 - **Finland** retains a similar position as with total discharges
 - **Sweden** and **Northern Ireland** climb up the rankings
 - **Luxembourg** and **France** drop to the bottom of the table
- Some of the variance is undoubtedly due to **differing population age structures** and thus the use of age standardised rates would be another potential area of further development for the system.



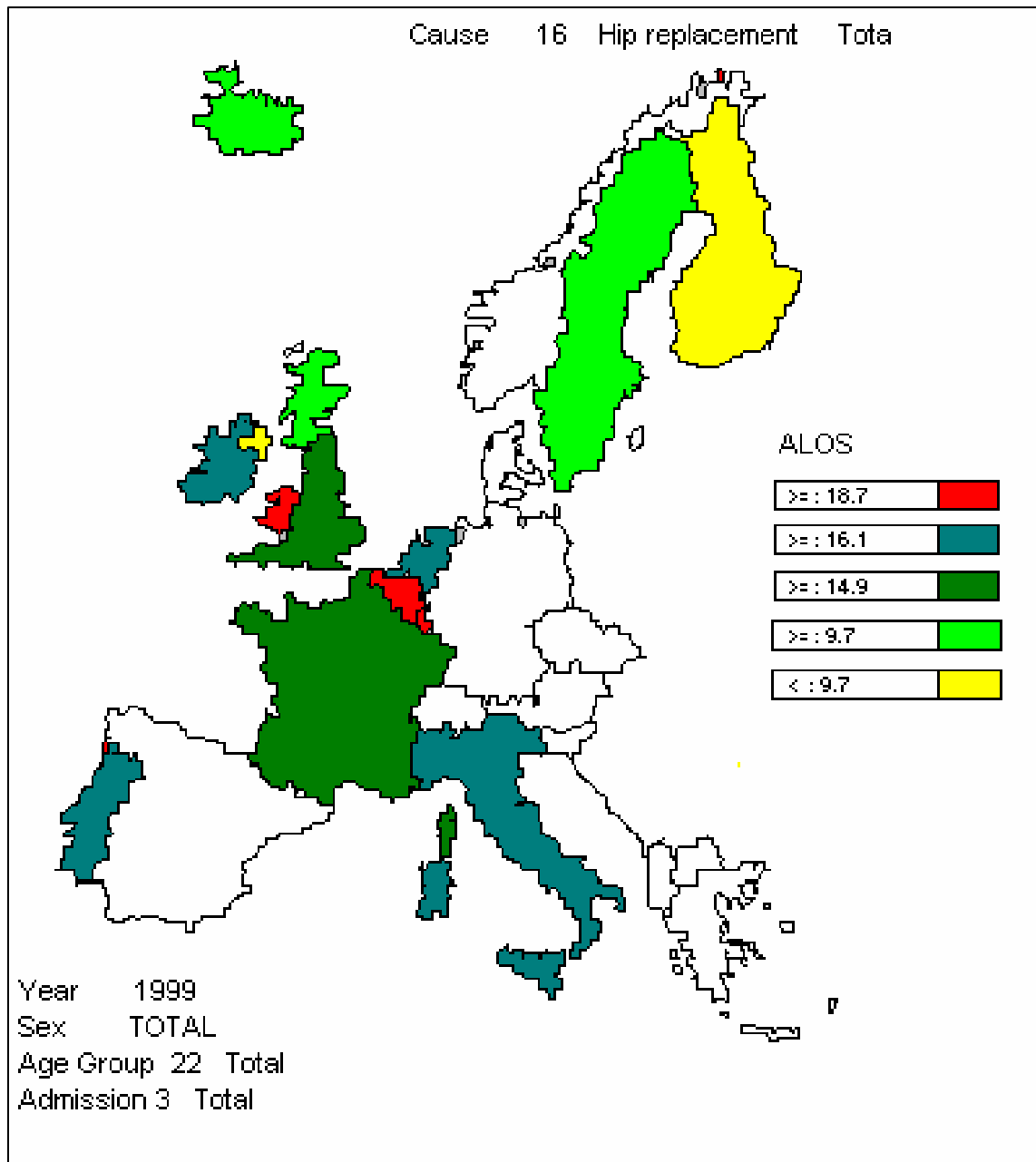


Figure 4.3: Mean Length of Stay for Hip Replacements



Figure 4.4

Total and Partial Hip Replacements: Mean Length of Stay by Country

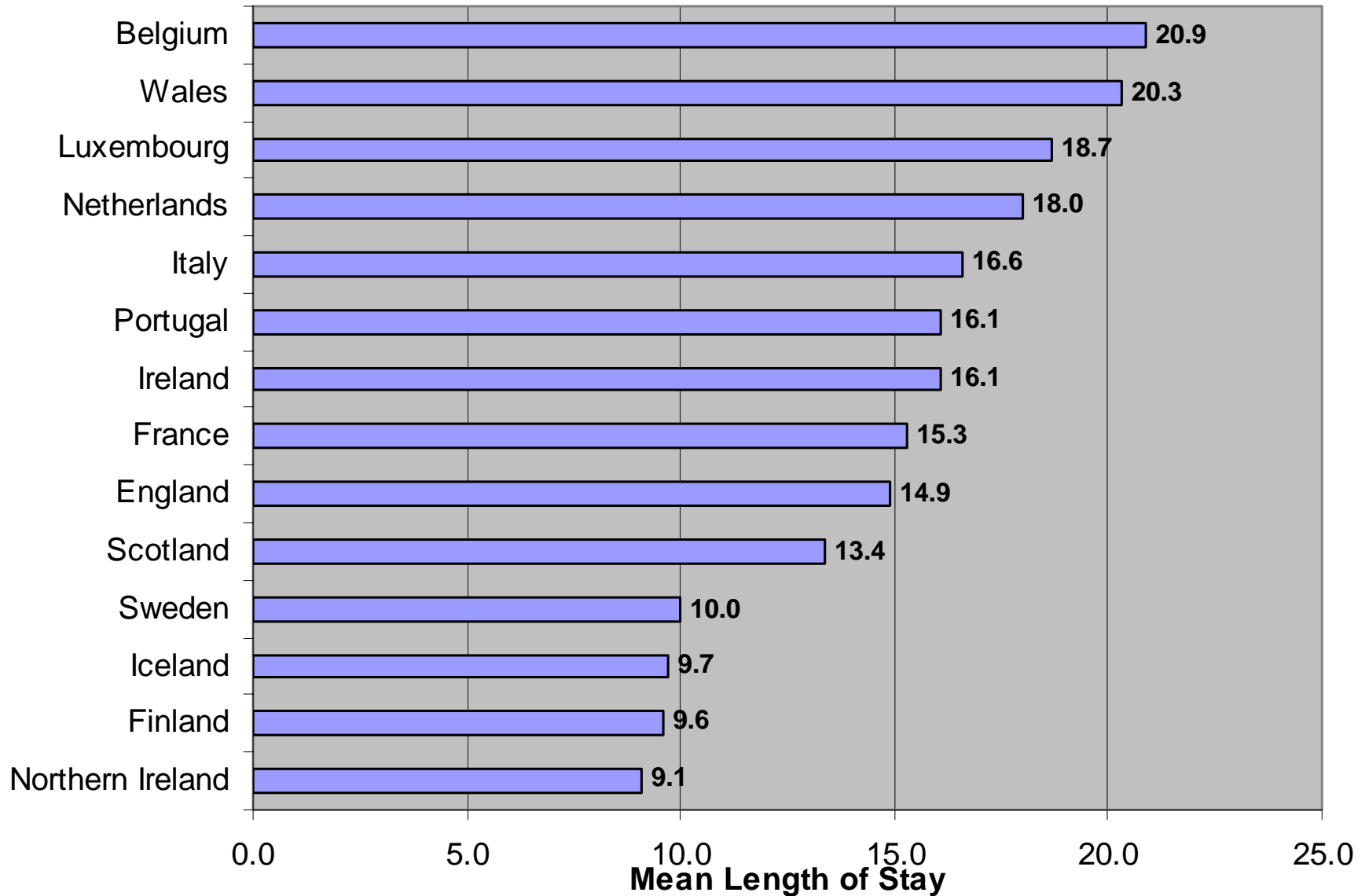


Figure 4.3 and 4.4 present mean length of stay for all hip replacement discharges (total and partial) by country

- There is quite **a variation in the average length of stay** of patients undergoing a hip replacement
 - with patients in **Belgium** staying on average 100% longer than patients in the **Nordic countries** and **Northern Ireland**.
 - This variation may be more a feature of **different health care systems** where patients in countries with a lower length of stay are moved out of the acute care setting to a convalescent setting.



Mental and Behavioural Disorders (HDP Chapter 500): Total Number of Discharges per 1,000 population by Country

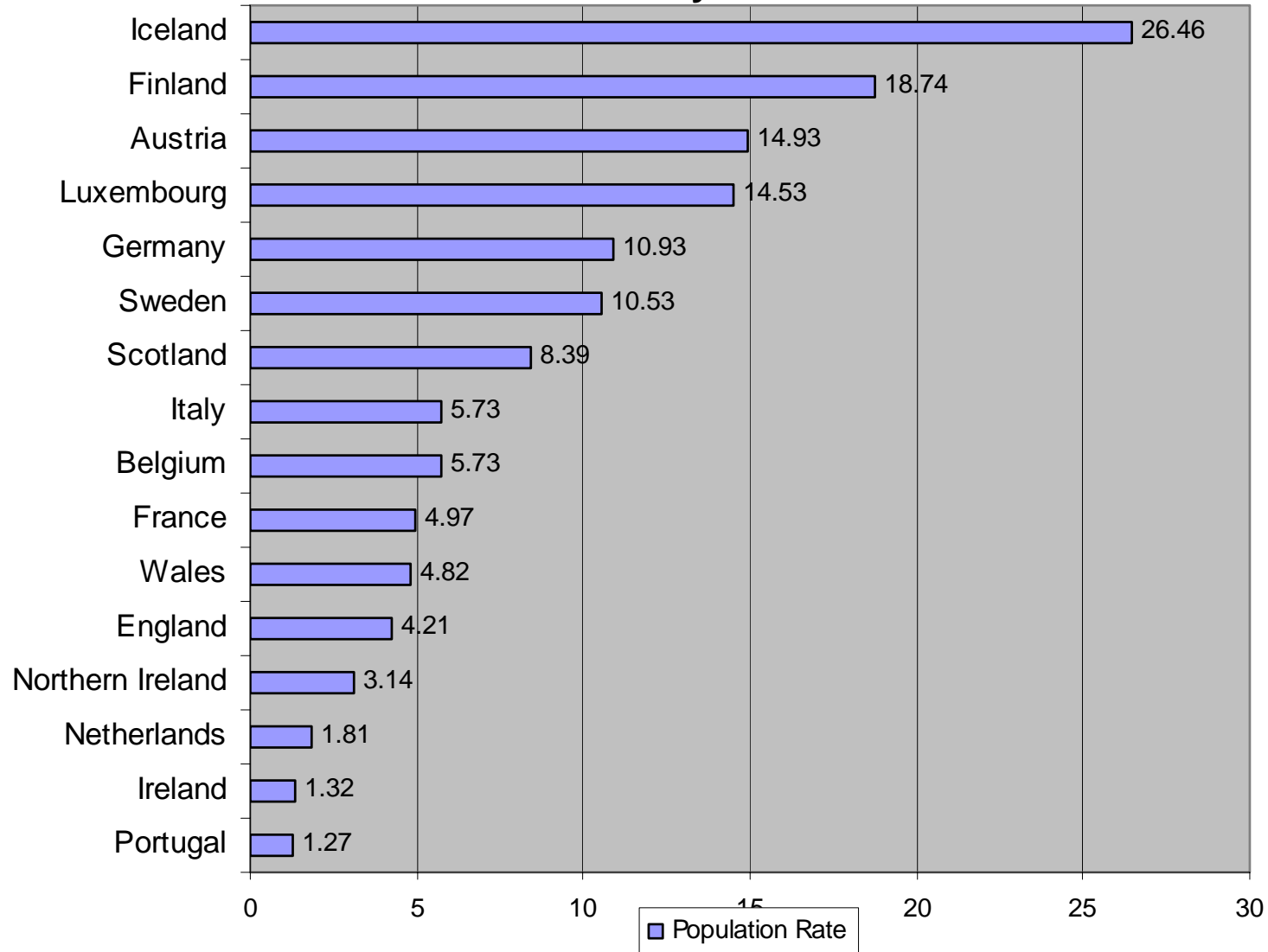


Figure 4.6 presents population rates for total discharges with a principal diagnosis of mental and behavioural disorders

- The **four countries with the lowest population rates** are, as expected, countries which **have not supplied data from specialist psychiatric hospitals**
- The countries reporting the highest population rates are countries with 100% coverage.

This example clearly illustrates the importance of referring to the metadata when interpreting data

Table 4.5 Operations for Cataracts: Percentage of Total Operations Performed as Day Cases by Country

| Country | Day Case (%) | Country | Day Case (%) |
|---------------------|--------------|------------|--------------|
| England | 77.41 | Wales | 53.57 |
| Iceland | 76.08 | Ireland | 30.07 |
| Finland | 74.65 | France | 27.32 |
| Netherlands | 74.45 | Italy | 27.32 |
| Northern Ireland | 72.70 | Luxembourg | 03.59 |
| Belgium | 63.98 | Austria | 00.80 |
| Scotland | 63.40 | Portugal | 00.06 |

Note: Sweden was not able to provide day case data for 1999.

Operations for cataracts are presented in Table 4.5

- This percentage varies from 77.41 percent in England to 0.06 percent in Portugal
- No data on day cases are available for Sweden for 1999

In order for such benchmarking to have maximum value, time series data would have to be collected **to mark the shift from inpatient to day case** across countries over time

Accidental Falls: Rates per 1,000 Population

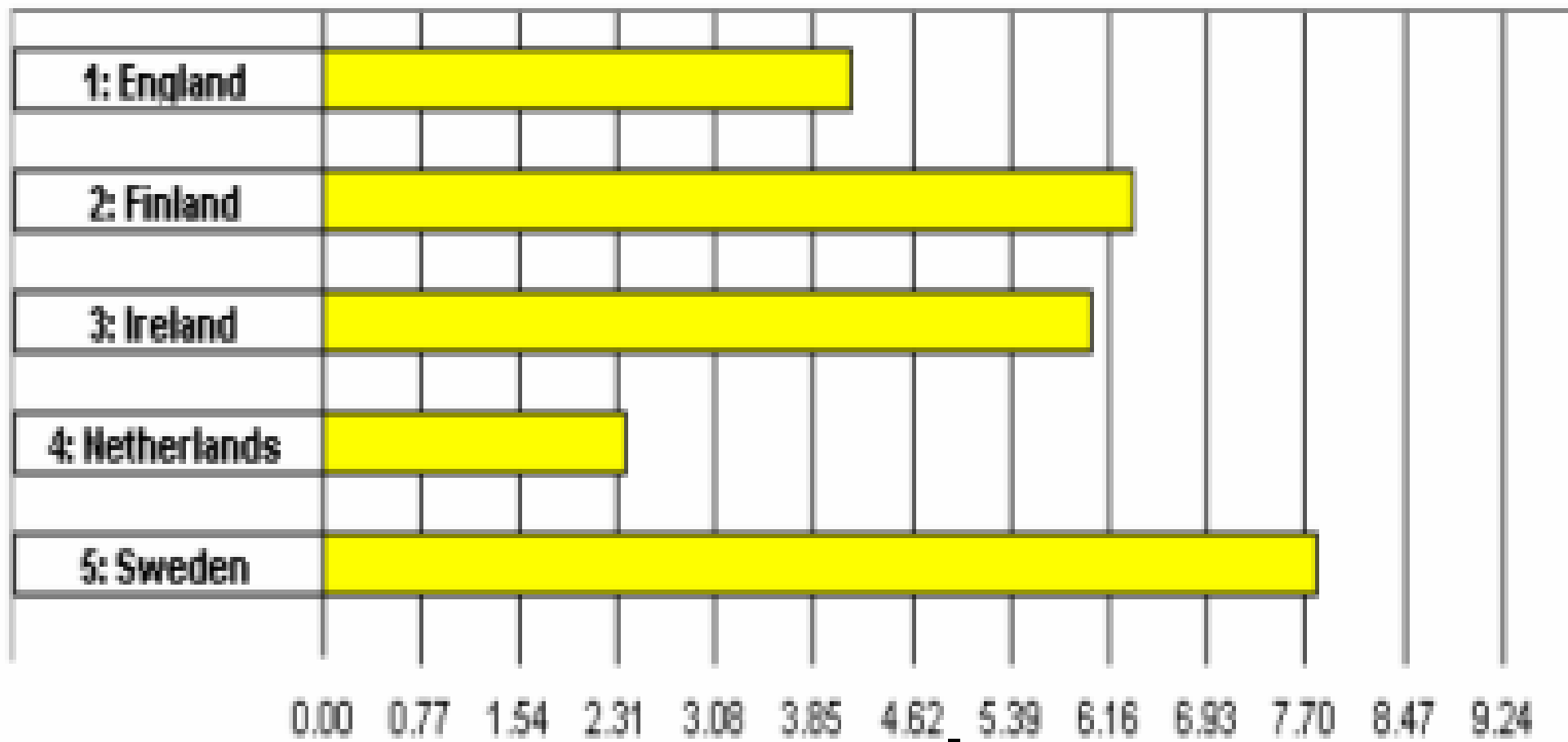


Figure 4.7 presents all discharges with an external cause of accidental fall

- Data for England, Finland, Ireland, Netherlands and Sweden
 - These countries were selected because of low percentage of missing external cause data reported
- **Finland** and **Sweden** report the highest population rates.
- **Netherlands** has a much lower rate than the other countries.



Areas for further development

1. Production of **time series** data.
2. Extension to **more countries**.
3. Development of common **procedure list**.
4. Improved **validation**.
5. Continued revision and enhancement of **coverage** issues (in conjunction with work of OECD and EUCOMP2).
6. Inclusion of **additional analysis variables** (e.g. patient mobility, sub-national data, DRGs etc.).
7. Inclusion of **additional patient types** (e.g. outpatients).
8. Development of **performance/outcome indicators** (e.g. quality of care, readmission, sentinel measures).
9. Investigate potential **variation in national coding/classification rules**.
10. Work on **data analysis**.
11. Extend method to **infrastructural indicators** such as hospital beds.
12. Further **develop EUHDP software**.

If prioritising some of those items

1. Production of **time series data**.
6. and 7. These were taken together under the heading '**Increase scope of data.**' (e.g. variables, patient types)
3. Development of **common procedure list**.
10. Work on **data analysis**.



Comments by an Expert Group for HDP about medical information

- In general
 - organization
 - recording practice
 - diagnostic labelling
 - coding

are much more likely **to explain statistical differences found between countries** than morbidity differences



Comments (2/2)

- Studying **frequencies for specific diagnoses** and codes included in a shortlist group may be necessary in order to understand and interpret surprising differences at shortlist level.
- **Casemix groups** is *not recommended*, such as DRGs for the HDP, due to the differences found in existing casemix systems.
- **External cause information** should be included in the common data set and some broad groups were suggested for external cause tabulation.
- Some principles for a **hospital procedure shortlist** were recommended but no such list was developed by the experts due to time constraints.
- **Grouping by specialty** should *not be done* through diagnostic data due to overlap between specialties.
- **Principal diagnosis** should be defined according to ICD-10 but there is *no need for defining a principal procedure*.

Comparison of diagnoses: France, England and Sweden

- **Z-codes:**

- France 36 %
- England 8 %
- Sweden 3 %

- **Reasons:**

- Newborn infants (Z38-code) are included in England and France, not in Sweden.

- **One-day stays**

- France 45%
- England 30 %
- Sweden (no data)

- **Reasons**

- Treated and discharged the same day
- Transferred to other hospital
- Died within 24 hours of admittance

Some statistics from the Swedish Federation of County Councils

- Length of stay at hospitals
- Number of Hospitals
- Beds in hospitals
- Inpatient to outpatient care
- Development of inpatient care
- Number of visits to doctors

Source: Swedish Health Care in Transition. Resources and Results with International Comparisons. The Swedish Federation of County Councils. Stockholm, april 2004.

(File: doc35570_1.pdf)



Length of stay in hospitals in Sweden

- **Lengths of stay** in hospitals have decreased
 - from an average of **11** days in 1970 to **7.9** days in 1992
 - The decrease continued throughout the 90s, to **6.1** days in 2002.
- **The shortest lengths of stay** in 2002 were in
 - Denmark and Finland.
 - Next came Sweden with a 45% shorter average length of stay than in France and Germany.



Number of hospitals in Sweden

- In the late 1960s **115** emergency hospitals
- Twenty years later dropped to **87**
- After the changes of recent years, the number of emergency hospitals in 2003 was **76**
 - Nine of these, however, do not perform emergency surgery, and another seven do not provide emergency surgery on evenings, weekends or at night.

That leaves **only 60 complete emergency hospitals**, practically half of the figure from the 1960s.



Number of beds in hospitals in Sweden

- In the same 40-year period, the **number of beds in hospitals** has *decreased* by **nearly 80%**, from **120,000** to just over **27,000**.
- In the EU in 2001, Sweden and Finland had the **lowest proportion of beds per inhabitant**.

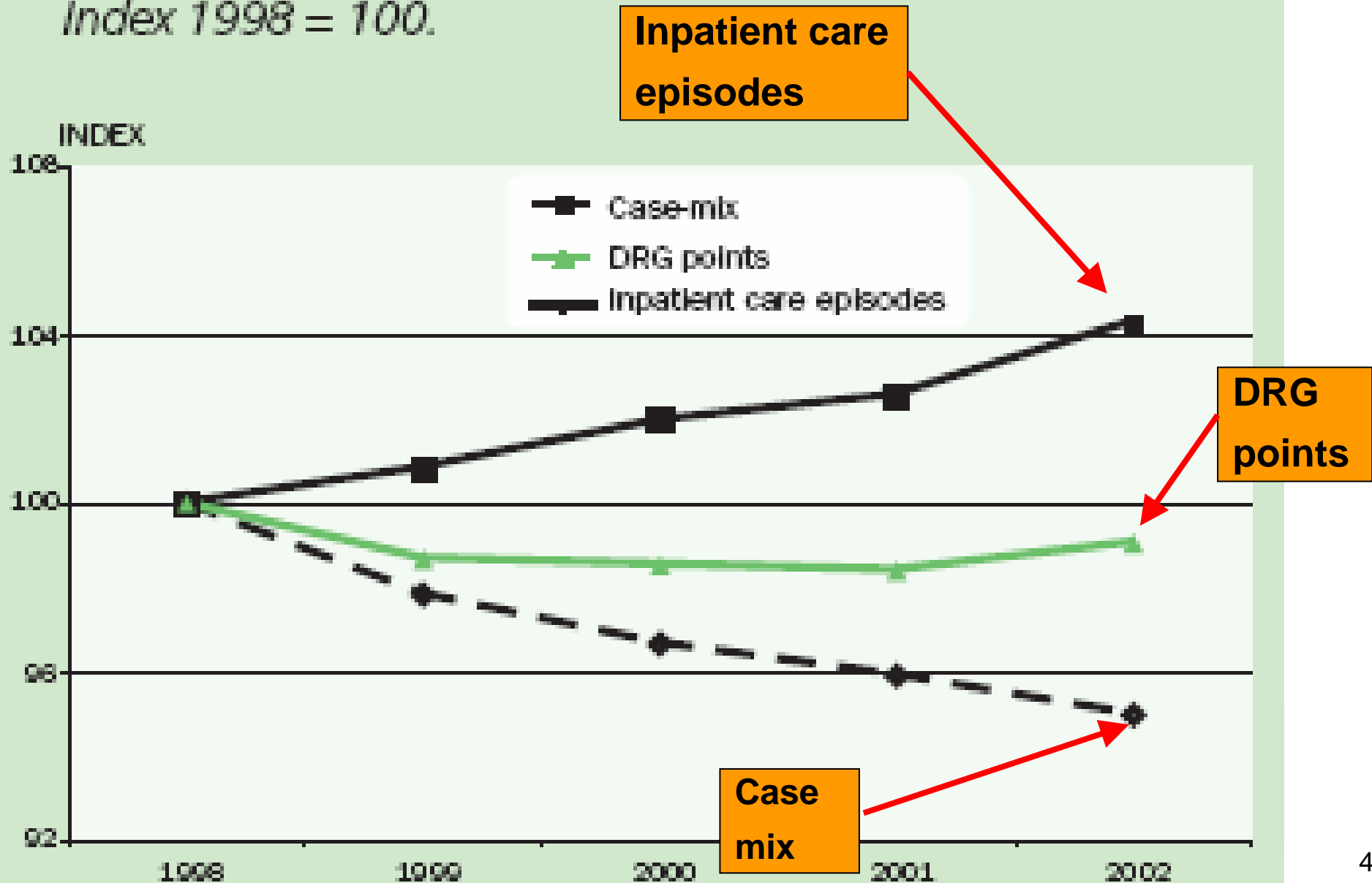


From inpatient to outpatient care

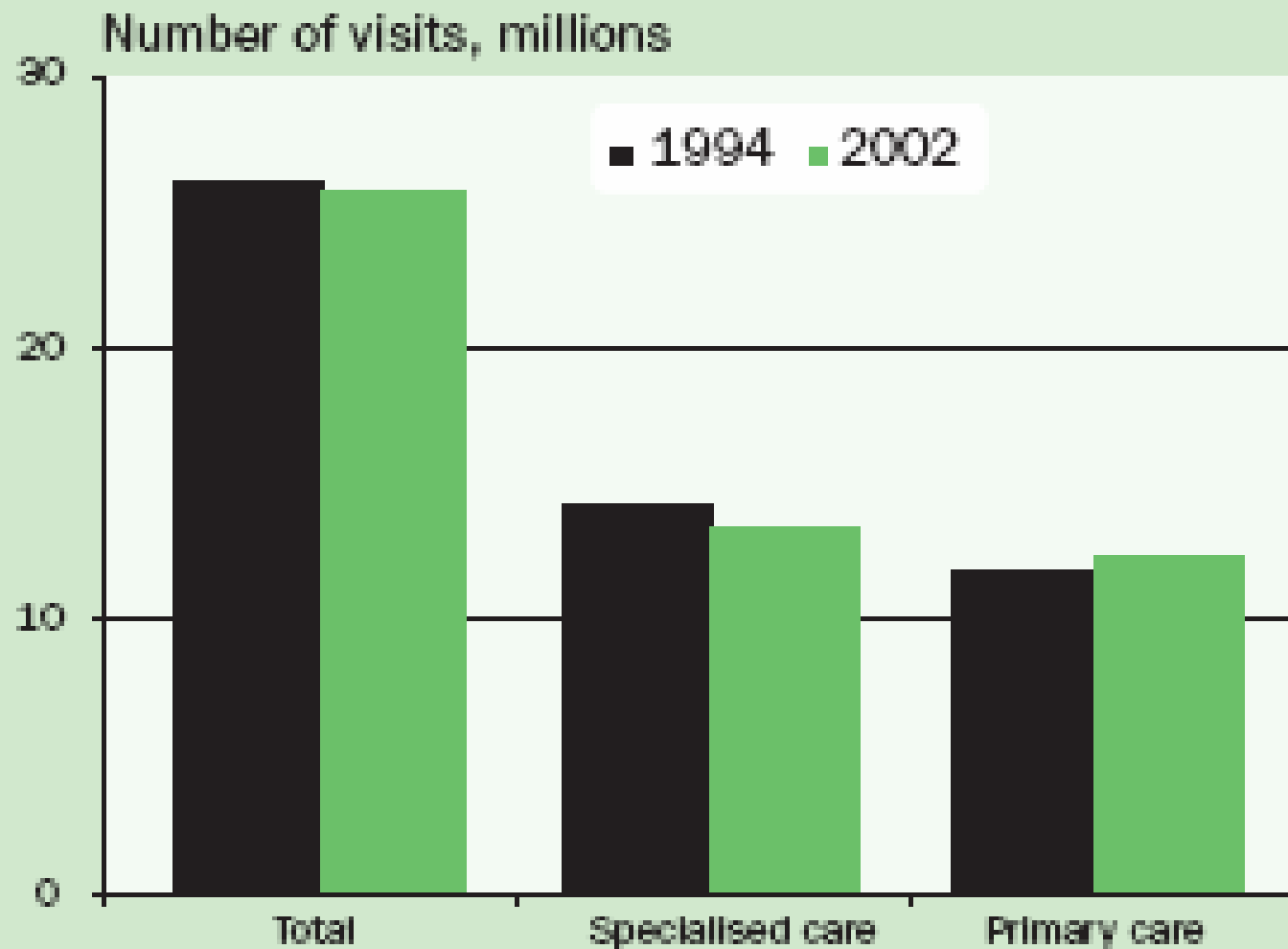
- In the 90s, the percentage of **cataract operations** performed as outpatient procedures increased from 75% to 95%.
- The corresponding increase for **groin hernia** operations was from 37% to 70%.
- **Arthroscopic meniscus operations** are mainly done as outpatient procedures (over 90%).



Graph 18. *Development of inpatient care, 1998–2002.*
Index 1998 = 100.



Graph 32. *Number of visits to doctors. Total, specialised care and primary care, 1994 and 2002. Publicly financed care.*



Results from some swedish validation studies of diagnose coding

Wrong main diagnosis

| | |
|-----------------------------------|-------|
| Norrlands US 1997 | 17,5% |
| Västernorrland 1997 | 15 % |
| Västernorrland 1998 | 19 % |
| Stockholms County Council 1998 | 16 % |
| Norrlands US 1999 | 19 % |

Some swedish and international results of validation studies

Wrong main diagnosis

- K Berglund, Sverige 1985: 30 %
- CA Nilsson, Sverige 1987: 8,3 %
- ES Fisher, USA 1992: 21,8 %
- AC Nilsson, Sverige 1994: 11 % (1986)

Wrong DRG

- O Steinum, Sverige 1995: 7,7 %
- A Cook, Australia 1997: 11,7 %

Primary & secondary care

- Nordic efforts (NOMESCO=Nordic Medico-Statistical Committee) since 1995:
 - In 1995 NOMESCO set up an **ad hoc working group** with the brief of uncovering **the differences in use of general practice in the Nordic countries**, through a pilot study.
 - The results have been presented as a **theme section** in the **1998 issue of *Health Statistics in the Nordic Countries***.

Source: Nomesco (www.nom-nos-dk/nomesco.htm)



Continued work 1999-2003 ...

- Subsequently, a **working group** has put forward a **recommendation for a minimum data** set in this area, and on this background NOMESCO has applied to the Nordic authorities on health and health statistics.
- In 2003 a meeting has been held in a newly established **reference group**, and it is expected that it will be possible to include **statistics based on diagnoses and procedures** for **non-admitted patients** for **at least three countries** in the 2004 edition of *Health Statistics in the Nordic Countries* (but this appeared not to be possible yet !)



Data to collect

- Outpatient consultations, but from only some hopefully representative parts of the countries, to
 - GP (general practice/family medicine)
 - Hospital doctors /specialists except GPs outside hospital
- Diagnostic groups, based on the classifications
 - ICPC-2 (Norway, Finland) or ICD-10-PhC (in Sweden)
 - ICD-10
- Procedures
 - Test of possibility to collect data for referrals, prescriptions, X-ray, laboratory tests, physiotherapy, surgical procedures

Diagnostic groups (Nomesco)

- 01. Respiratory tract infections, incl. otitis
- 02. Astma
- 03. Neck, shoulder and other enthesopathies/tendinitis
- 04. Low back problems
- 05. Psychiatric problems
- 06. Atopic and hypersensitivity problems
- 07. Hypertension
- 08. Ischemic heart disease and arrhythmias
- 09. Diabetes
- 10. Cancer
- 11. Female genital problems
- 12. Digestive system functional problems
- 13. Skin infections
- 14. Urinary diseases (cancer and injuries excluded)
- 15. Injuries and accidents
- 99. All other diagnoses
- X1. Pregnancy, family planning
- X2. Vaccination, check-ups and other preventive matters

The continued work will now be ...

- Continued work during 2004/2005 with statistics from primary and secondary care within at least three nordic countries
- The results will be presented as a **theme section** in the **2006 issue of *Health Statistics in the Nordic Countries***.



Conclusions

Much to be done about health care statistics to make it comparable between countries, and about definitions and use of classifications !!

