

## Appendix D: Health Economics Analysis of Polypharmacy

### Introduction and overview

Although the primary purpose of polypharmacy reviews is in deriving clinical benefits, they also deliver long-term direct and indirect economic benefits. A direct reduction in the cost of prescribing, and reduction in medicines waste is anticipated. In terms of indirect economic benefits, a patient stabilised on fewer medicines will likely require less contact with health professionals, thereby freeing up capacity. Of prime aim is the indirect economic benefit of fewer unscheduled hospital admissions due to adverse drug reactions (ADRs).<sup>64 65</sup>

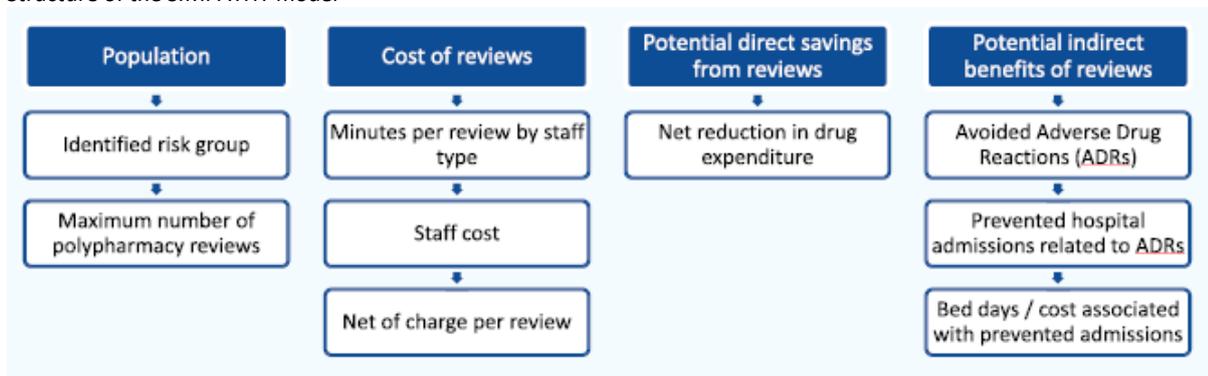
### SIMPATHY Economic Analysis Tool

The goal of the SIMPATHY Economic Analysis tool<sup>66</sup>, developed as part of the EC SIMPATHY project, was to provide a high-level analysis of the economic costs and benefits associated with carrying out polypharmacy reviews. The analysis follows a top-down approach and estimates maximum costs and benefits associated with activity. Activity is driven by the selected population for whom reviews are intended to be carried out.

Costs of reviews are based on the resource (staff) cost of carrying out a review, net of any potential review charge. The direct potential financial benefit of reviews will consist of the net reduction in drugs prescribed, and associated expenditure. Potential indirect benefits (non-cash releasing) centre around potentially avoided Adverse Drug Reactions (ADRs), preventable hospital admissions associated with these ADRs, and the associated number of hospital bed days avoided. The costs of medicines stopped and reduced are cash releasing, whereas avoided admissions are a capacity release productive opportunity.

Ultimately, the tool was intended to add to the package of SIMPATHY change management tools by offering a bespoke analysis of the micro-economic impacts, the costs and benefits of introducing and carrying out reviews. It is thought that this will give a broad overview around resource needs and potential benefits to interested users.

Structure of the SIMPATHY model



### Implementation cost – review cost

Table D1 provides an overview of estimated activity and associated costs per review for Scotland. A range of different models and estimates are provided with some variation in the way that this information was provided. Renewed estimates range from £24.36 to just over £67 per review, which is a reduction on earlier work. It should also be noted that these cost estimates are a monetisation of assumed core clinical activity, and will therefore not pose an additional cost.

### Cost avoidance – number of drugs stopped

Net reductions in the number of items stopped over one year were estimated to be in a range of between 4.9 and 18.2 items, and an average of 11.9 items (number of reviews per annum, applied to the net of the number of drugs stopped/decreased minus those started/increased, and their average number of repeats). That range is then applied to a lower and an upper estimate of costs per item (£10.17 and £10.90)<sup>A</sup> to give a full range of the potential direct savings from net reductions in drugs, ranging from £50 to £200.

## Indirect impacts – Adverse Drug Reactions

Pirmohamed (2004) estimate a prevalence of 6.5% (95% C.I. 6.2% to 6.9%) of admissions judged as being due to an ADR. The study determined avoidability of admissions related to an ADR. Only 28% (25% to 30%) of the ADRs were assessed as unavoidable, while 9% (7% to 10%) were classified as definitely avoidable and 63% (60% to 66%) as possibly avoidable.

Applying these parameters, and an additional conservative assumption that 10% of avoided admissions (and associated bed days) are avoided due to polypharmacy reviews, to a population of 1,000 gives the associated indirect benefits presented in Table D4 (central estimates only). Note that this also gives a variation in results depending on different types of population groups, each stratified by their level of risk of admission or readmission via Scottish Patients at Risk of Readmission and Admission (SPARRA) database.

## Scottish SPARRA population groups

Tables 1a and 1b in [Appendix G](#) summarise SPARRA population groups. Applying the estimated ranges of costs, and direct and indirect benefits (central estimates) to the population of, e.g. the 75+ SPARRA group (and underlying admissions data) generates the set of results summarised in table D3.<sup>B</sup>

## Net value of direct and indirect costs and benefits

Table D4 shows the net benefit of deducting the range of costs from savings from all benefits. If all indirect benefits are taken into account, the net benefit is positive throughout. Note that, in the most pessimistic scenario with maximum costs and minimum drug savings, the balance is tipped and can become negative if only direct benefits are taken into consideration.

### Notes

<sup>A</sup> Item cost estimates are quarter 3, 2016/17 only, to acknowledge more accurately the current cost of prescriptions, but not taking seasonality into consideration. Includes items prescribed on GP10 forms only, excludes prescribed by pharmacists, nurses, etc, to avoid inclusion of stock orders and medicines supplied from hospital and CPU forms. Excludes appliances and vaccines as these are not therapeutic treatments considered in polypharmacy reviews

Lower estimate includes BNF chapters: 01;02;03;04;05;06;07;09;10;11;12

Upper estimate includes all BNF chapters

<sup>B</sup> Cost and benefit are per annum, given the assumption that these are derived as a follow on from the first review

Table D1: Cost of polypharmacy reviews (per patient)

Different models of review staff time allocation	Staff type Type	AfC Band (where appropriate) Band	Preparation (work-up)		Face to Face review		Follow-up and Related activities <sup>1</sup>		Total time taken		Total cost per review <sup>2</sup>		
			min minutes	max minutes	min minutes	max minutes	min minutes	max minutes	min minutes	max minutes	min £	max £	
<b>2015 guidance</b>	Clinical Pharmacist	8a			60	60	15	15	75	75	£40.61	£40.61	
	GP	n/a			15	15	15	15	30	30	£26.40	£26.40	
	<b>Total cost</b>										<b>£67.01</b>	<b>£67.01</b>	
<b>Highland Model 1 - First review</b>	Clinical Pharmacist	8a	5	5	15	15	40	40	60	60	£32.48	£32.48	
	<b>Total cost</b>										<b>£32.48</b>	<b>£32.48</b>	
	<b>Model 2 - Follow-up review</b>	Clinical Pharmacist	8a	5	5	10	10	35	35	50	50	£27.07	£27.07
	<b>Total cost</b>										<b>£27.07</b>	<b>£27.07</b>	
<b>Tayside Model 1 - independent Pharm prescriber</b>	Clinical Pharmacist	8a	15	30	30	30			45	60	£24.36	£32.48	
	<b>Total cost</b>										<b>£24.36</b>	<b>£32.48</b>	
	<b>Model 2 - non -independent prescriber, With GP review</b>	Clinical Pharmacist	7	15	30			15	30	30	60	£14.15	£28.30
		GP	n/a					15	15	15	15	£13.20	£13.20
	<b>Total cost</b>										<b>£27.35</b>	<b>£41.51</b>	
<b>Model 3 - consultant clinic, with GP follow-up</b>	GP	n/a					15	15	15	15	£13.20	£13.20	
	Geriatric consultant	n/a			30	30			30	30	£42.00	£42.00	
	<b>Total cost</b>										<b>£55.20</b>	<b>£55.20</b>	
<b>Ayrshire and Arran<sup>3</sup></b>	Clinical Pharmacist	8a							80	120	£43.31	£64.97	
	<b>Total cost</b>										<b>£43.31</b>	<b>£64.97</b>	
<b>GG&amp;C<sup>4</sup> Model 1 - non -independent prescriber, with GP review</b>	Clinical Pharmacist	7	30	30	30	30			60	60	£28.30	£28.30	
	GP	n/a					5	10	5	10	£4.40	£8.80	
	<b>Total cost</b>										<b>£32.70</b>	<b>£37.10</b>	
<b>Model 2 - independent pharm. prescriber, With tech. support</b>	Clinical Pharmacist	8a	10	30	30	30			40	60	£21.66	£32.48	
	Pharmacy tech.	5	15	5					15	5	£5.26	£1.75	
	<b>Total cost</b>										<b>£26.91</b>	<b>£34.24</b>	

<sup>1</sup> Follow-up and related activities include: Follow-up; MDT meetings; practice meetings; travel; other activities

<sup>2</sup> Estimated Weighted Total Cost including on-cost, AfC 2015-16

<sup>3</sup> based on Advisers carrying out 2-3 reviews during half-day sessions (4hrs)

<sup>4</sup> models for AfC band 7 and band 8a led reviews. Local variation around tech support, less tech support requires more pharmacist preparation time

**Table D2: Avoidable bed days and present values of avoidable admissions for 1,000 people**

Population = 1,000	No risk stratification	Risk stratification			
		BNF10+	BNF10+ & High Risk Med	BNF 5-9	BNF 5-9 & High Risk Med
<b>Definitely</b> avoidable hospital bed days*	0.9	8.4	7.3	7.6	6.6
Assoc. cost avoidance of <b>definitely</b> avoidable admissions	£326	£3,110	£2,699	£2,801	£2,421
<b>Possibly</b> avoidable hospital bed days	6.2	59.1	51.3	53.2	46.0
Assoc. cost avoidance of <b>possibly</b> avoidable admissions	£2,280	£21,771	£18,891	£19,604	£16,945

\* Including assumption that 10% of avoided bed days are avoided due to polypharmacy reviews

**Table D3: Costs and benefits for 75+ SPARRA group, in year one**

Total in group	42,882	
<b>Direct costs and benefits</b>	minimum	maximum
Cost of reviews	£1,044,761	£2,873,565
Net drug reduction	£2,137,077	£8,509,982
<b>Indirect benefits: avoidable bed days and admissions</b>		
<b>Definitely</b> avoidable hospital bed days*	362	
Associated cost avoidance of <b>definitely</b> avoidable admissions	£133,368	
<b>Possibly</b> avoidable hospital bed days	2,535	
Associated cost avoidance of <b>possibly</b> avoidable admissions	£933,576	

\* Including assumption that 10% of avoided bed days are avoided due to polypharmacy reviews

**Table D4: Net value of direct and indirect costs and benefits**

		Costs of reviews (£m)	
		minimum	maximum
Net drug savings & indirect benefits* (£m)		£1.04	£2.87
minimum	£3.20	£2.16	£0.33
maximum	£9.58	£8.53	£6.70

\* indirect benefits of definitely avoidable admissions only