

A model to assess the cost of flare in ulcerative colitis to the NHS

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Background

- Disease flares of active ulcerative colitis (UC) can result in substantial cost implications to the NHS, affecting both primary and secondary care.¹
- In secondary care, flares of active UC are associated with a 2-fold increase in costs for non-hospitalised cases and more than 20-fold increase for hospitalised cases, compared with the maintenance phase.¹
- While the costs associated with treatment and management of UC in secondary care are well-documented, estimates of the cost of flare across the spectrum of care pathways are lacking.
- A cost analysis was performed to estimate the healthcare costs associated with managing a flare by modelling resource use across alternative pathways in primary and secondary care.
- This model was then used to estimate costs associated with increased flares, which may result from non-adherence to Asacol® (mesalazine).

Methods

- A decision tree model was developed in Excel to estimate the direct healthcare costs of flares of varying clinical severity.
- The model forms the basis for estimating the average cost of flare in a model cohort, which allows for sensitivity analyses and adapting the model to local patient populations.
- Treatment and management strategies were based on best practice guidelines, published data sources and expert opinion.²
- Drug costs were calculated using the British National Formulary (BNF) and healthcare management costs were based on published unit costs.
- A market forces factor of 1.08 (the UK average) was applied to account for cost differences between healthcare providers due to geographical location.^{3,4}

Costs of UC in remission (base case)

- Within the model, the baseline UC patient cohort was assumed to be maintained on Asacol at a maximum dose of 2.4 g/day, given as 800 mg MR tablets. This is the maximum daily dose recommended for maintenance of remission and provides an upper estimate of the drug costs.⁵
- Annual management costs for patients in remission were estimated assuming one secondary care consultation per year,⁶ colonic surveillance every 5 years⁶ and routine monitoring tests per year, such as full blood count, liver function and renal function tests.⁷

Costs associated with flare

- Illustrative care pathways were mapped, assuming that patients with a flare of active disease would either be treated and managed in primary care, or as an outpatient, or admitted to hospital.

- Taking a conservative approach, costs for surgery and post-surgical management, e.g. stoma care, were excluded as inclusion would have skewed the data and significantly increased average flare cost estimates.

Average cost of flare

- To calculate an estimated average cost of flare, default values for proportions of patients were assigned to each treatment pathway, based on clinical experience.²
- The default values provide an illustrative example of a model population.

Costs associated with non-adherence

- Using a cohort approach, costs associated with an increase in flare in patients who are non-adherent to Asacol were estimated for a population of 100,000 people (Table 1).

Table 1. The model population in the adherence analysis.

Total population	100,000
Prevalence of UC per 100,000	240 ⁸
Estimated proportion of patients on Asacol	39.5% ⁹
Estimated number of patients on Asacol in cohort	95

Results

Costs of remission and flare

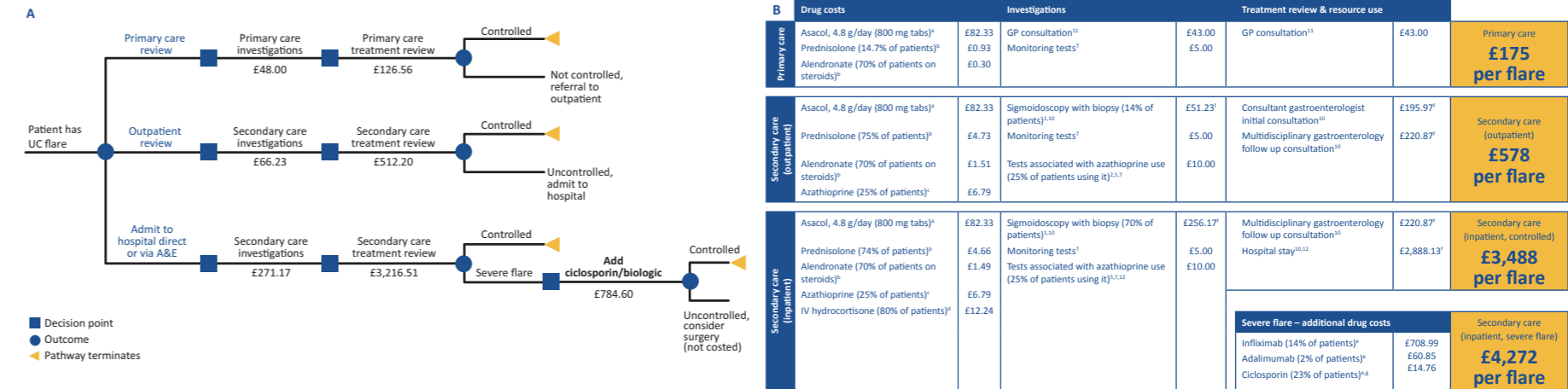
- The estimated annual cost to manage a patient with UC in remission was £955 (base case; Table 2).
- The additional estimated cost to control a flare in primary care was £175 and for secondary care outpatient management was £578 (Figure 1).
- For secondary care inpatient management, the estimated cost was £3,488 (Figure 1).
- If a biologic/cyclosporin was needed, the estimated cost rose to £4,272 (Figure 1). All costs were inclusive of clinical investigations and treatment reviews.
- Applying the default values for proportions of patients to each of the 3 pathways produced an estimated average cost of flare of £984 in the UC cohort (Table 3).

Table 2. Annual costs of ulcerative colitis in remission (base case).

Annual drug costs	Management costs	Annual costs in remission
Asacol 2.4 g/day (800 mg MR tablets) ⁵	£715.52	£955 per patient
Secondary care consultation unit cost ⁶	£111.52*	
Endoscopy ¹⁰	£123.43*	
Monitoring tests ⁷	£5.00	

*Market forces factor applied

Figure 1. Estimated costs associated with flare in ulcerative colitis: A. Illustrative primary and secondary care pathways for treatment and management of flare; B. Break down of costs.



*Asacol dose was doubled to 4.8 g/day for 6 weeks;^{5,13,14,15} Prednisolone (30 mg/day, with a tapering dose) and alendronate (10 mg/day) for 6 weeks;^{2,5,12,16} Azathioprine (125 mg/day) for 12 weeks;^{2,5,12} Intravenous hydrocortisone (100 mg, three times daily) for 5 days;^{12,17} *Infliximab (3 doses of 312.5 mg),^{12,18,19} adalimumab (160 mg induction dose followed by 80 mg, then 3 doses of 40 mg),^{5,12,18} and ciclosporin (250 mg/day for 7 days)^{5,12,17,19} were prescribed for severe flare; *Market forces factor applied; *Unlicensed indication

Table 3. Calculating the average cost of flare.

Pathway via which flare is managed	Estimated cost per flare	Proportion of patients managed via this pathway (illustrative examples)		
		Model population (default values) ²	Increased management in primary care	Reduced management in primary care
Primary care	£175	10.0%	20.0%	5.0%
Secondary care (outpatient)	£578	76.5%	71.5%	79.0%
Secondary care (inpatient) ¹	£3,880	13.5%	8.5%	16.0%
Estimated average cost of a flare	£984		£778	£1,086

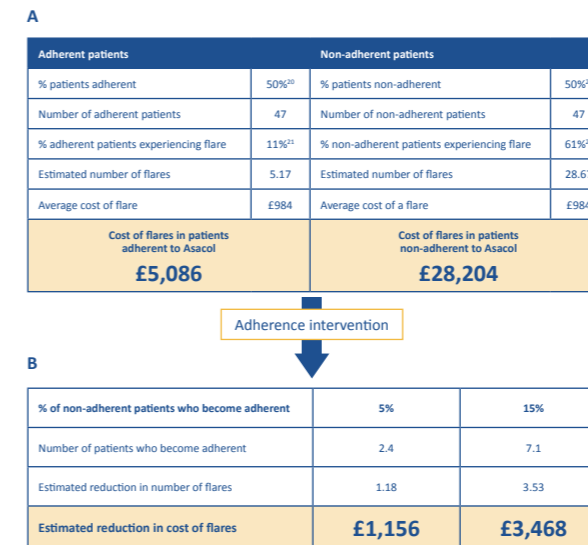
*Crude average of controlled and severe flare

- In sensitivity analysis the proportion of patients managed via each route were varied to reflect differences in patient population characteristics across localities (Table 3).

Adherence analysis

- The estimated annual cost of flare per 100,000 people was £5,086 for patients adherent to Asacol and £28,204 for those who were non-adherent (Figure 2A).
- A potential annual cost saving of £1,156–£3,468 per 100,000 people could be achieved if 5–15% of these non-adherent patients became adherent (Figure 2B).

Figure 2. Estimated annual costs associated with non-adherence to Asacol per 100,000 people: A. Cost of flare for adherent vs non-adherent patients; B. Potential cost savings if a proportion of non-adherent patients become adherent.



Conclusion

- A decision tree model was developed to estimate the cost of treating a flare of active UC via illustrative primary or secondary care pathways.
- The findings support the argument for focusing services towards prompt detection and early management of flares,²² to help avoid A&E attendances, unplanned hospital admissions and other costly secondary care resource use.
 - In the base case, the estimated annual cost to manage a patient with UC in remission was £955.
 - Depending on the severity of the episode, costs to manage a single flare ranged from £175 to £4,272 with an average of £984.
 - A potential annual cost saving of £1,156–£3,468 per 100,000 people could be achieved if 5–15% of non-adherent patients became adherent.
- While further investigation is required to assess real-world validity, this cost model represents a valuable tool for exploring resource utilisation in UC flare management.

Acknowledgements

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