

Scottish Arthroplasty Project Report 2002

Information and Statistics Division

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Introduction

Objective – The Scottish Arthroplasty Project was set up to provide anonymised individual consultant and aggregated service outcome data on patients undergoing elective joint replacement surgery throughout Scotland.

Current coverage – The project uses the routine SMR01 data set, and importantly the linked data set. All NHS hospitals in Scotland where arthroplasty surgery is undertaken are included. Yearly aggregated data from 1992 to 2001 have been included. Routine complication data from 1996 have been investigated and reported.

Project Status and Funding – The Scottish Arthroplasty Project commenced three years ago with the routine return of quarterly data retrospectively relating to patients whom the individual surgeon had operated on. There has been no formal funding mechanism and no funds have been received for this project, which relies on fairly parsimonious support from ISD core business resources.

Setting guidelines and standards – The Scottish Arthroplasty Project does not have the infrastructure or breadth of knowledge to set guidelines or standards. Where these are available, and analysis is possible, the project will produce data to allow national and international comparisons.

Organisation, structure and management

The aim of the committee organisation is to provide a mechanism whereby the anonymity of patient and surgeon are maintained while allowing a detailed analysis of the patients pathway through Scottish Health Service following total joint replacement. To encourage a feeling of ownership and reliability, centrally held data on each patient have been returned quarterly to consultants throughout Scotland requesting that any errors be returned to ISD for action ([appendix A](#)).

The executive committee is specifically tasked with commissioning areas for reports and agreeing areas of further data management and usage to ensure that meaningful and correct data is produced to prevent mis and overinterpretation which would lead to loss of confidence in the process.

The executive committee consists of:

- Three orthopaedic representatives nominated by the Scottish Committee for Orthopaedics and Trauma (who receive no individually identifiable data).
- Representatives from the Information and Statistics Division of the CSA (Mr G Mitchell, Dr R Muir, Consultant in Public Health Medicine, Mrs Etta Shanks).
- Representatives of the private sector.
- Representatives of the public (not yet in post as no budget allocated to cover costs). The committee elects a chairman and meets quarterly to agree analysis and coding issues and subjects for detailed analysis in future years.
- In addition to the persons in attendance ex officio, there will be a minute secretary.

The management committee is tasked with the day to day running of the project, agreeing search methodologies, practical distribution strategies and answering participants queries. In addition members of this group will be responsible for liason with other departments and bodies to ensure the smooth working of the system. Areas for data analysis can be suggested

and investigated but not released to third parties without the specific consideration and agreement of the executive group. The management committee consists of:

- Chairman of executive committee (plus an orthopaedic surgeon if the chair is not a practicing surgeon)
- ISD representatives to include a consultant in public health medicine, staff responsible for data analysis, statisticians.
- Others coopted for specific reasons or projects following the agreement from the executive group.

Methods

The Scottish Arthroplasty Project identifies all patients undergoing primary revision joint replacement as an elective procedure. Each episode is then logged to a consultant and quarterly reports returned to the individual consultants for checking. Should the patient be readmitted to any Health Service facility in Scotland that episode is recorded by ISD and linked to the original index procedure. Careful review of the diagnostic codings may then produce crude complication rates for major joint replacement. Because of the possibility of record linkage with the General Registrar's office (Register of Deaths), subsequent death rates can also be calculated. This process allows adverse events to be identified using end points easily understood by members of the public (death, dislocation, infection, DVT or pulmonary embolus (Measuring the health outcomes of total hip replacement through the commissioning process. Heaton et al Nuffield Institute for Health Leeds Outcome measurement reviews No 1. 1995)). On the basis of these data, subsequent reports have been produced.

Individual consultant feedback has been issued with lists of patients thought to have been readmitted with dislocation, DVT, pulmonary embolus or infection, together with overall numbers of procedures carried out in the preceding five years.

Regional complication rates have been produced, together with comparisons with the Scottish National Average for those years. (Appendix B)

Reports to the Scottish Committee for Orthopaedics and Trauma have been tabled and discussed annually at the Scottish Orthopaedic Club meeting. The annualised results and proposals for future analysis have been discussed and agreed.

National datasets have been produced recording changes in practice since 1992. Numbers carried by each consultant during this period and outcomes analysed by activity volume have been tabulated. (Appendix B)

Information technology - Presently, data are collected through the assignment of diagnostic and operative codes by medical records staff as part of the process of health care management. It is hoped that this will continue. In addition, the regular submission of electronic data to include prosthesis data will be pursued. Regular consultant feedback may be possible using eSCRIPS¹ an ISD development. In time the exploitation of the national data sets for arthroplasty case analysis and interpretation may become well enough established for some aspects to be carried out routinely through eSCRIPS.

Current state of Scottish Arthroplasty Project

The Scottish Arthroplasty Project has been functioning for three years and now returns quarterly data to all orthopaedic surgeons in Scotland undertaking elective arthroplasty work.

- Comparative activity data has been produced by health board area.
- Preliminary analysis of major complication data has been made available to individual consultants and aggregated health board figures.

¹ eSCRIPS is a web based system providing consultants with access to data on their workload

- All NHS hospitals have participated.
- Private hospitals indicated a willingness to take part in the system, but investment is required to establish electronic data submission of a reduced SMR01 data set to ISD.

Deficiencies – To date, there has been no financial support for data analysis, interpretation or infrastructure. Coding has relied heavily on local coding systems, the quality of which remain patchy. Coding of complications has proven difficult to analyse, further work needs to be done on the simplification of complication codes. Verification of data relies on local vigilance and feedback. While this has been forthcoming in many areas, great activity is necessary. The data set included, while sufficient to allow identification of complication rates, could be further enhanced by including implant, anaesthetic and operative data, all of which could be gathered electronically from existing systems. Due to resource limitations or difficulties the full utilisation of data collected through the Scottish Arthroplasty Project has been limited to preliminary work thus far.

Refinements to present audit

Enhanced individual annual review, including overall numbers and complications.

Patient derived outcome scores have been widely used and validated in elective orthopaedics with sufficient funding this could easily be added to the existing dataset.

Aggregated unit data allowing annual review using techniques of statistical analysis for this data (Mohammed A Mohammed, KK Cheng, Andrew Rouse Tom Marshall. Bristol Shipman and clinical governance: Shewharts forgotten lessons. Lancet 2001; 357: 463-467)

Feedback on the quality and relevance of coding from the participating consultants using their own dataset will ensure ongoing local coding quality assurance thus allowing variance analysis to be carried out with confidence on the national dataset.

Periodic detailed analysis of specific problems (e.g. DVT, pulmonary embolus, infection or dislocation) may be carried out following detailed case mix analysis.

Annual production of written reports for individual consultants and participating units.

Appraisal. It is anticipated that this data set could be used by consultants in the local appraisal process (Note: All individual consultant data are anonymous and available only to that individual consultant. No individual consultant data will be released to a third party).

Inclusion of prosthesis data. Implant registries in other countries gather this data through paper based systems. It would be possible to attach implant data to the centrally held record, and derive outcome data by implant.

Operative data could be included from existing theatre management systems to relate any care differences to type of anaesthetic and to contribute to the monitoring of training.

Trust responsibility

Trust Chief Executives are ultimately responsible for clinical governance within their institutions. The Scottish Arthroplasty Project provides external, objective, audit data on the clinical effectiveness of their unit. The Trust must accept responsibility for coding errors and ensure adequate and timely coding to allow the process to proceed.

Trusts should ensure that where variances from the Scottish figures occur that these are looked at to ensure that the figures are meaningful, not the result of spurious coding or case mix issues. Variance should result in local audit to ensure relevance and veracity.

Consultant specific data has been made available to all Orthopaedic consultants in Scotland with yearly complication rates compared with national figures. These will require detailed interpretation at a local level before meaningful judgements can be made (case mix, background population, coding issues etc). It is hoped that the appraisal process and local audit will be facilitated by this process.

Appendix A

Quarterly reports

Feedback from consultants on quality of data recorded on SMR01 for one year period: July 99 - June 00 (*as at March 2001*)

Status of records included in period	Number	% of total
Total arthroplasties	8434	
Record status		
confirmed as being correct by consultant	3412	40.5
consultant reported 'unable to check listing'	193	2.3
error/query reported	211	2.5
no feedback from consultant	4618	54.8

Current status of records with notified queries/errors	Number	% of queries
Total	211	
<i>of which</i>		
have been resolved	99	46.9
no contact from trust - still outstanding	112	53.1
<i>of those resolved</i>		
Total	99	100.0
amended SMR re-submitted to ISD ¹	57	57.6
no action necessary ²	28	28.3
unable to resubmit amended SMR ³	10	10.1
miscellaneous	4	4.0

1 The following sites have been amending/resubmitting records: Inverclyde Hospital, RAH, Crosshouse, Ayr Hospital, Borders, Victoria Hospital Kirkcaldy, Falkirk & District RI, Stirling RI, Dr Gray's Hospital, Victoria Infirmary, Western Infirmary, Raigmore, Perth RI

2 no action necessary = e.g. no error found or no action taken.

3 unable to resubmit but agree that national database can be amended.

Summary of problems notified on outstanding queries ¹	Number	% of outstanding queries
Total	112	100.0
case recorded to wrong consultant	33	29.5
wrong diagnosis	21	18.8
not an arthroplasty of hip, knee, shoulder or elbow	13	11.6
revision v primary	12	10.7
laterality - missing or recorded incorrectly	11	9.8
recorded to wrong site code - e.g. hip instead of knee	5	4.5
recorded to 'other' should have been e.g. shoulder, elbow	6	5.4
wrong date of operation	5	4.5
elective v emergency	4	3.6
was hemi-arthroplasty	2	1.8

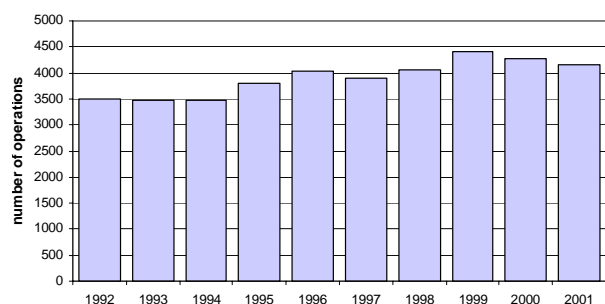
1 Nearly half of these outstanding queries are from only 3 hospitals - 2 in Glasgow, 1 in Lothian.

Appendix B

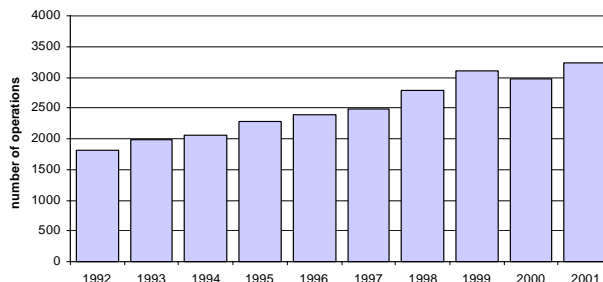
1 Trends over time

Overall the volume of elective arthroplasty surgery has decreased by 2.5% since 1999, with a larger decrease in primary hip replacement (-6%) and a small rise in the numbers of total knee replacement (+5%). The number of revision Total Hip Replacements (THR) has fallen for the second year in a row (-14%); unfortunately the number of revision knees has continued to increase (+10%).

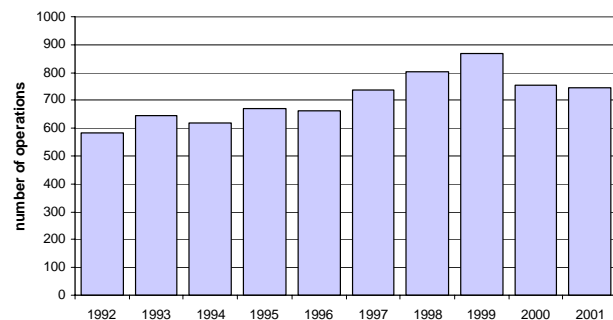
1 a
Primary hip operations
 by year ending March



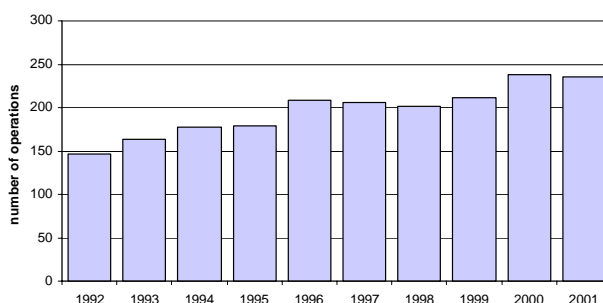
1 b
Primary knee operations
 by year ending March



1 c
Revision hip operations
 by year ending March



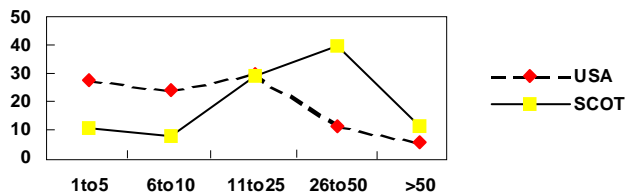
1 d
Revision knee operations
 by year ending March



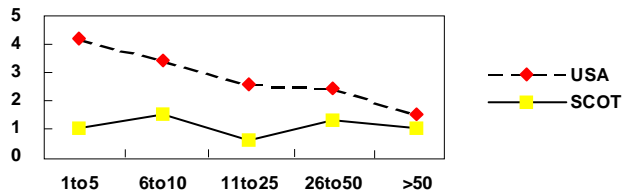
2 90 Day Outcomes for Hip Arthroplasty : American Healthcare Provider compared with Scotland.

Comparative data from published series derived in the same manner is limited to one article from an American healthcare provider using short (90 days) outcomes for hips only(Katz et al JBJS 93(A) 1622-29 2001). From this it would appear that the same trend to reduced mortality in larger case numbers has been noted but we have not noted their association with dislocation. Organisation of the orthopaedic system is clearly different with more surgeons performing fewer primaries but the more complex revisions are referred on more frequently in the US.

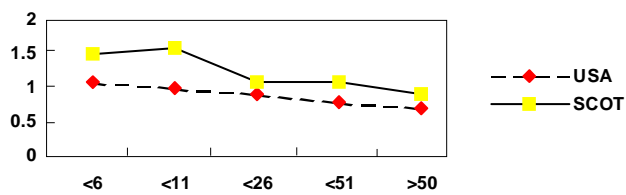
2 a
Percentage of surgeons performing primary THR by volume



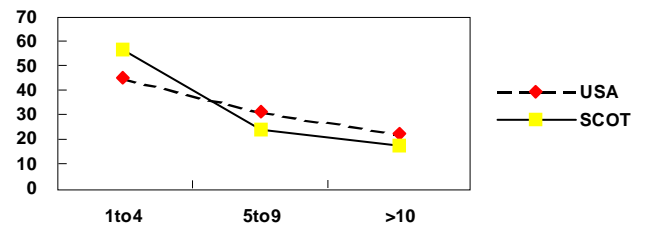
2 b
Dislocation following THR by volume performed



2 c
Death rates following THR by volume of procedures undertaken



2 d
Percentage of revision THR carried out by volume

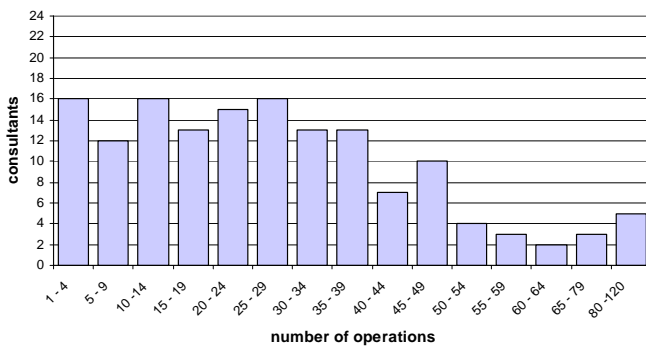


3 Hip Replacement primary and revision: distribution of surgeons according to their annual volume of procedures performed

One hundred and forty-eight surgeons were involved in elective primary hip surgery through 2001. This number is higher than the number of consultants in post because of locums, retirees and new appointments. Eleven percent of all elective primary total hips are carried out by surgeons performing 5 or less NHS THR's per year, 57% of all revision THR's were carried out by surgeons performing less than 5 per year. With the exception of deaths, there is no discernable relationship between case volume and complications in the primary situation.

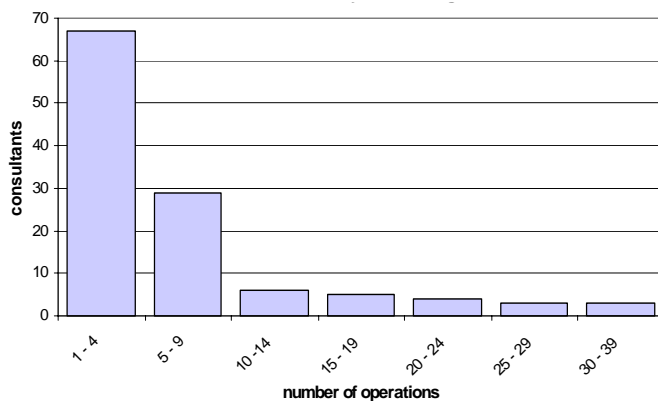
3 a

Primary hip replacements performed in year ending March 2001



3 b

Hip revisions performed in year ending March 2001

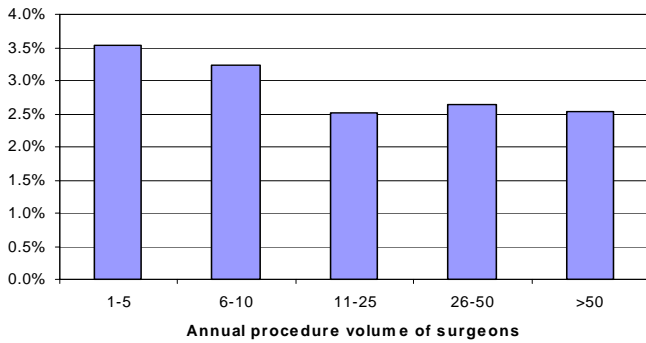


Source : Information & Statistics Division
SMR01 linked database

4 Elective Primary Hip Replacement: complication trends by annual activity level of surgeon

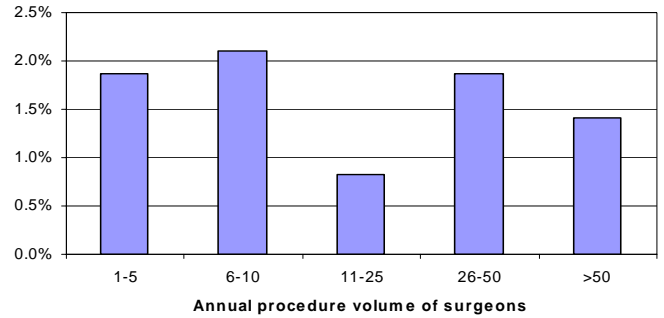
4 a

365 day mortality rate in patients having elective primary hip replacement: April 1995 - March 2000



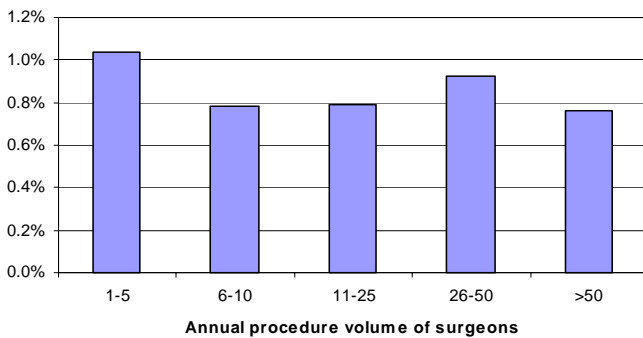
4 b

365 day dislocation rate in patients having elective primary hip replacement: April 1995 - March 2000



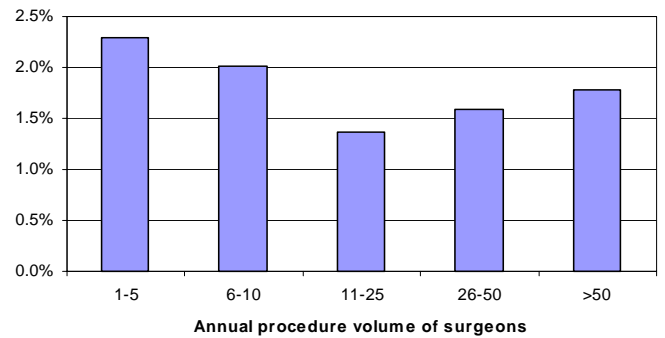
4 c

365 day infected prosthesis rate in patients having elective primary hip replacement: April 1995 - March 2000



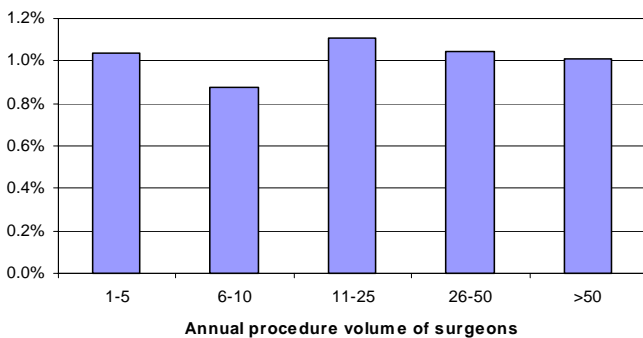
4 d

365 day DVT rate in patients having elective primary hip replacement: April 1995 - March 2000



4 e

365 day PE rate in patients having elective primary hip replacement: April 1995 - March 2000

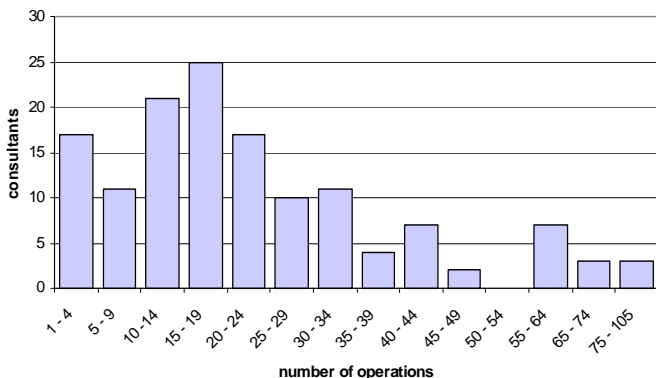


Source : Information & Statistics Division
SMR01 linked database

5 Knee Replacement primary and revision: distribution of surgeons according to their annual volume of procedures performed

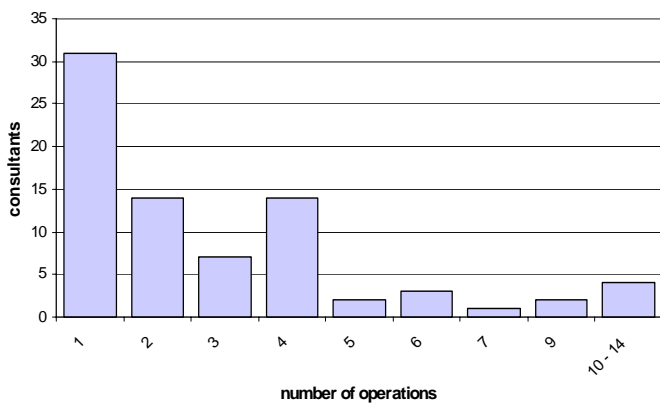
5a

Primary knee replacements performed in year ending March 2001



5 b

Knee revisions performed in year ending March 2001

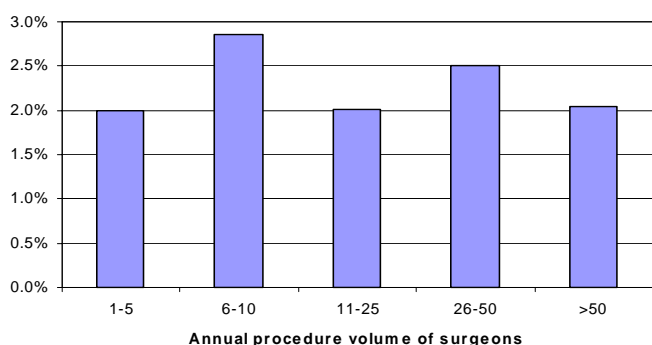


Source : Information & Statistics Division
SMR01 linked database

6 Elective Primary Knee Replacement: complication trends by annual activity level of surgeon

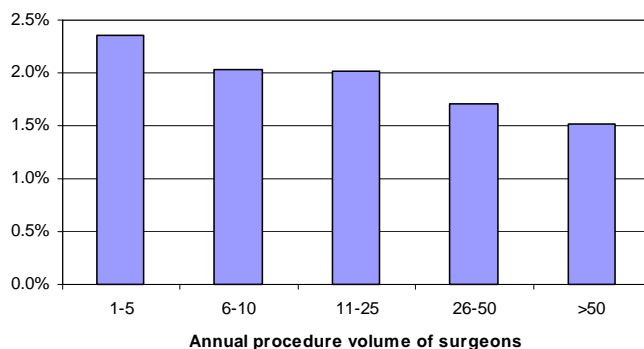
6 a

365 day mortality rate in patients having elective primary knee replacement: April 1995 - March 2000



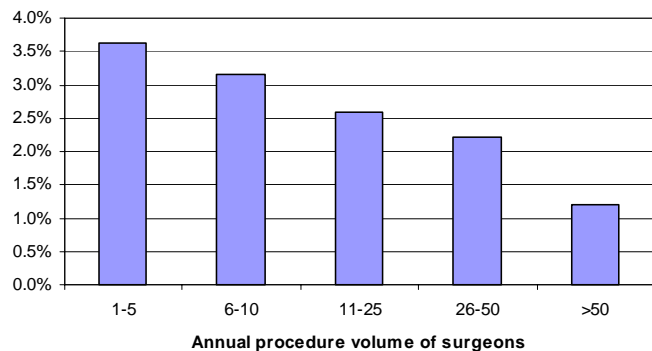
6 b

365 day dislocation rate in patients having elective primary knee replacement: April 1995 - March 2000



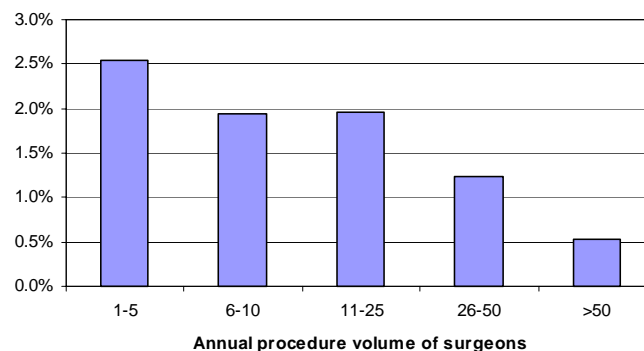
6 c

365 day infected prosthesis rate in patients having elective primary knee replacement: April 1995 - March 2000



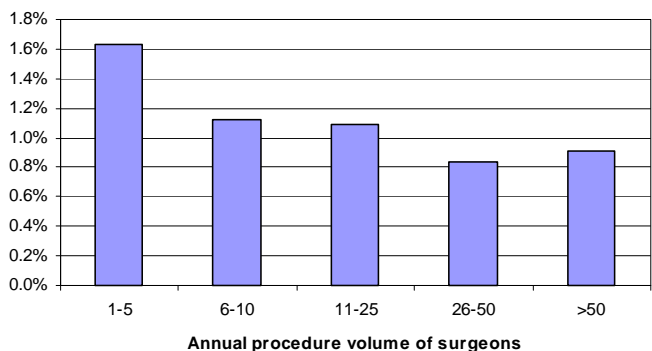
6 d

365 day DVT rate in patients having elective primary knee replacement: April 1995 - March 2000



6 e

365 day PE rate in patients having elective primary knee replacement: April 1995 - March 2000



Source : Information & Statistics Division
SMR01 linked database

7 Elective Primary Hip Replacement: complication trends by region

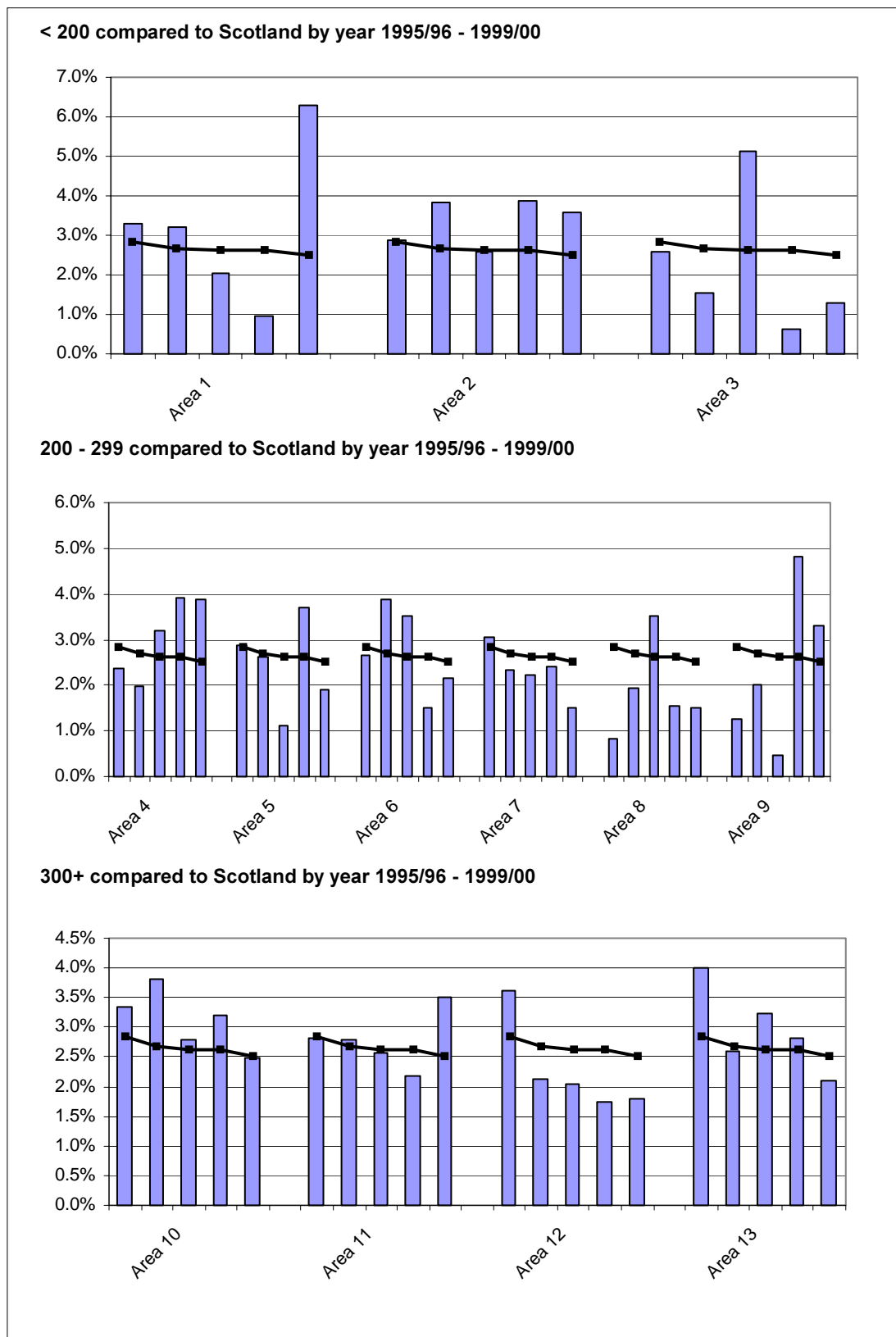
Each area has been identified by number, the management and surgeons in that area have been notified of the coding and will be able to identify their own results. Because much of this data has been derived from the central dataset and the search codes have been aggregated, we cannot be sure at this stage that the coding and analysis is robust. The purpose of producing this information is to allow individuals and areas to review (and if necessary correct) the information as well as identify possible areas for concern. At the same time this information is made available to reassure the public that the outcomes following these common and successful procedures are under constant review.

These charts should be viewed with some caution as the overall numbers of complications are small and annual variations large. No casemix analysis has been carried out. It is possible that some areas code differently, until more feedback is obtained through local investigation these should be regarded as pointers rather than definite figures.

7 Elective Primary Hip Replacement: complication trends by region

7a Mortality

365 day mortality rates in patients having elective primary hip replacement :
 areas grouped by annual volume of procedures performed



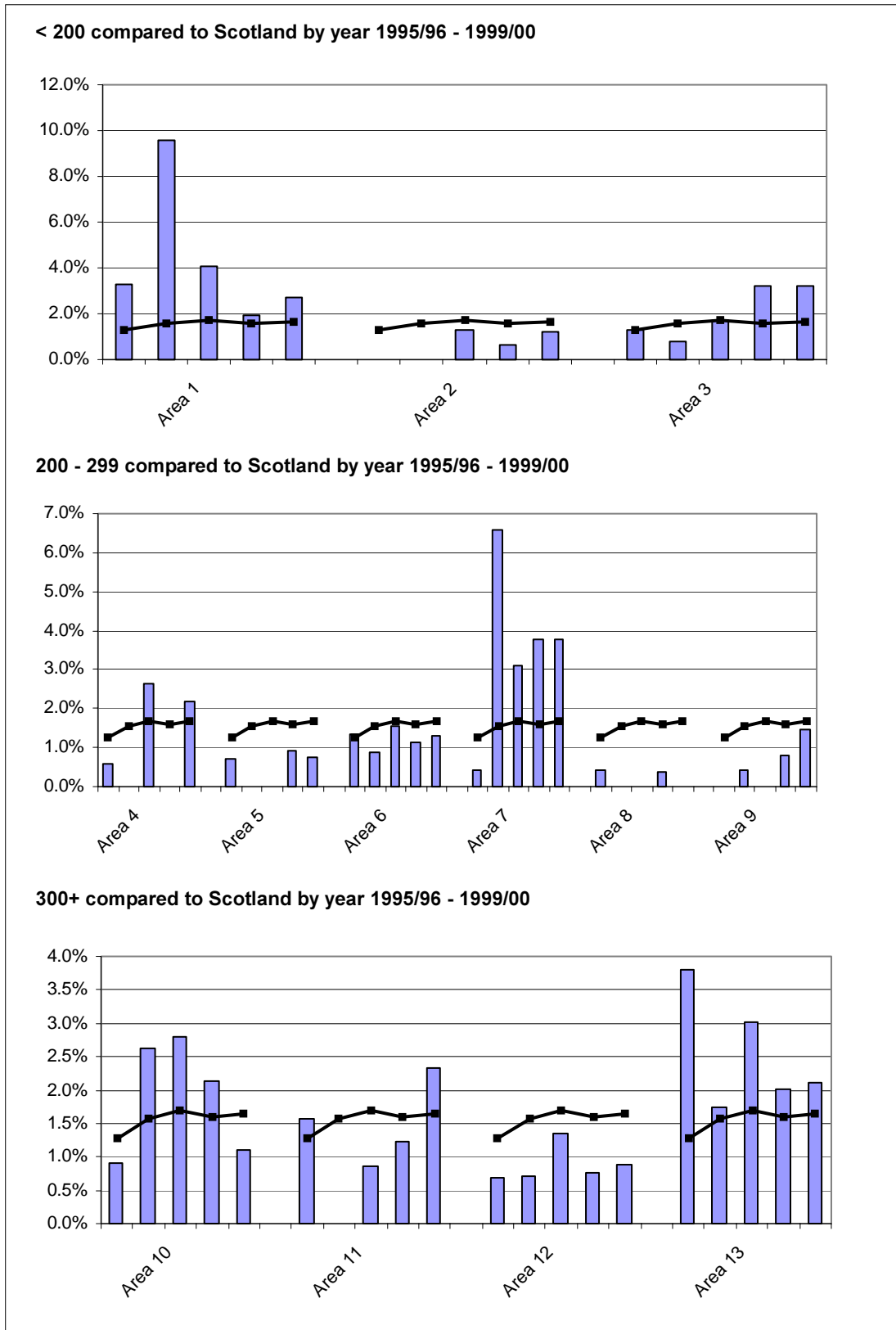
Note : Graphs are not the same scale

Source : Information & Statistics Division
 SMR01 linked database

7 Elective Primary Hip Replacement: complication trends by region

7b Dislocation

365 day complication rate in patients having elective primary hip replacement :
 areas grouped by annual volume of procedures performed



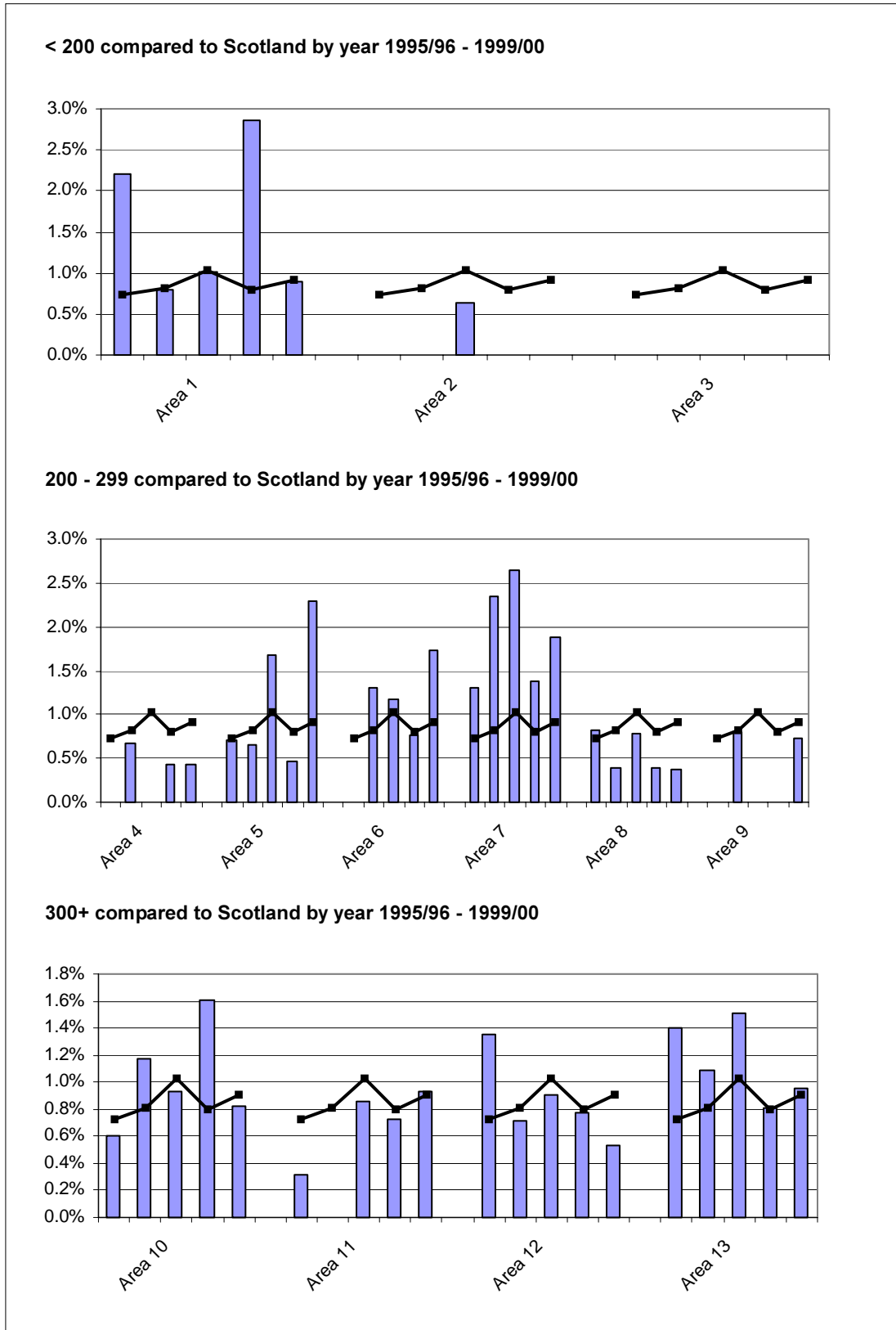
Note : Graphs are not the same scale

Source : Information & Statistics Division
 SMR01 linked database

7 Elective Primary Hip Replacement: complication trends by region

7c Infected prosthesis

365 day complication rate in patients having elective primary hip replacement :
 areas grouped by annual volume of procedures performed



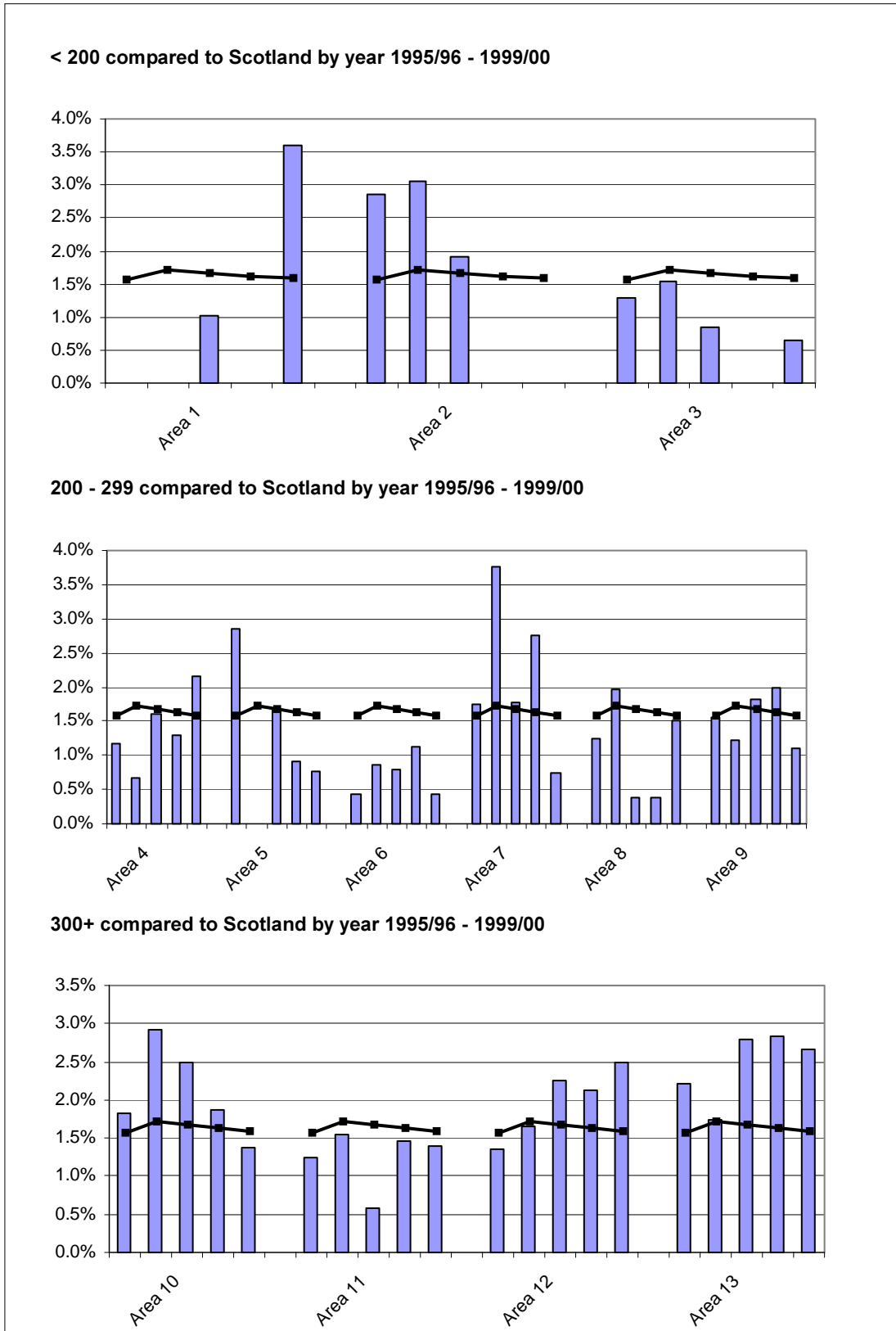
Note : Graphs are not the same scale

Source : Information & Statistics Division
 SMR01 linked database

7 Elective Primary Hip Replacement: complication trends by region

7d Deep Vein Thrombosis

365 day complication rate in patients having elective primary hip replacement :
 areas grouped by annual volume of procedures performed



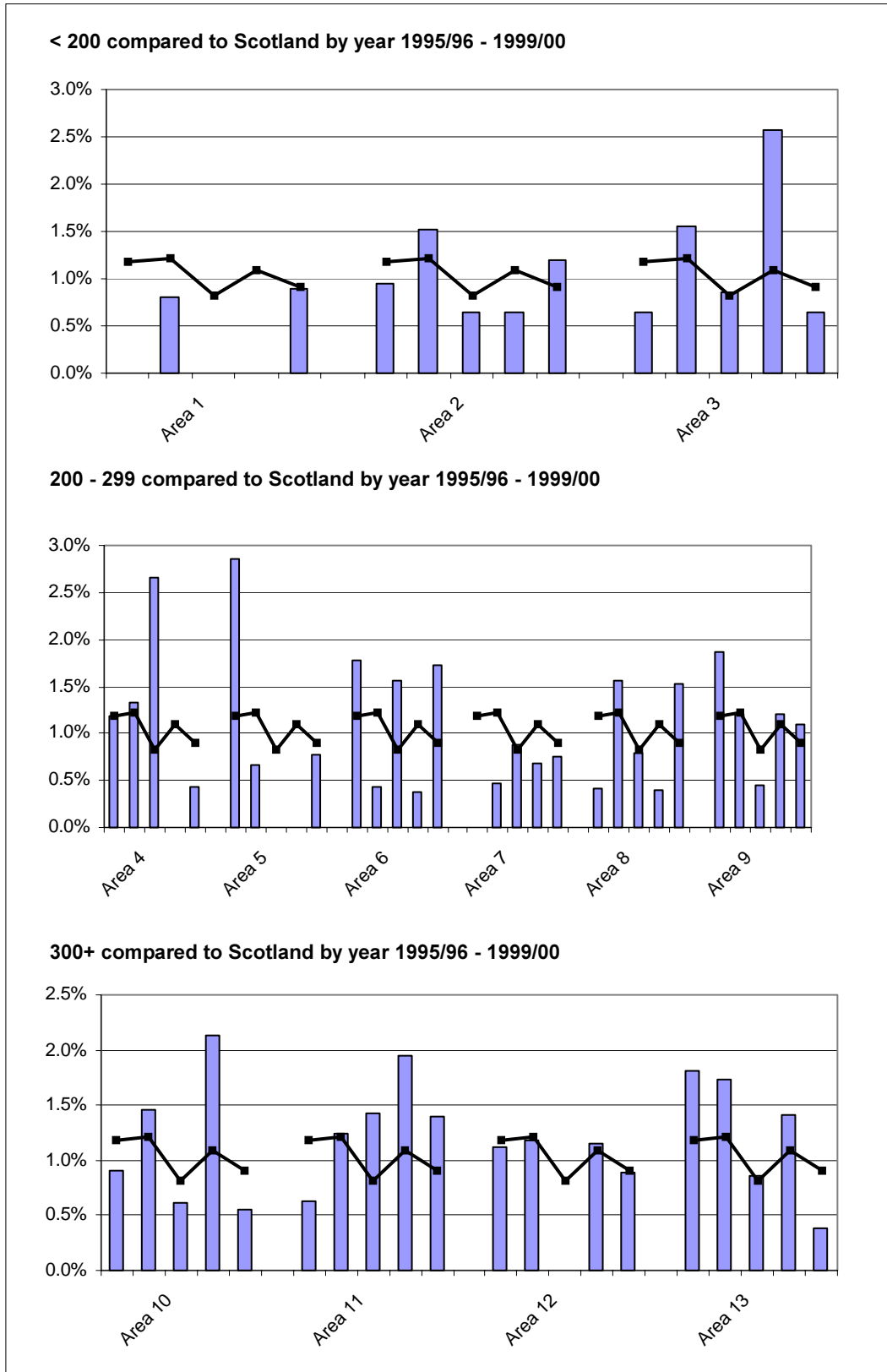
Note : Graphs are not the same scale

Source : Information & Statistics Division
 SMR01 linked database

7 Elective Primary Hip Replacement: complication trends by region

7e Pulmonary Embolism

365 day complication rate in patients having elective primary hip replacement :
 areas grouped by annual volume of procedures performed

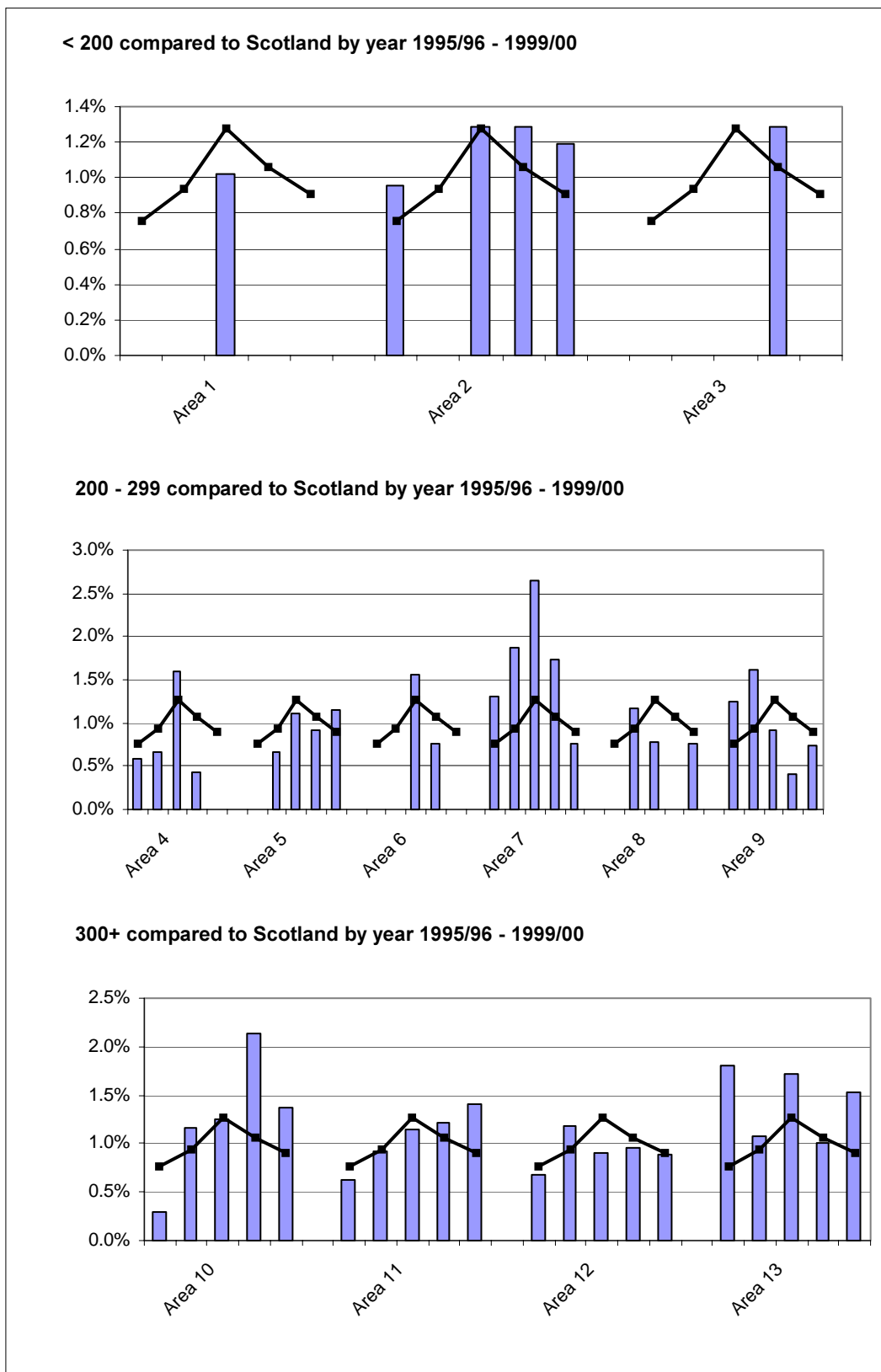


Note : Graphs are not the same scale

7 Elective Primary Hip Replacement: complication trends by region

7f Revision

365 day complication rate in patients having elective primary hip replacement : areas grouped by annual volume of procedures performed

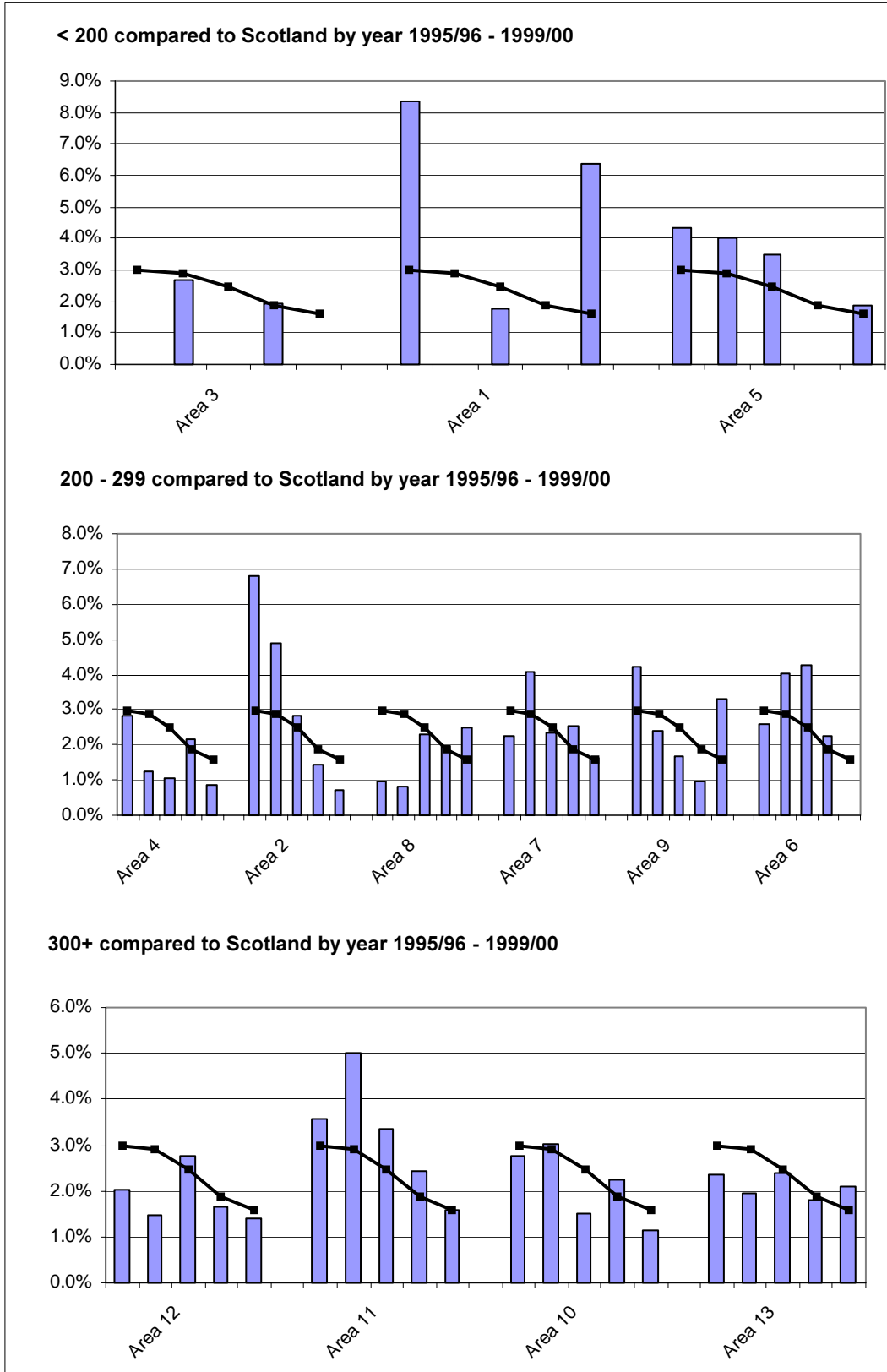


Note : Graphs are not the same scale

8 Elective Primary Knee Replacement: complication trends by region

8a Mortality

365 day complication rate in patients having elective primary knee replacement : areas grouped by annual volume of procedures performed



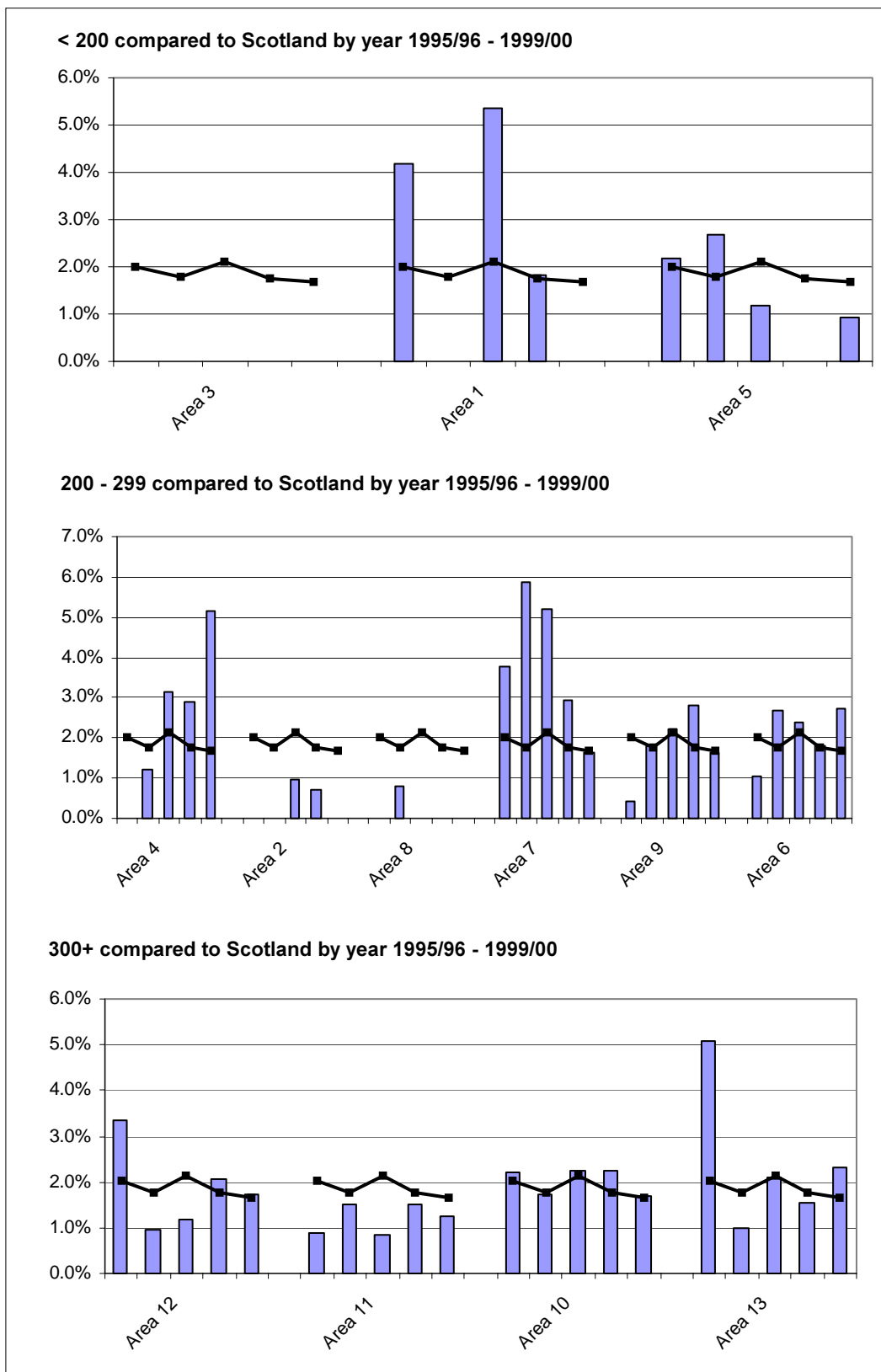
Note : Graphs are not the same scale

Source : Information & Statistics Division
SMR01 linked database

8 Elective Primary Knee Replacement: complication trends by region

8b Infected prosthesis

365 day complication rate in patients having elective primary knee replacement : areas grouped by annual volume of procedures performed

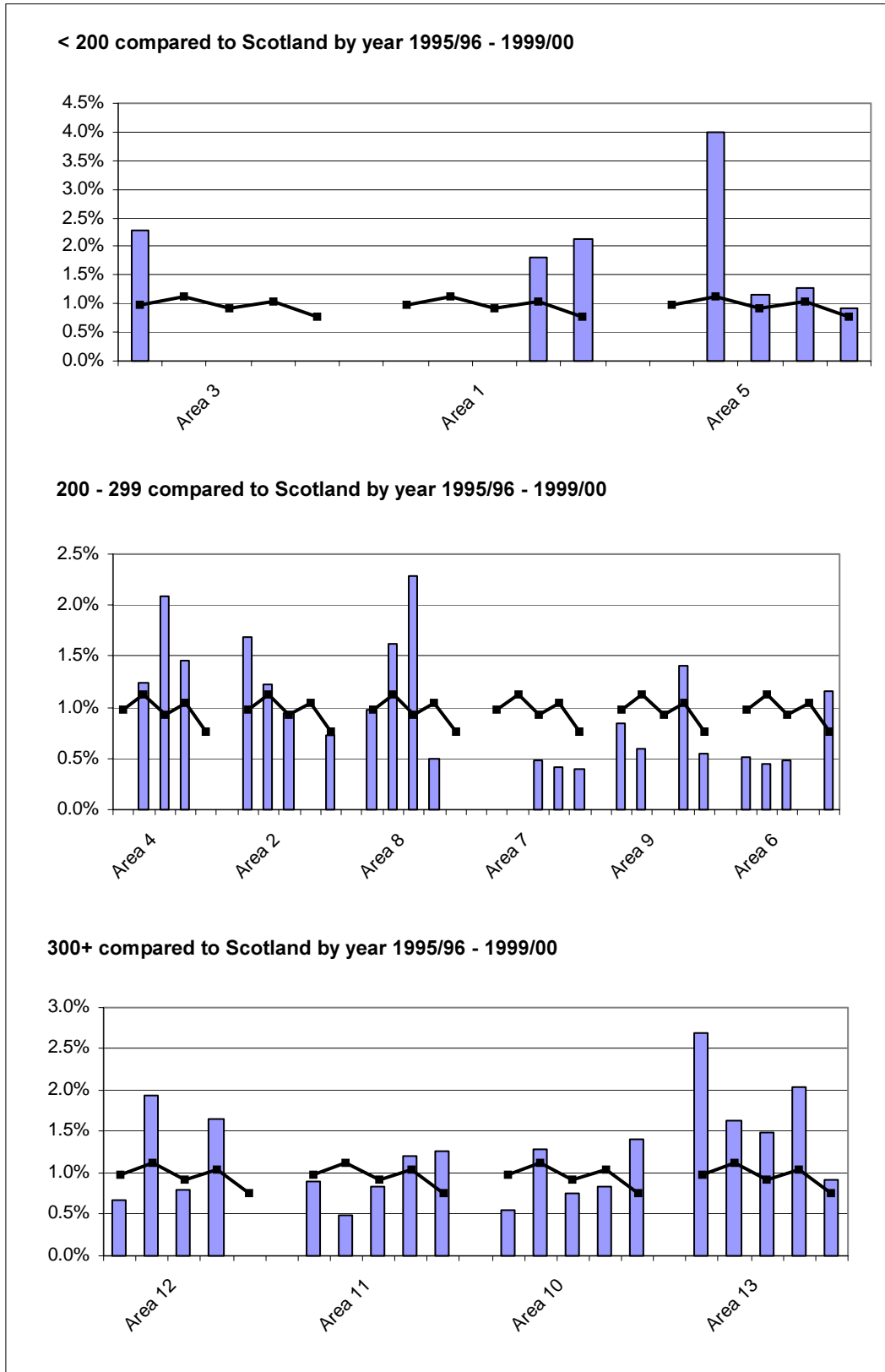


Note : Graphs are not the same scale

8 Elective Primary Knee Replacement: complication trends by region

8c Deep Vein Thrombosis

365 day complication rate in patients having elective primary knee replacement :
 areas grouped by annual volume of procedures performed



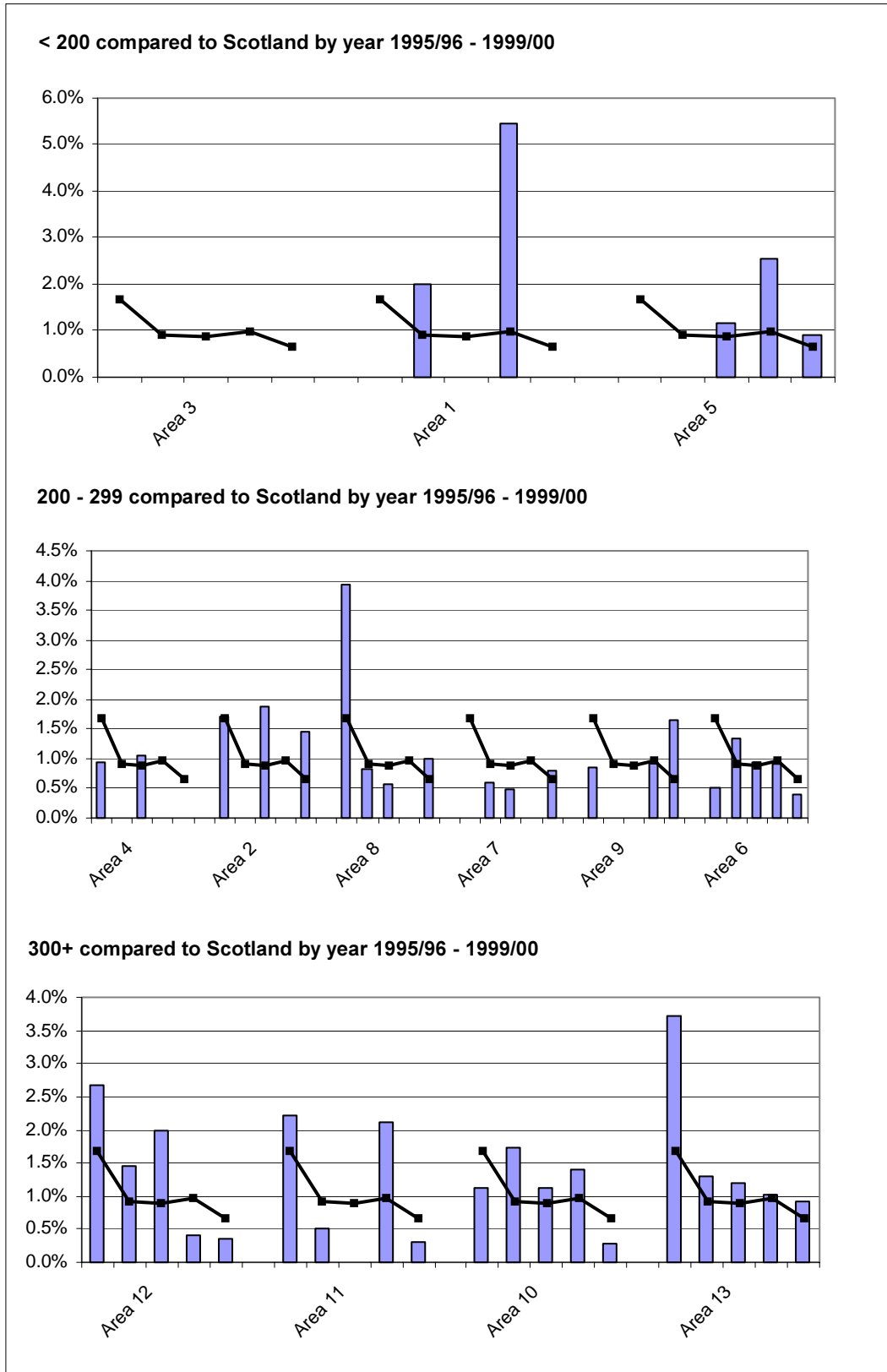
Note : Graphs are not the same scale

Source : Information & Statistics Division
 SMR01 linked database

8 Elective Primary Knee Replacement: complication trends by region

8d Pulmonary Embolism

365 day complication rate in patients having elective primary knee replacement :
 areas grouped by annual volume of procedures performed

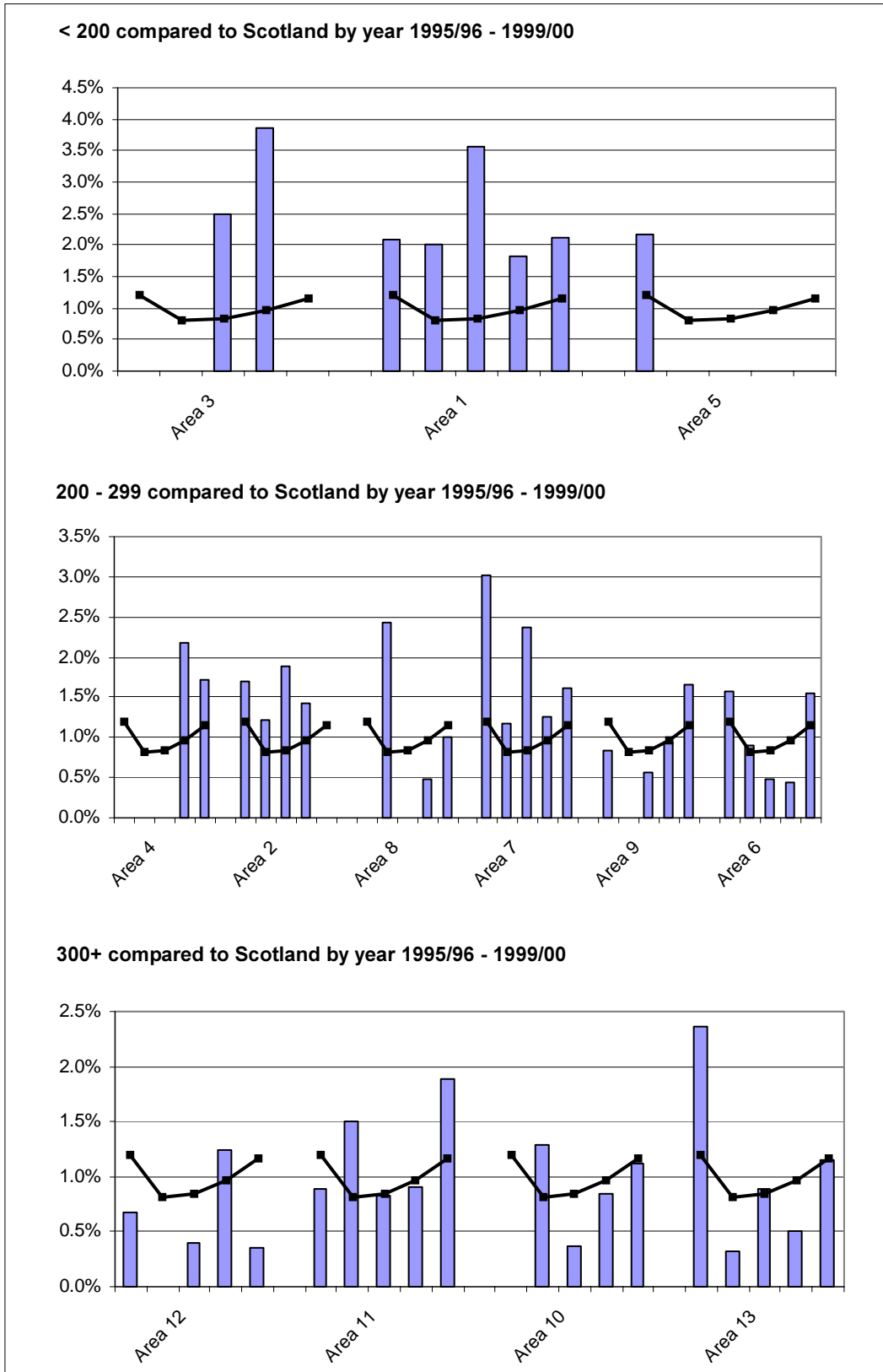


Note : Graphs are not the same scale

8 Elective Primary Knee Replacement: complication trends by region

8e Revision

365 day complication rate in patients having elective primary knee replacement :
 areas grouped by annual volume of procedures performed



Note : Graphs are not the same scale