

Programme Budgeting - Testing the Approach in Scotland

PROGRAMME BUDGETING – TESTING THE APPROACH IN SCOTLAND

Sara Twaddle, Health Improvement Strategy
Marjorie Marshall, ASD
Nils Michael, ASD

Executive Summary

This methodology paper describes the pilot application of Programme Budgeting and Marginal Analysis (PBMA) in Scotland. Two approaches were tested using data from 2007/08: a „bottom up“ approach identifying the costs of preventative activity and related diseases for three risk factors amenable to early intervention (obesity, smoking and excessive alcohol consumption) and a „top down“ approach presenting all NHSScotland activity and cost information by 21 diagnostic categories.

Within the Health Care Quality Strategy for NHSScotland¹ one of the three quality ambitions is concerned with providing a more efficient and effective health service. This paper supports this ambition by discussing how outcome measures could be used, along with cost data disaggregated in this way, to inform discussions around the value for money associated with different programmes.

With further development PBMA information could inform discussions such as:

- Could better value for money be achieved by expanding investment in preventative activities?
- Does the distribution of expenditure between programmes reflect the priorities for NHSScotland?
- Could better value for money be obtained by redistributing among programmes?

¹ The Scottish Government, May 2010. The Healthcare Quality Strategy for NHSScotland

Table of Contents

Executive Summary	1
Table of Contents	2
1. Background	3
2. Use of Programme Budgeting information	4
3. Preliminary findings - bottom up approach	6
3.1 Smoking	9
3.2 Obesity	10
3.3 Alcohol	11
4. Preliminary findings - top down approach	14
4.1 Mental health	16
Outcomes associated with mental health services	17
4.2 Cancer services	18
Outcomes associated with cancer services	18
4.3 Diabetes	19
Outcomes associated with diabetes services	19
4.4 Stroke	20
Outcomes associated with stroke services	20
5. Discussion	21
6. Conclusion	23
8. References	24
Appendix A: Detailed breakdown of activity and expenditure by programme	25
Appendix B: PBMA – experience from England	27
Appendix C: NHSScotland Programme Budgeting Methodology 2007/08 data	29
Appendix D: Diagnoses or Specialty groups in „Other“ PBC category	36

PROGRAMME BUDGETING – TESTING THE APPROACH IN SCOTLAND

1. Background

1. The Government has set a target to match European Union population growth over the period 2007-2017, supported by increased Healthy Life Expectancy. Levels of healthy life expectancy for women and men have been gradually increasing since 1980.

2. In order to increase healthy life expectancy further, a significant delivery challenge for SG and local authorities is how to promote the necessary resource shifts upstream to prevention and addressing of underlying causes. This can be achieved by:

- Stopping doing things that don't work
- Allocating resources locally to reflect levels of need more accurately
- Getting the balance right between universal and targeted services
- Moving resources to prevention rather than cure.

3. Programme Budgeting and Marginal Analysis (PBMA) offers an analytical framework for assessing the costs and benefits of alternative courses of action, which could assist with identification of the effects of resource shifts and areas for disinvestment among programmes. Programme Budgeting (PB) involves the presentation of estimates of expenditure in „programmes“ across an entire budget. For example within the health budget the programme may reflect different diseases, different levels of care (primary, secondary and tertiary) or different location of care. Marginal Analysis (MA) uses economic evaluation techniques to evaluate incremental changes in costs and consequences when resources in programmes are deployed in different ways. Marginal Analysis focuses solely on the extra costs and benefits of changes in expenditure of resources. It analyses the effects of changing the balance of expenditure. Overall efficiency will increase when the marginal gain in benefit in the expanding programmes exceeds the marginal loss of benefit in the contracting programmes. As a result, Marginal Analysis identifies where additional resources should be targeted, where reductions should be made if expenditure must be cut, and how resources can be reallocated to achieve an overall gain in benefit with no overall change in expenditure.

4. PBMA has been used in a number of countries and settings, including in NHS Boards in Scotland, for more than 30 years². Recent experience from England suggests that this approach may have been helpful for the Department of Health and PCTs to make better informed decisions about where their limited budgets are being spent³ (Appendix B).

5. Ongoing work on *Shifting the Balance of Care in Scotland* aims to develop and implement a transparent Integrated Resource Framework for health and social care at Locality/CHP level. This will enable partners to be clearer about the cost and quality implications of local professional decision making about care and will provide

² Mitton, C; Donaldson, C. (2001)

³ Martin S, Rice N & Smith PC. (2008)

an evidence base for reducing variation in practice and outcomes for patients / service users. It will also provide Boards and their partners with the information required to strategically plan and review services more effectively, and to enable realignment of resources to support shifts in clinical/care activity within and across health and social care systems.

6. There is a high level of interest in information being provided in a different format than that currently provided by the NHSScotland cost book. MSPs, and other interested parties, frequently request information on the cost attributable to particular diseases or groups of diseases. In June 2010 the Public Audit Committee, in an oral evidence session on the performance of NHSScotland, explored the link between specific activity and costs with Dr Woods, the then NHSScotland Chief Executive. The CMO also referred to PBMA as a way of shifting resources in his oral evidence to the Finance Committee's "Preventative Spending Inquiry" in October 2010.⁴

2. Use of Programme Budgeting information

7. Programme budgets provide information on current expenditure related to activity in different programmes. These data can be used, along with process and intermediate outcomes, to review the value for money associated with various programmes and therefore potentially compare this among programmes. They can be used to facilitate discussions around areas such as:

- Is the level of preventative activity for each programme appropriate?
- Could better value for money be achieved by expanding investment in preventative activities?
- Which programmes could be reduced to allow more investment in preventative activities?
- Is the distribution of expenditure among programmes appropriate?
- Does the distribution of expenditure between programmes reflect the priorities for NHSScotland?
- Is the distribution of expenditure within programmes (between primary and secondary care for example or among sub programmes) appropriate?
- Does the allocation of resources in NHSScotland vary from that in other healthcare systems?
- Could better value for money be obtained by redistributing among programmes?
- Could better value for money be obtained by redistributing resources within programmes?

8. The following sections describe work by analysts within the Scottish Government to test the use of Programme Budgeting at national level in Scotland. Two approaches to determining programme budgets were tested:

Bottom up approach using activity and cost data obtained from information requests to the Information Services Division of NHS National Services Scotland (ISD) for conditions related to risk factors for long term conditions.

⁴ Scottish Parliament Finance Committee's Inquiry into Preventative Spend

Top down approach grouping expenditure and activity by 21 of the 23 programmes of care used in the NHS in England. These programmes reflect ICD10 categories, plus an 'other' category⁵. The two programmes that were excluded were „healthy individuals“ and „social care needs“ as these map specifically to National Service Framework activities, which do not apply in Scotland. Any activity and cost identified with these was included in the „other“ category. Details of the methodology used by ISD is included as Appendix C.

9. Information from programme budgets in itself will not offer insight into the appropriate allocation of resources across various programmes. This requires measures of outcome which can be applied consistently across all programmes to determine the relative efficiency of different programmes.

10. Such an outcome measure should reflect the purpose target of increased healthy life expectancy and the national outcomes:

- We live longer, healthier lives
- We have tackled significant inequalities in Scottish society

11. An outcome measure should therefore incorporate both aspects of healthy life expectancy - additional years of life gained (reduce premature mortality) and enhanced quality of life (reduced morbidity). At present it is not possible to measure outcomes in this way across disparate programmes. Instead, proxy process and intermediate outcome measures, such as attendances at retinal screening or 30 day survival after stroke, can be used to build up a picture within the relevant programme.

12. To illustrate the potential use of Programme Budgeting, policy colleagues were asked to identify measures of process and intermediate outcome associated with the relevant programme.

13. For illustrative purposes, detailed information is presented on activity, costs and examples of process and intermediate outcomes relating to obesity, smoking and excessive alcohol consumption for the bottom up approach. Similar information is presented for the cancer and mental health programmes, plus cerebrovascular and diabetes sub programmes, for the top down approach.

⁵ NHSScotland Programme Budgeting Methodology 2007/08 data, ISD Scotland, February 2010.

3. Preliminary findings - bottom up approach

14. For the three risk factors, smoking, obesity and excessive alcohol consumption, activity and expenditure related directly to secondary prevention⁶ is presented alongside activity and expenditure related to diseases directly resulting from the presence of the risk factor. Use of community and ambulance services could not be estimated. Non NHS service provision was also excluded. Primary prevention to prevent people developing the risk factor in the first place, such as general health improvement activities, smoking in public places legislation etc, is excluded from this analysis.

15. Disease attributable fractions were applied to activity related to the sequelae to generate estimates of the cost to NHSScotland of disease related to the risk factor. Obesity attributable fractions derived from fractions for England (NAO 2001, as used in ScotPHO obesity study 2007)⁷ were applied to total costs for individual specified conditions. Similarly, UK smoking attributable fractions (Statistics on Smoking, The Health and Social Care Information Centre, 2009)⁸ were applied to total costs for the relevant conditions. Note that activity and costs were based on the primary diagnosis used in coding, not a diagnosis in any position.⁹

16. In each case, costs were made up of inpatient (including daycases), outpatient, and primary care costs as well as prescription charges for each condition (by ICD10 code).

17. Inpatient (including day cases)¹⁰ and outpatient¹¹ activity data were applied to treatment costs given in the Cost Book¹². For all other surgical appointments and all medical appointments, pro rata proportions of individual conditions were calculated for inpatient episodes and these fractions were then applied to the main disease categories for outpatients. The number of GP consultations was derived from Practice Team (PTI) sample data for 2007/08. The total cost of primary medical services divided by the total number of face-to-face contacts was used as a proxy for a unit cost per GP visit.

18. For prescription costs for conditions indirectly related to obesity or smoking, volume and cost (Gross Ingredient Cost (GIC)) associated with the main BNF sections for digestive, circulatory, respiratory diseases and cancers were obtained from ISD¹³. Direct costs for drugs in smoking cessations are available from ISD¹⁴.

⁶ Secondary prevention relates to activities which decrease the chance of development of diseases in those with the relevant risk factor. For example, preventative interventions in those who are overweight and obese may reduce the chance of developing type 2 diabetes.

⁷ NAO 2001

⁸ NHS IC 2009

⁹ Each hospital discharge can include up to six diagnoses. The diagnosis / condition which appears first in the discharge record is known as the underlying or primary diagnosis, while conditions in any other position are supplementary diagnoses

¹⁰ ISD data: summary activity data disaggregated from category summaries by data request

¹¹ ISD data: Summary activities at specialist outpatient clinics

¹² ISD data: Cost book tables R040 and R044

¹³ ISD data: Prescription cost analysis for Scotland

¹⁴ ISD data: Prescribing of Smoking Cessation Interventions

19. Data on activity and cost related to alcohol in Scotland in 07/08 were taken from „*Societal Cost of Alcohol Misuse in Scotland for 2007*”¹⁵. The information in the report was based on ISD data, enhanced with additional analyses.

¹⁵ York University 2010

Table 3.1: Summary of risk factor activity

Programme	Secondary Prevention Activities	Related disease activity			
		Primary care contacts	Prescribing items	OP attendances	IP episodes/daycases
Smoking	<ul style="list-style-type: none"> Smoking cessation services Smoking cessation prescribing (244,283 items) 	130,131	34,886,390	44,160	32,349
Obesity	<ul style="list-style-type: none"> Healthy weight community projects Counterweight HEAT target NHS Health HEAL support 	925,857	8,211,483	31,872	22,851
Excessive alcohol consumption*	<ul style="list-style-type: none"> Screening in A&E Brief interventions 	470,752	202,373	194,258	19,000

* For consistency only similar data to those presented for obesity and smoking are shown for 2007/08 in this overview.

Table 3.2: Summary of estimated risk factor costs

Programme	Total (£m)	Secondary Prevention Activities (£m)	Related disease activity (£m)			
			Primary care contacts	Prescribing items	OP attendances	IP episodes/daycases
Smoking	£336.3	18.3 (5.6%)	7.0	62.6	19.2	229.3
Obesity	£190.9	16.4 (8.6%)	29.9	83.0	4.0	57.6
Excessive alcohol consumption	£114.7	10.1 (8.8%)	15.1	1.6	20.9	67.0

3.1 Smoking

20. Tables 3.3 and 3.4 provide a more detailed overview of activity and cost linked to smoking, disaggregated by major disease categories.

Table 3.3: Activity attributable to smoking 2007/08

Programme	Secondary Prevention Activities	Related disease activity			
		Primary care contacts	Prescribing items**	OP attendances	IP episodes/daycases
All diseases of the digestive system		588	5,056,691	449	175
All circulatory diseases		97,887	23,791,257	21,760	19,185
All respiratory diseases		24,758	6,019,723	5,454	6,150
All cancers		4,351	18,719	13,719	5,998
Other*		2,547		2,779	841
Direct smoking cessation prescription items	244,283				
Total	244,283	130,131	35,130,673	44,160	32,349

* includes attributable fractions for: age-related cataract; Periodontal disease; Spontaneous abortion; Hip fracture (GP appointments only)

**measured independently from GIC

Data source: ISD data request (2007/08 data) – Inpatient, Outpatient and Daycase activity data (diagnosis); number of GP consultations; prescribing of smoking cessation interventions

Table 3.4: Estimated costs attributable to smoking 2007/08

Programme	Total (£m)	Secondary Prevention Activities (£m)	Related disease activity (£m)			
			Primary care contacts	Prescribing items	OP attendances	IP episodes/daycases
All diseases of the digestive system	10.4		0.2	1.1	1.2	7.9
All circulatory diseases	105.7		3.8	32.7	4.4	64.9
All respiratory diseases	82.2		2.2	28.7	2.7	48.5
All cancers	118.1		0.7	0.05	10.8	106.6
Other*	1.6		0.07		0.2	1.3
Direct smoking cessation prescription costs	7.3	7.3				
Smoking Cessation	11.0	11.0				
Total	336.3	18.3	7.0	62.6	19.2	229.3

* includes attributable fractions for: age-related cataract; Periodontal disease; Spontaneous abortion; Hip fracture (GP appointments only)

Data source: ISD cost book data (2007/08) R040; R044. R100; ISD data request (2007/08 data) total number of face-to-face GP visits

3.2 Obesity

21. Tables 3.5 and 3.6 provide a more detailed overview of activity and cost linked to obesity, disaggregated by major disease categories.

Table 3.5: Activity attributable to obesity 2007/08

Programme	Related disease activity			
	Primary care contacts	Prescribing items**	OP attendances	IP episodes/daycases
Direct Obesity	183,456	110,303	1,202	601
All diseases of the endocrine system	297,608	1,214,531	10,096	3,097
All circulatory diseases	410,573	6,307,827	10,031	6,841
All cancers	1,822	627	3,045	7,763
other*	32,398	578,195	7,498	4,549
Total	925,856	8,211,483	31,872	22,851

*includes attributable fractions for: Osteoarthritis, Gallstones and Gout

**measured independently from GIC

Data source: ISD data request (2007/08 data) – Inpatient, Outpatient and Daycase activity data (diagnosis); number of GP consultations; prescribing data for associated disease treatment

Table 3.6: Estimated costs attributable to obesity 2007/08

Programme	Total (£m)	Secondary Prevention Activities (£m)	Related disease activity (£m)			
			Primary care contacts	Prescribing items	OP attendances	IP episodes/daycases
Direct Obesity costs	28.6	16.4	5.9	4.5	0.1	1.6
All diseases of the endocrine system	45.7		9.6	26.9	1.2	8.0
All circulatory diseases	80.7		13.3	48.4	1.5	17.5
All cancers	19.1		0.1	0.0	0.3	18.8
other*	16.8		1.0	3.1	0.9	11.8
Total	190.9	16.4	29.9	83.0	4.0	57.6

*includes attributable fractions for: Osteoarthritis, Gallstones and Gout

Data source: ISD cost book data (2007/08) R040; R044; R042. R100; ISD data request (2007/08 data) total number of face-to-face GP visits

3.3 Alcohol

22. Tables 3.7 and 3.8 provide a more detailed overview of activity and cost linked to alcohol misuse, disaggregated by major disease categories including injuries and other external influences.

23. Note that, as alcohol has a protective effect for coronary heart disease and cholelithiasis (gallstones) at lower levels of consumption, the alcohol attributable fraction (as used in the York study) has a negative value and therefore the estimate is of the number of prevented hospital episodes attributable to alcohol consumption. The negative impact for heart diseases is outweighed by other disease impacts in the circulatory disease category, but the impact for gallstones is the dominating contributor in the digestive disease category. This is represented by a negative prefix in Table 3.7 and a negative cost in Table 3.8 in the digestive disease category.

24. The activity and costs shown in tables 3.7. and 3.8 differ from those in the York study (2007) and this work is not intended to replicate that. In common with the estimates for the other risk factors they omit costs using assumptions from literature such as the cost of ambulance journeys or A&E visits; and are based on primary diagnosis only. The York study uses diagnosis in any position.

Table 3.7: Activity attributable to alcohol misuse 2007/08

Programme	Related disease activity			
	Primary care contacts	Prescribing items**	OP attendances	IP episodes/daycases
Direct Alcohol misuse ***	109,594	38,680		13,943
Indirect activity				
All diseases of the digestive system	2,134			-1,433
All circulatory diseases	323,182			1,203
All cancers	4,454			3,183
other*	27,368			2,104
Injuries and other external	4,020			
Total indirect activity***	361,158	163,693		5,057
Total	470,752	202,373	194,258	19,000

*includes attributable fractions for: epilepsy; spontaneous abortion, psoriasis

**prescriptions for direct treatment and dependence, indirect: withdrawal symptoms

***excl OP attendances

Data source: York 2010

Table 3.8: Estimated costs attributable to alcohol abuse 2007/08

Programme	Total (£m)	Secondary Prevention Activities (£m)	Related disease activity (£m)			
			Primary care contacts	Prescribing items	OP attendances	IP episodes/daycases
Direct Alcohol misuse costs***	67.45	10.10	3.51	0.87		52.97
Indirect costs						
All diseases of the digestive system	-3.92		0.07			-3.99
All circulatory diseases	13.69		10.34			3.35
All cancers	9.00		0.14			8.85
other*	6.73		0.88			5.85
Injuries and other external	0.13		0.13			
Total indirect costs***	26.40		11.56	0.78		14.07
Total	114.7	10.1	15.1	1.6	20.9	67.0

*includes attributable fractions for: epilepsy; spontaneous abortion, Psoriasis

**prescriptions for direct treatment and dependence, indirect: withdrawal symptoms

***excl OP attendances Data source: York 2010

Outcomes for risk factors

25. As with all NHSScotland activity, outcomes should reflect both life years gained and the quality of these years gained. In the absence of such a measure of the effectiveness of prevention, process and intermediate outcomes can be used to describe the outcomes of the programmes. Table 3.9 provides examples:

Table 3.9: programme outcomes

Programme	Process outcomes	Intermediate outcomes
Smoking	<ul style="list-style-type: none"> • Smoking cessation clinic attendances 	<ul style="list-style-type: none"> • Smoking cessation rates • Lung cancer incidence • Incidence of other smoking related conditions
Obesity	<ul style="list-style-type: none"> • Child healthy weight interventions carried out 	<ul style="list-style-type: none"> • % population overweight • % population obese • Incidence of type 2 diabetes
Excessive alcohol consumption	<ul style="list-style-type: none"> • Brief interventions undertaken • Number of people screened in A&E • Admissions for alcohol related disease 	<ul style="list-style-type: none"> • Harmful drinking quit rates • Incidence of harmful drinking

26. Such analyses could demonstrate the return on investment from secondary prevention in those with particular risk factors. For example, expenditure of £x million in smoking cessation services, led to y successful quit attempts (at one month post quit). Likewise with time series information, the reduced incidence in lung cancer over time could be presented alongside information on investment in smoking cessation services.

4. Preliminary findings - top down approach

Activity

27. NHSScotland activity was allocated to the 21 programmes, with the exception of A&E, community, and prevention activity and expenditure, which it was not possible to disaggregate at this time. Total activity by programme is disaggregated and shown in Table A1 in Appendix A.

Expenditure

28. Overall, all NHS Scotland expenditure was allocated to the 21 programmes (Table A2 in Appendix A). The biggest category was „other“, which incorporates much of the community activity in Scotland as well as other activity that cannot be allocated by diagnostic category. The high level (estimated) results are shown in Table 4.1 with proportions from the English PB exercise included for comparison.

Table 4.1: Programme budgeting categories & associated estimated spend

Programme Budgeting Category	All Services	Percentage	% from English PB exercise
All Other	£2,363,206,181	29.3%	31.4%
Problems of circulation	£756,720,451	9.4%	7.8%
Mental Health Disorders	£728,254,492	9.0%	11.0%
Problems of the respiratory system	£508,300,584	6.3%	4.0%
Problems of the gastro intestinal system	£481,524,197	6.0%	4.4%
Cancers and Tumours	£475,299,004	5.9%	5.3%
Neurological	£437,592,278	5.4%	3.7%
Dental problems	£374,083,410	4.6%	3.2%
Problems due to Trauma and Injuries	£357,432,705	4.4%	3.3%
Problems of Genito Urinary system	£314,612,189	3.9%	3.9%
Problems of the Musculo skeletal system	£290,808,712	3.6%	4.4%
Problems of the Skin	£203,331,806	2.5%	1.8%
Endocrine, Nutritional and Metabolic problems	£195,824,862	2.4%	2.6%
Problems of Vision	£185,093,353	2.3%	1.7%
Infectious diseases	£85,184,967	1.1%	1.4%
Adverse effects and poisoning	£89,540,357	1.1%	0.9%
Maternity and Reproductive Health*	£77,496,004	1.0%	3.2%
Disorders of Blood	£65,608,322	0.8%	1.3%
Problems of Learning Disability	£49,220,106	0.6%	3.0%
Problems of Hearing	£24,565,963	0.3%	0.5%
Conditions of neonates*	£1,989,574	0.0%	1.0%
Total expenditure	£8,065,689,520	100%	100%

* the majority of these data are currently included in the other category

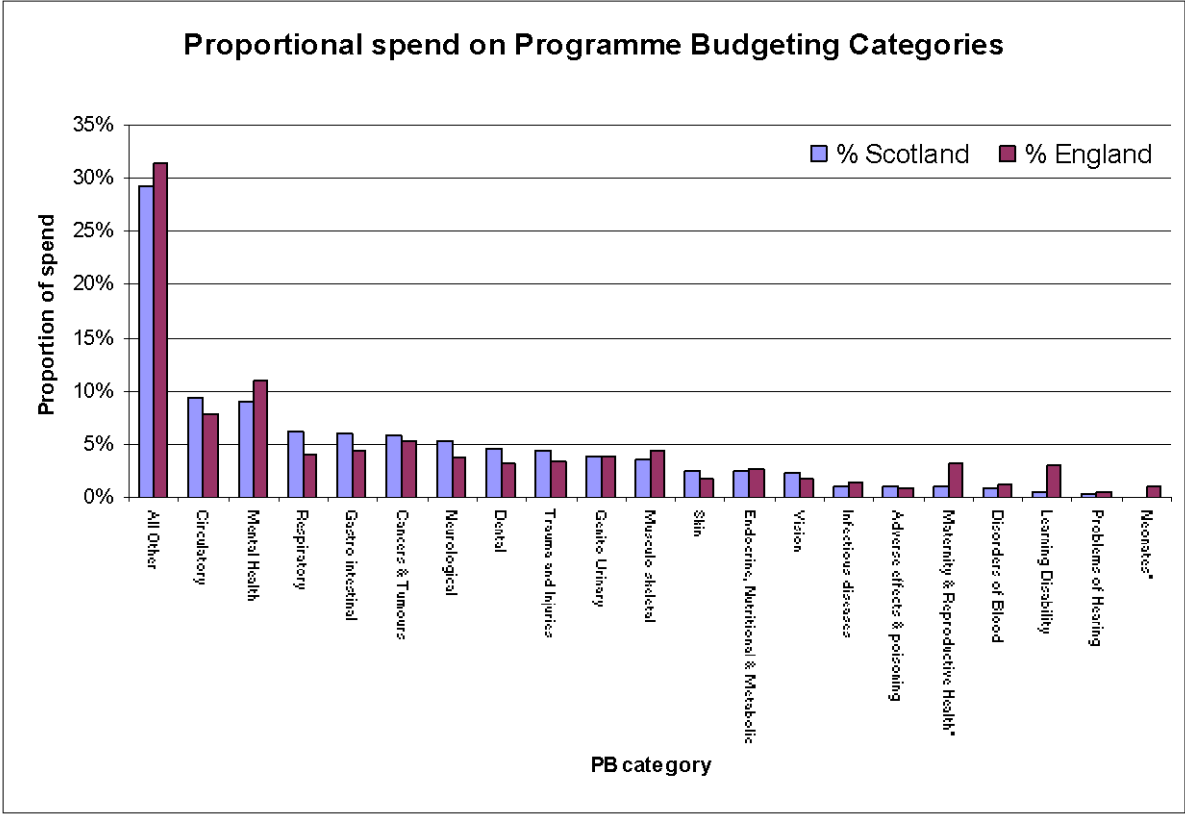
Data source: ISD data request

29. A few of the estimates presented are worthy of comment. At the time of analysis it was not possible to map maternity spend and as a result the majority of the data is in the “other” category. This problem is being resolved. We are aware of data quality and completeness issues with LD data across both hospital and community care, so this category should be treated with caution and the low percentage will be one of the resulting effects. Conversely dental spend may seem

high, in relative terms, because it was possible to map comprehensively from existing datasets to the programme budgeting category.

30 Table A2 in the Appendix further disaggregates the spend shown in Table 4.1, allowing comparison across programmes in terms, for example, of acute services, out patients, GP attendances or primary care prescribing.

Figure 1



32 Figure 1 is a graphical representation of some of the data in Table 4.1. It shows the relative proportion of total spend across the programme budget categories in England and Scotland. Although not presented here, a similar analysis could be done for elements of the total spend such as GMS or prescribing or acute care. Also, within a programme budget, the data shows the distribution of spend across different care settings. The availability of time series would enable analysis of any shifts in these.

Detailed programme budgets

33. Four programme budgets were identified for further examination – mental health, cancer services, diabetes and stroke. Information and expenditure relating to A&E and community services were unable to be allocated to individual programmes. For the diabetes and stroke sub programmes, it was not possible to allocate outpatient activity and costs.

4.1 Mental health

34. Mental health disorders form a programme budget category in their own right. Total expenditure was estimated to be £728 million, which represents 9% of total NHSScotland expenditure. The programme budget is subdivided into 5 separate sub programmes – substance misuse, organic mental disorders, psychotic disorders, child & adolescent (C&A) mental health disorders and other mental health disorders. Figure 4.2 shows the activity associated with these sub programmes and with the different service provision.

Table 4.2: Mental health estimated activity

Sub programme	Acute services episodes	Geriatric long stay episodes	Mental health & learning disabilities episodes	OP attendances	Pharmaceutical items dispensed	GMS visits
Substance misuse	5,323	17	3,566	-	816,808	184,365
Organic MH disorders	3,208	599	3,657	-	95,819	21,959
Psychotic disorders	297	4	8,829	-	693,301	25,079
Child and Adolescent MH disorders ¹⁶	24	-	12	27,259	71,794	788
Other MH disorders	1,863	21	8,055	252,191	5,949,285	767,671
All	10,714	641	24,119	279,450	7,627,007	999,863

Data source: ISD data request

Note: these figures have been apportioned across all activity to ensure they cover the activity figures reported in the Costs Book

The associated expenditure is shown in table 4.3

¹⁶ There is a separate data collection in ISD for CAMHS and not all will be included on SMR04. This separate CAMHS dataset has not been included in any of the analyses presented.

Table 4.3: Mental health estimated expenditure

	Total (£)	Acute services episodes (£)	Geriatric long stay episodes (£)	Mental health & learning disabilities (£)	OP services (£)	Pharmaceutical items dispensed (£)	GMS visits (£)
Substance misuse	63,882,023	7,014,704	188,296	28,629,093	0	22,083,882	5,966,048
Organic MH disorders	169,203,520	19,332,568	16,087,125	12,1717,842	0	11,355,377	710,608
Psychotic disorders	239,842,417	776,063	57,007	203,349,257	0	34,848,537	811,553
Child and Adolescent MH disorders	11,058,935	68,354	0	746,637	5,984,579	4,233,858	25,507
Other MH disorders	244,267,596	4,389,840	361,292	118,967,816	38,674,192	57,032,602	24,841,855
All	728,254,492	31,581,529	16,693,721	473,410,644	44,658,771	129,554,256	32,355,571

Data source: ISD data request

Outcomes associated with mental health services**Process outcomes**

- Early diagnosis and treatment of dementia
- Alcohol brief interventions delivered
- Readmissions within 28 / 133 days

Intermediate outcomes

- Reduced suicide rates / 1000 population

4.2 Cancer services

35. Cancer is a programme budgeting category in its own right and is split into 8 sub programmes, reflecting the major tumour sites. Cancer services estimated expenditure was **£475 million**, representing **5.9%** of total NHSScotland budget. This excludes cancer screening programmes, which are included in the „other“ category. Additionally we know that activity and cost associated with radiotherapy may not well captured by the data.

Table 4.4: Cancer services estimated activity

Sub programme	Acute services episodes	Geriatric long stay episodes	OP services	Pharmaceutical items dispensed	GMS visits
Cancer, Head and Neck	5,354	9			2,739
Cancer, Upper GI	14,504	56		-	9,878
Cancer, Lower GI	23,030	76		74	8,030
Cancer, Lung	18,166	95		-	11,844
Cancer, Skin	5,885	2		-	5,334
Cancer, Breast	24,223	35		140,441	10,422
Cancer, Gynaecological	10,590	15		4,091	2,636
Cancer, Urological	13,583	67		32,802	18,606
Cancer, Haematological	27,179	41		-	5,753
Cancers and Tumours	45,627	121		976,206	120,120
All	188,141	517	144,624	1,153,614	195,363

Data source: ISD data request

Table 4.5: Cancer services estimated expenditure

	Total (£)	Acute services episodes (£)	Geriatric long stay episodes (£)	OP services (£)	Pharmacy items dispensed (£)	GMS visits (£)
Cancer, Lower GI	60,978,784	59,683,596	1,010,581		24,753	259,853
Cancer, Lung	47,939,226	46,216,400	1,339,545		0	383,282
Cancer, Skin	9,553,213	9,337,406	43,187		0	172,620
Cancer, Breast	47,632,653	34,210,952	1,228,245		11,856,203	337,253
Cancer, Gynaecological	18,996,935	18,704,807	83,166		123,667	85,294
Cancer, Urological	39,065,959	30,356,771	1,205,788		6,901,309	602,092
Cancer, Haematological	51,530,511	50,528,473	815,869		0	186,170
Cancers and Tumours	146,101,588	88,274,471	2,050,777		26,832,657	3,887,085
All	475,299,004	389,749,741	8,432,124	25,056,598	45,738,589	6,321,952

Data source: ISD data request

Outcomes associated with cancer services

36. There are a range of outcome measures, including morbidity and mortality data, and comparative data with EUROCARE. This is collected and published by the Scottish Cancer Registration Scheme, managed by ISD. Information about the process of cancer care is collected by the cancer networks on an individual cancer basis.

4.3 Diabetes

37. Diabetes is not a programme budget category in its own right, but comes under the programme „endocrine, *nutritional and metabolic problems*“ which together account for an estimated £196 million expenditure (2.4% total budget). Within this, diabetes accounts for total expenditure of £93 million, or 1.2% of the NHSScotland budget.

Table 4.6: Diabetes estimated activity

Acute services episodes	Geriatric long stay episodes	Pharmaceutical items dispensed	GMS visits
5,996	71	2,620,120	451,692

Data source: ISD data request

Table 4.7: Diabetes estimated expenditure

Total (£)	Acute services episodes (£)	Geriatric long stay episodes (£)	Pharmaceutical items dispensed (£)	GMS visits (£)
93,000,152	11,964,874	1,906,408	64,512,096	14,616,774

Data source: ISD data request

Outcomes associated with diabetes services

Process outcomes

- Attendances at retinal screening
- Attendances at structured education
- Use of intensive insulin therapy
- Attendances at foot screening

Intermediate outcomes

- Reduced incidence of sequelae, including nerve/ eye/ kidney/ cardiovascular disease

Comment

38. This is likely to be a significant underestimate of the cost of diabetes to NHSScotland. For example, the Department of Health’s advisory body, NHS Diabetes estimates that care of people with diabetes consumes around 5-8% of the UK NHS budget, while Diabetes UK estimate the cost is around 10%.

39. There are a number of reasons why this may be the case, including:

- the use of first diagnostic place for hospital data as the determinant of programme budget, as many diabetes related admissions would be categorised according to the complication or co-morbidity rather than diabetes.
- the inability to allocate outpatient and community activity (the majority of diabetes care occurs in primary care) and expenditure to this programme budget.

4.4 Stroke

40. Like diabetes, stroke forms part of a larger programme budget grouping, in this case, „problems of circulation“, which together accounts for an estimated £757 million expenditure (9.4% of total) and forms the largest clinical programme budget group. Within this programme, estimated stroke expenditure is £146 million, or 1.8% of total NHSScotland expenditure.

Table 4.8: Stroke estimated activity

Acute services episodes	Geriatric long stay episodes	Mental health & learning disabilities	Pharmaceutical items dispensed	GMS visits
20,671	792	1	1,095,584	259,420

Data source: ISD data request

Table 4.9: Stroke estimated expenditure

Total (£)	Acute services episodes (£)	Geriatric long stay episodes (£)	Mental health & learning disabilities (£)	Pharmaceutical items dispensed (£)	GMS visits (£)
146,453,319	104,629,685	24,438,551	8,344	8,891,918	8,394,821

Data source: ISD data request

Outcomes associated with stroke services

Process outcomes

- Use of primary and secondary prevention
- Administration of thrombolysis
- Admission to stroke units
- Access to imaging

Intermediate outcomes

- TIAs and strokes prevented
- Improved 30 day survival
- Reduced long term disability

5. Discussion

41. This work has identified that it is possible to generate programme budgets from both a top down and a bottom up approach.

42. Section 3 presents estimates of activity and spend associated with three risk factors which are amenable to change through policy intervention – smoking, obesity and excessive alcohol consumption. The three programme budgets developed using the bottom up approach are limited because there are no other such programmes with which to compare them. They were effectively generated using a “cost of illness” approach. However they do represent the NHS resources associated with particular risk factors. By impacting on these risk factors there is the potential to reduce the resources required to treat particular disease categories, albeit with a time lag. For example, in the identified expenditure in section 4, problems of circulation accounted for over 9%, a substantial proportion of NHS resources. Literature used to support the bottom up analyses suggests that 24% of Ischaemic Heart Disease, 15% of strokes and 62% of aortic aneurysms are smoking related: over a third of hypertension is related to obesity.

43. Mental Health is second only to problems of circulation in terms of the proportion of the identified expenditure that it represents. Admissions for mental and behavioural disorders due to use of alcohol accounted for over 3,250 hospital episodes in 2007. This represents over a quarter of such episodes that year. Approximately 17% of intentional self harm in men and 12% in women can be attributed to alcohol.

44. Cancers are identified as responsible for around 6% of spend. Over 80% of lung cancers can be attributed to smoking. It is estimated that 31% of male and 27% of female oesophageal cancer morbidity and mortality can be attributed to alcohol consumption: as can approximately 20% of breast cancer mortality and morbidity. Just less than 30% of colon cancer is obesity related.

45. We know that the diseases and conditions generating most activity and subsequent cost are not distributed evenly across the population. Inequalities are demonstrable in the conditions related to the largest areas of spend across NHSScotland. If these could be reduced then again, there would be both an increase in health for the affected population and a reduction in resource use. The 2008 Scottish Health Survey showed a clear relationship between deprivation and prevalence of CHD or stroke with 5.1% prevalence among men in the least deprived areas compared to 12.7% in the most deprived areas. The equivalent figures for women were 4.1% and 10.6%. The relationship with income was even stronger, with prevalence among women on the lowest incomes more than four times that of the highest income women.

46. In 2006, adults under 75 in the most deprived decile were 1.5 times more likely to be diagnosed with cancer than those in the least deprived decile. There are, however, different patterns for different cancers. There is a very steep social gradient for cervical and lung cancer incidence and mortality for example, but other cancers e.g. prostate cancer and skin cancer show higher incidence among the least deprived areas. For others, there are no apparent differences in incidence and

mortality by socioeconomic group; these include colorectal, breast and brain cancers¹⁷.

47. For smoking rates a social gradient is well established and increasing as more affluent groups give up in greater numbers. For obesity there is a clear gradient by income, but not by deprivation, albeit a different relationship for each sex. (Obesity prevalence was lowest among men with the lowest incomes but, for women, obesity was lowest among those with the highest incomes.) For determinants such as participation in sport, there is a social gradient.

48. Inequalities in first admissions to hospital relating to alcohol are substantial – those in the most deprived decile are 5.5 times more likely to be admitted than those in the least deprived decile. In 2007 those from the most deprived decile were 13.5 times more likely to die from alcohol-related conditions than those in the least deprived.

49. Programme budgeting allows analysis of resource use by specific disease categories. If demand associated with resource intensive programmes has a social patterning then it suggests that targeting those groups could release resources and reduce inequalities.

50. Further, programme budgeting may help to identify pattern of spend in Scotland and compare the proportional differences in spend in identified problem areas with average proportional spend in other regions (e.g. England & Wales), or changes in spending patterns over times, set against changes in inequality outcomes.

51. Section 4 shows the comparative spend across the Programme Budgeting categories from a top down approach. These are predominantly defined by broad disease categories. Broad comparisons among programmes show that the areas of highest proportions of expenditure are mental health, problems of circulation and cancer, which corresponds to national priority areas.

52. It is acknowledged, however, that there are a number of limitations with the top down approach as it is currently presented:

- Not all activity is able to be allocated to the appropriate programme. This is a particular issue for community and A&E services, where no diagnostic information is routinely collected. In addition, prevention activity, such as general health improvement activities and cancer screening programmes, are not able to be included with the relevant programme and appears under the heading „other“. This may diminish the potential for reallocation within programmes.
- As has been demonstrated for the diabetes sub programme, the reliance on first diagnostic place for grouping of activity may lead to a significant under reporting of activity levels against some programmes

¹⁷ This last group of cancers could push up the apparent incidence of cancer for less deprived areas, suggesting that the “true” social differential for incidences of cancer is even greater than headline figures suggest.

- The sub programme generated by the top down approach (which provide information by diagnostic groups and type of care) may not be most appropriate for all programmes. For example, in cancer it might be more appropriate to have disaggregation by stage of care (diagnosis, treatment and palliation) and by age group. This may require disaggregation at sub programme level to differ among various programmes.
- There are limits to the value of single year comparisons. A time series, reviewing changes in the relative proportions of spend and outcomes achieved among and within programmes would be more useful for decision makers.
- In order to fully implement the PBMA approach work would be required to agree the most appropriate process and intermediate outcome measures to be used.

6. Conclusion

53. Testing of both top down and bottom up approaches to Programme Budgeting has demonstrated that both approaches are feasible at macro level within NHSScotland.

54. The top down programme budgeting approach described here in section 4 is the first exercise to analyse NHS Scotland spend in this manner. It has the potential to greatly increase understanding of where money is spent. It can act as a starting point for further analyses of resource allocation both between and within programmes.

8. References

- ISD data request: summary activity data on obesity and smoking, disaggregated from category summaries <http://www.isdscotland.org/isd/4334.html>
- ISD data: Cost Book – Inpatient and Outpatient cost and activity, tables R040 and R044 <http://www.isdscotland.org/isd/4434.html>
- ISD data: Prescribing of Smoking Cessation Interventions <http://www.isdscotland.org/isd/4636.html>
- ISD data: Prescription Cost Analysis for Scotland <http://www.isdscotland.org/Health-Topics/Prescribing-and-Medicines/Community-Dispensing/Prescription-Cost-Analysis/>
- ISD data: Summary activities at specialist outpatient clinics <http://www.isdscotland.org/isd/4156.html>
- ISD, Smoking Ready Reckoner, ISD Scotland, 2005
- Martin S, Rice N & Smith PC. The link between healthcare spending and health outcomes for the new English Primary care trusts. CHE Research paper 42, University of York, October 2008.
- Mitton, C; Donaldson, C. Twenty-five years of programme budgeting and marginal analysis in the health sector, 1974-1999. Journal of Health Services Research and Policy; 6 (4) Oct 2001, p.239-48
- National Audit Office, Tackling Obesity in England, Report by the Comptroller and Auditor General, HC 220 Session 2000-2001: 15 February 2001 www.nao.org.uk/publications/nao_reports/00-01/0001220.pdf
- NHSScotland Healthcare Quality Strategy Core Messages and Q&As: October 2010 <http://www.scotland.gov.uk/Topics/Health/CoreMessages>
- NHS Information Centre for Health and Social Care, Statistics on Smoking: England, 2009, http://www.ic.nhs.uk/webfiles/publications/smoking09/Statistics_on_smoking_England_2009.pdf
- NHSScotland Programme Budgeting Methodology 2007/08 data, ISD Scotland, February 2010.
- Scottish Parliament Finance Committee Inquiry into Preventative Spend <http://www.scottish.parliament.uk/s3/committees/finance/or-10/fi10-2202.htm#Col2551> col 2589
- The Scottish Government, May 2010. The Healthcare Quality Strategy for NHSScotland <http://www.scotland.gov.uk/Publications/2010/05/10102307/8>
- York Health Economics Consortium, York University, Alcohol Misuse in Scotland for 2007. Scottish Government Social Research, 2010 <http://www.scotland.gov.uk/Resource/Doc/297819/0092744.pdf>

Appendix A: Detailed breakdown of estimated activity and expenditure by programme

Table A1: Estimated activity by programme

Programme Budgeting Category	Hospital Sector						Community	Family Health Services			
	Acute Services discharges	Geriatric Long Stay discharges	Maternity	Mental Health & Learning Disabilities discharges	Outpatient Services attendances	A&E attendances		Pharmaceutical Services (no. items)	General Medical Services (Practice Team Information - estimated no. consultations)	General Dental Services	General Ophthalmic Services
Infectious diseases	12,199	39	-	-	25,364	-	-	4,602,507	471,548	-	-
Cancers and Tumours	188,141	517	-	-	144,624	-	-	1,153,614	195,363	-	-
Disorders of Blood Endocrine, Nutritional and Metabolic problems	21,053	24	-	-	222,650	-	-	1,013,227	162,478	-	-
	23,657	106	-	3	-	-	-	6,885,817	717,097	-	-
Mental Health Disorders	10,714	641	-	24,119	279,450	-	-	7,627,007	999,863	-	-
Problems of Learning Disability	95	2	-	1,636	9,875	-	-	-	3,975	-	-
Neurological	150,883	891	-	78	117,623	-	-	2,720,779	2,312,314	-	-
Problems of Vision	41,728	8	-	-	444,996	-	-	1,546,507	192,884	-	2,162,700
Problems of Hearing	6,775	1	-	-	-	-	-	226,645	377,963	-	-
Problems of circulation	127,387	1,254	-	1	180,365	-	-	23,763,840	2,391,296	-	-
Problems of the respiratory system	125,633	731	-	-	111,342	-	-	6,749,081	2,336,456	-	-
Dental problems	15,091	-	-	-	205,976	-	-	107,192	25,082	8,162,987	-
Problems of The gastro intestinal system	191,157	140	-	1	224,996	-	-	7,711,621	1,078,704	-	-
Problems of the Skin	38,220	55	-	-	491,329	-	-	4,214,283	1,652,564	-	-
Problems of the Musculo skeletal system	63,056	98	-	-	103,889	-	-	7,097,592	530,546	-	-
Problems due to Trauma and Injuries	76,301	331	-	10	574,682	-	-	1,492,266	308,536	-	-
Problems of Genito Urinary system	96,154	213	-	-	500,012	-	-	1,546,210	1,109,337	-	-
Maternity and Reproductive Health	25,587	-	-	-	227,874	-	-	818,030	564,740	-	-
Conditions of neonates	1,071	-	-	-	-	-	-	2,135	2,669	-	-
Adverse effects and poisoning	41,965	13	-	32	-	-	-	-	49,218	-	-
All Other	51,681	1,211	131,660	1,411	5,813,508	1,602,537	6,962,090	3,590,886	6,291,485	-	-
Total	1,308,550	6,276	131,660	27,291	9,678,554	1,602,537	6,962,090	82,869,237	21,774,118	8,162,987	2,162,700

Please note that some activity figures quoted in this table may not match published figures due to a level of apportionment that has been applied to the data.
Data Source: ISD Data request

Table A2: Estimated cost by programme

Code	Programme Budgeting Category	All Services	Percentage	Hospital Sector						Community	Family Health Services			
				Acute Services	Geriatric Long Stay	Maternity Services	Mental Health & Learning Disabilities	Outpatient Services	A&E		Pharmaceutical Services	General Medical Services	General Dental Services	General Ophthalmic Services
01	Infectious diseases	£85,184,967	1.1%	£31,780,338	£555,511	-	-	£9,199,277	-	-	£28,390,532	£15,259,309	-	-
02	Cancers and Tumours	£475,299,004	5.9%	£389,749,741	£8,432,124	-	-	£25,056,598	-	-	£45,738,589	£6,321,952	-	-
03	Disorders of Blood	£65,608,322	0.8%	£29,122,838	£330,197	-	-	£21,985,987	-	-	£8,911,507	£5,257,794	-	-
04	Endocrine, Nutritional and Metabolic problems	£195,824,862	2.4%	£42,188,930	£2,849,124	-	£37,418	-	-	-	£127,544,123	£23,205,267	-	-
05	Mental Health Disorders	£728,254,492	9.0%	£31,581,529	£16,693,721	-	£473,410,644	£44,658,771	-	-	£129,554,256	£32,355,571	-	-
06	Problems of Learning Disability	£49,220,106	0.6%	£308,682	£21,223	-	£45,934,887	£2,826,692	-	-	-	£128,622	-	-
07	Neurological	£437,592,278	5.4%	£253,364,540	£19,014,233	-	£2,565,452	£19,986,022	-	-	£67,835,503	£74,826,529	-	-
08	Problems of Vision	£185,093,353	2.3%	£51,583,131	£113,274	-	-	£35,405,635	-	-	£12,034,945	£6,241,713	-	£79,714,655
09	Problems of Hearing	£24,565,963	0.3%	£11,434,743	£5,182	-	-	-	-	-	£895,147	£12,230,891	-	-
10	Problems of circulation	£756,720,451	9.4%	£395,538,916	£32,712,733	-	£8,344	£27,658,041	-	-	£223,420,040	£77,382,378	-	-
11	Problems of the respiratory system	£508,300,584	6.3%	£262,359,340	£22,068,435	-	-	£15,320,790	-	-	£132,944,269	£75,607,750	-	-
12	Dental problems	£374,083,410	4.6%	£14,662,735	-	-	-	£28,945,671	-	£37,471,000	£374,856	£811,669	£291,817,480	-
13	Problems of The gastro intestinal system	£481,524,197	6.0%	£336,264,257	£2,133,943	-	£13,164	£30,437,294	-	-	£77,768,666	£34,906,872	-	-
14	Problems of the Skin	£203,331,806	2.5%	£75,363,503	£781,566	-	-	£40,155,071	-	-	£33,554,685	£53,476,982	-	-
15	Problems of the Musculo skeletal system	£290,808,712	3.6%	£203,429,496	£2,600,612	-	-	£15,639,182	-	-	£51,970,930	£17,168,491	-	-
16	Problems due to Trauma and Injuries	£357,432,705	4.4%	£275,377,840	£5,623,719	-	£507,018	£54,660,274	-	-	£11,279,629	£9,984,225	-	-
17	Problems of Genito Urinary system	£314,612,189	3.9%	£181,919,909	£4,460,379	-	-	£56,503,742	-	-	£35,830,005	£35,898,155	-	-
18	Maternity and Reproductive Health	£77,496,004	1.0%	£24,231,488	-	-	-	£26,367,976	-	-	£8,621,556	£18,274,985	-	-
19	Conditions of neonates	£1,989,574	0.0%	£1,878,189	-	-	-	-	-	-	£25,006	£86,379	-	-
20	Adverse effects and poisoning	£89,540,357	1.1%	£87,309,447	£273,931	-	£364,275	-	-	-	-	£1,592,705	-	-
21-23	All Other	£2,363,206,181	29.3%	£105,504,726	£12,046,773	£214,848,000	£74,108,005	£412,448,111	£148,300,263	£1,107,522,000	£84,835,759	£203,592,544	-	-
	Total expenditure	£8,065,689,520	100.0%	£2,804,954,316	£130,716,681	£214,848,000	£596,949,207	£867,255,135	£148,300,263	£1,144,993,000	£1,081,530,000	£704,610,784	£291,817,480	£79,714,655

Data Source: ISD Data request

Appendix B: PBMA – experience from England

1. In 2002, the Department of Health in England initiated the National Programme Budget Project. The aim of the project is to develop a source of information, which can be used by all bodies, to give a greater understanding of where the money is going and the return on the investment in the NHS. The project aims to provide an answer to these questions by mapping all PCT and SHA expenditure, including that on primary care services, to 23 programmes of care. These programmes reflect ICD10 categories, plus two non clinical groups¹⁸ and an 'other' category. The focus on clinical conditions is intended to forge a closer and more obvious link between the object of expenditure and the patient care it delivers.
2. There are three drivers of programme budgeting:
 - a way of monitoring where NHS resources are currently invested
 - a way of assisting in evaluating the effectiveness of the current pattern of resource deployment
 - a tool to support and improve the process for identifying the most effective way of commissioning NHS services for the future.
3. The Programme Budgeting project provides a retrospective appraisal of NHS resources broken down into 'programmes', with a view to influencing and tracking future expenditure in those same programmes to achieve the greatest health improvement per £ spent in the NHS.
4. At national level, all PCTs in England have collected data for the past 6 years using the 23 categories. PCTs are also required to „*use the budgeting information to review the relationship of expenditure to outcomes in their highest spending categories (usually mental health, CVD and cancer) and identify opportunities for improved value for money*’. PCTs are grouped into clusters which allows them to make comparisons between themselves and others which have similar characteristics. There is an online PB benchmarking tool¹⁹.
5. The data have been used by researchers from the Centre for Health Economics at the University of York to analyse the link between spend and outcomes. The latest paper²⁰ found that in several care programmes – cancer, circulation problems, respiratory problems, gastro-intestinal problems, trauma burns and injury, and diabetes – expenditure had the anticipated negative effect on the disease-specific mortality rate.
6. Furthermore, the NHS Institute for Innovation and Improvement has supported road testing of the PBMA approach in 3 English regions. The road testing involved three different programmes of care in 3 different areas – diabetes in Hull, CAMHS in Newcastle and mental health in Norfolk. Each pilot was predicated on the assumption that any additional investment would require the identification within the budget of a corresponding resource releasing disinvestment.
7. The Norfolk pilot for example did identify areas for disinvestment, including £194,000 released through changes to prescribing practices which would be used to fund a holistic mental well being service and to develop a young persons” one stop shop.

¹⁸ „Healthy individuals group“ represents expenditure on disease prevention and „social care needs“ reflects the cost of social support,

¹⁹http://www.dh.gov.uk/en/Managingyourorganisation/Financeandplanning/Programmebudgeting/DH_075743

²⁰ Stephen Martin, Nigel Rice, & Peter C Smith. (2008) *The link between health care spending and health outcomes for the new English Primary Care Trusts*. CHE Discussion Paper. University of York

8. The subsequent evaluation of the 3 programmes looked at:
 - Acceptability
 - Data availability
 - Practical value
 - Generalisability

9. The experience reported in the three sites varied, but a number of conclusions were identified:
 - there are a lot of data available for use in PBMA, yet costing of options for potential investment, disinvestment, estimating options and identifying options for disinvestment in services were still challenging
 - PBMA has the potential to change patterns of service, providing this is linked to the commissioning / service design process
 - There is enthusiasm to make PBMA part of the commissioning process.

10. A number of recommendations were subsequently made surrounding aim and scope, engaging stakeholder groups, determining the programme budget, valuing costs and benefits of potential service changes, evaluating these changes, validity checking and making final decisions.

Appendix C: NHSScotland Programme Budgeting Methodology 2007/08 data

1. This document is intended to be read alongside the NHSScotland Programme Budgeting analysis showing estimated expenditure by Programme Budgeting category for 2007/08.

C1 Background

2. The Department of Health describes Programme Budgeting as follows:

The aim of the project is to develop a source of information, which can be used by all bodies, to give a greater understanding of where the money is going and what we are getting for the money we invest in the NHS.

The three main drivers of this are:

- a way of monitoring where NHS resources are currently invested, e.g. for the purpose of monitoring expenditure against National Service Frameworks
- a way of assisting in evaluating the effectiveness of the current pattern of resource deployment
- a tool to support and improve the process for identifying the most effective way of commissioning NHS services for the future.

3. At a basic level the exercise involves collating and presenting NHS expenditure on the basis of programmes of care rather than on the basis of inputs or accounting conventions. This would track expenditure on patient care regardless of setting and therefore would cut across secondary, primary and community care.

4. Scotland does not currently collect programme level cost information from NHS Boards. The principal cost data collection is the Scottish Health Service Costs Book which reports expenditure on the basis of specialty or service (e.g. Family Health Services (FHS)).

5. This means that for acute hospital activity, Programme Budgeting expenditure will need to be estimated using central data sets based on a methodology similar to that used to cost activity for the Scottish National Tariffs.

6. For Family Health Services, cost information is collected by ISD as part of the payments process which produces more detailed cost information for FHS prescribing and General Dental and General Ophthalmic Services.

C2 Datasets and analysis

7. In Scotland the approach taken to allocate costs to Programme Budgeting Categories (PBC) varied depending on the breadth and quality of the information available nationally. For example, acute inpatient and day case activity is routinely costed as part of the Scottish National Tariff work, whereas within the Outpatient data collection system, information is only just being introduced to record diagnoses which allow the mapping of a PBC code. Wherever possible the most robust method for costing data has been used with this initial data run, with a view to enhancing the methodology as the data becomes more readily available.

8. The 2007/08 Scottish Health Service Costs Book was used as the primary data source, with much of the programme budgeting category distribution based on analysis conducted using nationally available datasets.

9. Expenditure in this analysis has been mapped to the Scottish Health Service Costs Book 2007/08 (Report R300), excluding resource transfer.

10. The specific data used and approach taken is detailed in the sections below.

C3 HOSPITAL SECTOR

C3.1 Acute Services

11. In order to calculate Acute services expenditure by PBC, a costed 2007/08 activity extract was taken from the SMR01 Acute Inpatients and Day Cases dataset. This file was run through the Information Centre for Health and Social Care 2008 Healthcare Resource Group (HRG) Local Payment grouper v3.5²¹ which assigns an HRG and PBC code to each activity record. Once the PBC codes were attached to the file, the data was aggregated by PBC to obtain the sum of the costs and activity data for each PBC category.

12. The difference between the SMR01 costs and the combined Inpatient, Day Case and Day Patient figures reported in the 2007/08 Costs Book (Reports R310;R330;R370) was apportioned based on the distribution of the allocated costs using the SMR01 dataset.

13. Although the Scottish National Tariff uses a cost per spell within specialty methodology, this particular analysis has been calculated using SMR01 episodes, in order to align with data in the Costs Book. For future programme budgeting analysis this approach would need to be refined. Unlike the expenditure figures in the table, the corresponding activity data detailed by Programme Budgeting category reflects Inpatient and Day Case activity only and excludes Day Patients, as these are counted in terms of attendances rather than number of cases.

²¹ The HRG grouper assigns HRG codes and PBC codes based on diagnostic/procedural information as well as other variables

C3.2 *Geriatric Long Stay*

14. Geriatric long stay activity for 2007/08 was extracted from the SMR01_E (formally SMR50) Geriatric Long Stay dataset and Programme Budgeting categories were matched on to the records using an ICD10 to PBC mapping file obtained from the Department of Health website²². The net Inpatient cost per week (Costs Book 2007/08 report R04LSX) was mapped onto the file and the cost per episode calculated (number of weeks stay x cost per week). The file was then aggregated to obtain cost and activity data for each PBC.

15. The difference between the expenditure reported in the 2007/08 Costs Book and the SMR based analysis was apportioned to the PBC's based on the distribution of the expenditure calculated using the SMR01_E file. The difference between the activity data extracted from SMR01_E and the Costs Book report (R040LSX) was also apportioned in a similar way.

C3.3 *Maternity Services*

16. At the time of writing, the Maternity datasets (SMR02 & Scottish Birth Record (SBR)) have not yet been investigated in terms of mapping to PBC. The figures reported in the tables have been taken directly from the 2007/08 Costs Book (Report R320) and allocated to the „Other“ PBC category until further investigations into the data have been completed. The figures reported in the Costs Book for Maternity Services include Special Care Baby Units.

C3.4 *Mental Health & Learning Disabilities*

17. Activity data for 2007/08 was extracted from the SMR04 Mental Health dataset and PBC codes were matched on using the HRG grouper software as per the Acute SMR01 analysis.

18. Preliminary costing of the activity data used inpatient expenditure figures and costs per inpatient week from the 2007/08 Costs Book Long Stay Specialty report (R04LSX). The cost per inpatient week per specialty was matched on to the SMR04 file and length of stay in weeks calculated from admission & discharge dates. This figure was then multiplied by the specialty specific cost per week and aggregated by PBC and specialty to obtain costs per PBC for each specialty. The difference between the net expenditure figure quoted in the 2007/08 Costs Book (Report R04LSX) and that calculated using the SMR04 file was then apportioned amongst the PBC's using the distribution of the calculated expenditure. The figures for each specialty were then summed to obtain the total by PBC.

19. The difference between the specialty specific expenditure from R04LSX and the combined total using R340 (General Psychiatry) and R350 (Learning Difficulties) Inpatient & Day Case figures was apportioned using the distribution of the total specialty specific expenditure. This difference is due to sub-contracting figures which are included in the R300 Costs Book tables.

20. The activity data from the SMR04 file was aggregated by PBC to obtain the activity distribution for the PBC codes; again the difference between the reported activity (Costs Book Report R040LSX) and the SMR04 activity was distributed in a similar way to the expenditure data.

C3.5 *Outpatients*

²² <http://www.dh.gov.uk/en/Managingyourorganisation/Financeandplanning/Programmebudgeting/index.htm>

21. The SMR00 Outpatient dataset contains limited information on diagnosis and procedures for outpatient attendances; therefore cost and activity data was taken from the 2007/08 Costs Book (Report R04opX) at Outpatient specialty level. The specialties were mapped to PBCs using the Department of Health's UNIFY2 Non Admitted Patient Care (NAPC) mapping file.

22. As the analysis was at specialty level only, it meant that much of the data was categorised into the „Other“ PBC, as some specialties (e.g. General Surgery) cover numerous PBC categories rather than falling into one (e.g. Dental, Obstetrics). The complete list of specialties included in „Other“ PBC is outlined in the appendix.

23. The Costs Book Outpatient Specialty report (R04opX) excludes Allied Health Professional Costs & Activity, as they cannot be broken down by specialty. As these costs and activity can not be accurately allocated to specific PBC codes, the AHP expenditure outlined in Costs Book report R046X was added to the „Other“ PBC category.

24. The remaining difference between the combined total of reports R04opX and R046X and the R300 tables (based on sub-contracting fees not included in specialty level data) was allocated to PBC's based on the activity specialty proportions.

C3.6 *Accident and Emergency*

25. The figures for A&E services were taken from the 2007/08 Costs Book (Report R04opX) and allocated to the „Other“ PBC category. For any future analysis the possibility of using activity data from the A&E datamart would be investigated further as it may allow a breakdown by PBC category.

C4 **COMMUNITY SECTOR**

26. Currently community sector costs and activity are unable to be accurately allocated to programme budgeting categories. Therefore all community expenditure reported in the 2007/08 Costs Book has been allocated to the „Other“ PBC category, except community dental (Report R820) which can be explicitly identified. The „Other“ PBC category will include Community Midwifery, Community Psychiatric teams, Learning Disabilities services and Community Nursing and Health Visiting teams.

C5 PHARMACEUTICAL SERVICES

C5.1 Prescribing (Prescribing Information System (PIS))

27. Prescription Cost Analysis 2007/08 data was obtained from the ISD website, <http://www.isdscotland.org/isd/5015.html>, and the „Total for Chemical names“ sheet extracted, which lists the number of items prescribed and Gross Ingredient cost (GIC) by individual chemical names. The data was allocated to PBC’s using the Department of Health’s British National Formulary (BNF) to PBC mapping file² and an additional excel mapping file which detailed the percentage share of the total for each drug for each relevant PBC. Some drugs can be used to treat more than one type of condition, therefore the analysis needed to take this into account when allocating expenditure in order to sufficiently reflect activity & cost by programme budgeting category. An example of the allocation mapping methodology is detailed in Table C1.

28. Activity data was obtained using same methodology and using „number of items prescribed“ rather than cost per item from the same data source.

C5.2 Other Pharmaceutical Services

29. The outstanding pharmaceutical expenditure reported in the 2007/08 Costs Book (Report R390) was apportioned to PBC based on the distribution of the allocated drug expenditure.

30. The activity detailed on the „Activity“ tables is based on the number of prescribed items alone.

Table C1: Example of Prescribing mapping tool

SECTION	SUB-SECTION	PARAGRAPH	CHEMICAL SUBSTANCE	PBC	Level (for matching to Prescribing Data)	BNF section	BNF subsection	BNF Chemical Name	Paragraph	1A	2F	2G	2H	4B	18X	23X	Total
8.3	Sex hormones and hormone antagonists in malignant disease																0
	8.3.1 Oestrogens			2H / 2F (90:10)	sub-section		080301				10		90				100
	8.3.2 Progestogens																0
			MEDROXYPROGESTERONE ACETATE	2F / 2G / 2H (20:60:20)	chemical sub		080302	Medroxyprogesterone Acetate			20	60	20				100
			MEGESTROL ACETATE	2F / 2G (40:60)	chemical sub		080302	Megestrol Acetate			40	60					100
			NORETHISTERONE	2F / 18X (10:90)	chemical sub		080302	Norethisterone			10				90		100
	8.3.3 Androgens			?	sub-section		080303										0
	8.3.4 Hormone antagonists																0
		8.3.4.1 Breast cancer		2F	paragraph				08030401		100						100
		8.3.4.2 Prostate cancer and gonadorelin analogues															0
			BICALUTAMIDE	2H	chemical sub		080304	Bicalutamide					100				100
			BUSERELIN	2H	chemical sub		080304	Buserelin					100				100
			CYPROTERONE ACETATE	2H	chemical sub		080304	Cyproterone Acetate					100				100
			FLUTAMIDE	2H	chemical sub		080304	Flutamide					100				100
			GOSERELIN	2H / 4B / 2F	chemical sub		080304	Goserelin			34		33	33			100
			LEUPRORELIN ACETATE	2H / 4B	chemical sub		080304	Leuprorelin Acetate					50	50			100
			TRIPTORELIN	2H / 4B	chemical sub		080304	Triptorelin					50	50			100
		8.3.4.3 Somatostatin analogues		4B	paragraph				08030403					100			100

C6 FAMILY HEALTH SECTOR

C6.1 Practice Team Information (PTI) estimated consultations

31. General Practice surgeries use a different diagnostic coding system to the hospital setting, using Read codes rather than ICD10 diagnostic codes. As PBC mapping relies on ICD10 codes, this involved mapping Read codes to ICD10 codes before mapping to PBC categories.

32. ISD's PTI team carried out an appropriate mapping of PTI data and provided GP Practice consultation estimates by PBC for 2007/08. Unlike with SMR submissions, Practice staff tend not to use a „main diagnosis“ code, but rather list all relevant codes for the individual consultation. This means that one consultation may be counted in more than one PBC as no assumptions can be made regarding which is the „main“ diagnosis. The method described below was applied to the data to account for this.

33. Costs were apportioned using the percentage distribution of PBC's (using the sum of the individual PBC consultations rather than the total number of consultations, as this was the greater figure). Expenditure was taken from the 2007/08 Costs Book (Report R390 – General Medical Services).

34. The difference between the total number of estimated consultations from PTI and the sum of the individual PBC's was calculated and this excess distributed among the PBC's using the percentage distribution calculated previously. The calculated excess was then subtracted from the estimated no. of consultations for each PBC category in order to obtain a total for each PBC category which, when summed, matched the total estimated no. of consultations from PTI.

C6.2 General Dental Services & General Ophthalmic Services

35. General Dental & General Ophthalmic Services 2007/08 costs and activity have been taken directly from the 2007/08 Costs Book (Reports R820 & SFR8.4).

Appendix D: Diagnoses or Specialty groups in 'Other' PBC category

SMR01 - Acute activity

PBC	ICD10 code	Description
23X - Other	Q893	Situs inversus
	Q898	Other specified congenital malformations
	Q899	Congenital malformation, unspecified
	Q929	Trisomy and partial trisomy of autosomes, unspecified
	Q933	Deletion of short arm of chromosome 4
	Q935	Other deletions of part of a chromosome
	Q959	Balanced rearrangement and structural marker, unspecified
	Q969	Turner's syndrome, unspecified
	Q979	Sex chromosome abnormality, female phenotype, unspecified
	Q984	Klinefelter's syndrome, unspecified
	Q998	Other specified chromosome abnormalities
	Q999	Chromosomal abnormality, unspecified
	R53X	Malaise and fatigue
	R54X	Senility
	R571	Hypovolaemic shock
	R578	Other shock
	R579	Shock, unspecified
	R58X	Haemorrhage, not elsewhere classified
	R590	Localized enlarged lymph nodes
	R591	Generalized enlarged lymph nodes
	R599	Enlarged lymph nodes, unspecified
	R600	Localized oedema
	R601	Generalized oedema
	R609	Oedema, unspecified
	R620	Delayed milestone
	R628	Other lack of expected normal physiological development
	R629	Lack of expected normal physiologic development unspec
	R681	Nonspecific symptoms peculiar to infancy
	R682	Dry mouth, unspecified
	R683	Clubbing of fingers
	R688	Other specified general symptoms and signs
	R760	Raised antibody titre
	R788	Finding of oth spec subs not normally found in blood
	R798	Other specified abnormal findings of blood chemistry
	R799	Abnormal finding of blood chemistry, unspecified
	R897	Abn finds specs oth organs abn histol finds
	R898	Other abnormal findings in specimens from other organs
	R938	Abn finds on diag imaging of other spec body structures
	R948	Abn results of function studies of other organs and systems
	R960	Instantaneous death
	Z090	Follow-up examination after surgery for other conditions
	Z091	Follow-up examination after radiotherapy for oth conditions
	Z092	Follow-up examination after chemotherapy for oth conditions
	Z097	Follow-up exam after combined treatment for other conditions
	Z098	Follow-up exam after other treatment for other conditions
23X Other cont.	Z099	Follow-up exam after unspec treatment for other conditions
	Z451	Adjustment and management of infusion pump

PBC	ICD10 code	Description
	Z452	Adjustment and management of vascular access device
	Z458	Adjustment and management of other implanted devices
	Z459	Adjustment and management of unspecified implanted device
	Z468	Fitting and adjustment of other specified devices
	Z469	Fitting and adjustment of unspecified device
	Z480	Attention to surgical dressings and sutures
	Z488	Other specified surgical follow-up care
	Z489	Surgical follow-up care, unspecified
	Z501	Other physical therapy
	Z508	Care involving use of other rehabilitation procedures
	Z509	Care involving use of rehabilitation procedure, unspecified
	Z514	Preparatory care for subsequent treatment NEC
	Z518	Other specified medical care
	Z519	Medical care, unspecified
	Z530	Procedure not carried out because of contraindication
	Z531	Proc not carried out; pat's decision reasons belief/gp press
	Z532	Proc not carried out because pat's dec oth unspec reasons
	Z538	Procedure not carried out for other reasons
	Z539	Procedure not carried out, unspecified reason
	Z540	Convalescence following surgery
	Z548	Convalescence following other treatment
	Z549	Convalescence following unspecified treatment
	Z758	Oth probs related to med facilities and other health care
	Z768	Persons encountering health servs in oth spec circumstances
	Z769	Person encountering health services in unspec circumstances
	Z900	Acquired absence of part of head and neck
	Z910	Personal hist of allergy oth than to drugs and biol subs
	Z911	Personal hist noncompliance with med treatment and regimen
	Z912	Personal history of poor personal hygiene
	Z988	Other specified postsurgical states
U - Unclassified	H031	Involvement of eyelid in other infectious diseases EC
	R69X	Unknown and unspecified causes of morbidity
	R99X	Other ill-defined and unspecified causes of mortality

SMR01_E - Geriatric Long Stay

PBC	ICD10 code	Description
23X - Other	R53X	Malaise and fatigue
	R54X	Senility
	R58X	Haemorrhage
	R600	Localized oedema
	R609	Oedema
	R798	Other specified abnormal findings of blood chemistry
	Z501	Other physical therapy
	Z508	Care involving use of other rehabilitation procedures
	Z509	Care involving use of rehabilitation procedure
	Z514	Preparatory care for subsequent treatment NEC
	Z539	Procedure not carried out
	Z540	Convalescence following surgery
	Z549	Convalescence following unspecified treatment
U - Unclassified	B967	Clostridium perfringens as cause of dis class to other chaps
	R69X	Unknown and unspecified causes of morbidity

	R99X	Other ill-defined and unspecified causes of mortality
--	------	---

SMR04 – Mental Health & Learning Disabilities

PBC	ICD10 code	Description
U - Unclassified	F03x	Invalid code
	F550	Invalid code
	F552	Invalid code
	F610	Invalid code

Outpatient activity

PBC	Specialty
23X - Other	General Surgery (exc Vascular Surgery)
	Ear, Nose & Throat
	Surgical Paediatrics
	General Medicine
	Rehabilitation Medicine
	Medical Paediatrics
	Geriatric Assessment
	Medical Other (includes Allergy; Clinical Pharmacology & Therapeutics; Endocrinology; GUM; Homoeopathy; Immunology; Nuclear Medicine; Palliative Medicine)
	General Practice
	Clinical Genetics
	Acute Other (Chiropody; surgical Podiatry)
	Allied Health Professionals (AHP) includes Audiometry; Chiropody; Clinical Psychology; Dental Ancillary Staff; Diagnostic Radiology; Dietetics; Electrocardiography; Electroencephalography; Hearing Aids; Industrial Therapy; Nuclear Medicine; Occupational Therapy; Optical Dispensing (by Hosp Opticians); Orthoptics; Physiotherapy; Radiotherapy; Sight Testing (by Hosp Opticians); Speech Therapy; Surgical Appliances; Ultrasonics

Maternity Services

Currently all costs and activity have been allocated to the „Other“ PBC category.

Accident and Emergency Services

Currently all costs and activity have been allocated to the „Other“ PBC category.

Community Services

Currently all costs and activity (except Community Dental) have been allocated to the „Other“ PBC category.



© Crown copyright 2012

You may re-use this information (excluding logos and images) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence, visit <http://www.nationalarchives.gov.uk/doc/open-government-licence/> or e-mail: psi@nationalarchives.gsi.gov.uk.

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

ISBN: 978-1-78045-746-8 (web only)

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

Produced for the Scottish Government by APS Group Scotland
DPPAS12801 (04/12)

Published by the Scottish Government, April 2012

w w w . s c o t l a n d . g o v . u k