# An Economic Model to Establish the Costs Associated with Routes to Presentation for Patients with Myeloma in the UK

**This poster and model were developed on a pro bono basis by Costello Medical**

## Objective

- To quantify the costs associated with different routes of presentation and investigate the economic impact of delays to diagnosis for patients newly diagnosed with myeloma in the United Kingdom (UK).

## Background

- Myeloma is a relatively rare cancer with vague and non-specific symptoms. Patients often face considerable delays to diagnosis, with one third of patients diagnosed following an emergency presentation.[1]
- Patients diagnosed via the emergency route have more advanced disease and a considerably poorer prognosis than other routes such as general practitioner (GP) routine referral or two-week wait (TWW).[1-3] These patients often have additional complications such as bone disease and/or renal problems.

## Methods

- An economic model was developed to estimate the costs associated with different routes of presentation (emergency presentation, GP TWW, GP urgent, GP routine and consultant to consultant referral) over a lifetime time horizon.

### Model Structure

- A decision tree model framework was adopted, **(Figure 1)**, based on referral route characteristics described in Howell et al. (2017).[2]
- Following diagnosis, patients were modelled to receive one of three **first line management options (observation, active treatment or end of life care)**, which determined the subsequent treatment pathway.
  - Those who receive observation were assumed to have asymptomatic smouldering myeloma (SMM) and could progress to active myeloma and receive active treatment.
  - In the absence of data, it was assumed that active treatment was the same regardless of whether patients received active treatment at diagnosis or after a period of observation.

### Model Inputs

- The model employed a National Health Service and Personal Social Service perspective, and the decision framework precluded discounting.
- Costs included treatment costs (acquisition, administration, adverse event and monitoring costs), complication costs and end of life care costs.
- Other model inputs (such as model probabilities and treatment duration inputs) were based on National Institute for Health and Care Excellence technology appraisals, or derived from targeted literature reviews and discussions with UK clinical experts.

## Results

- The costs per route of presentation are presented in **Figure 2**.
  - These costs are calculated assuming 1 patient presents via each route, but reflect the probability of receiving different first-line management options depending on the route of presentation.
- Treatment costs were similar across referral routes, and marginally higher for the emergency, GP TWW and consultant to consultant routes.
  - Treatment costs for patients with active treatment as first-line management constituted a larger proportion of the emergency costs, whereas treatment costs for patients with observation as first-line management (who then progressed from SMM) were higher for the other routes.
- Complication and end of life care costs were considerably higher for the emergency route.
- Total costs per route of presentation were similar across referral routes, but were highest for the emergency route.

## Conclusions

- This model comprehensively explores the factors that may drive differences in economic costs between routes of presentation for patients with multiple myeloma in the UK.
- The results suggest that there may be an **economic benefit associated with earlier diagnosis** through a reduction in complication and end of life care costs.
- The model captures differences in the distribution of treatment costs across different parts of the decision tree framework, but the **impact of prior observation on treatment costs remains a key data gap**.

**Figure 1**: Model structure

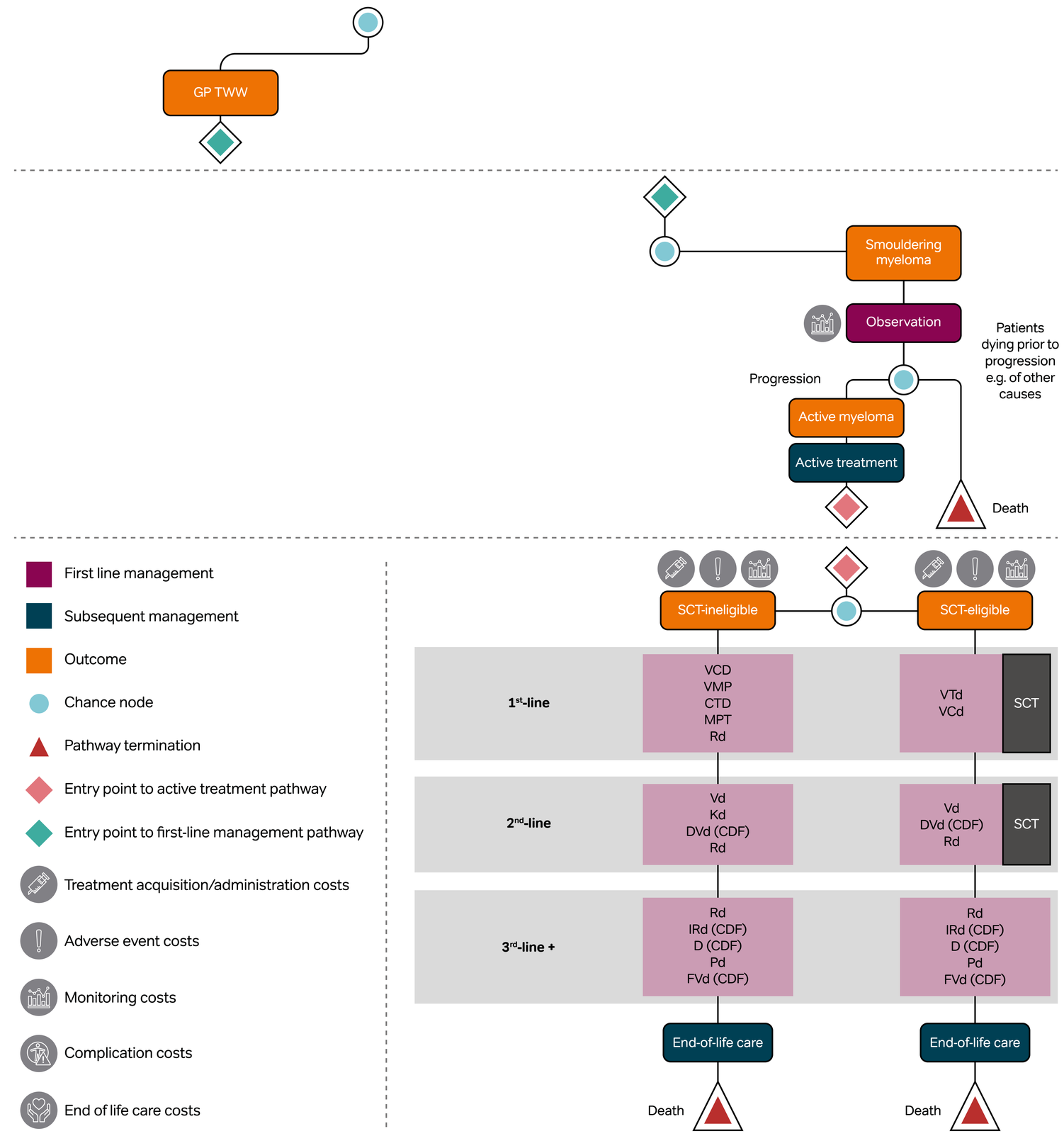
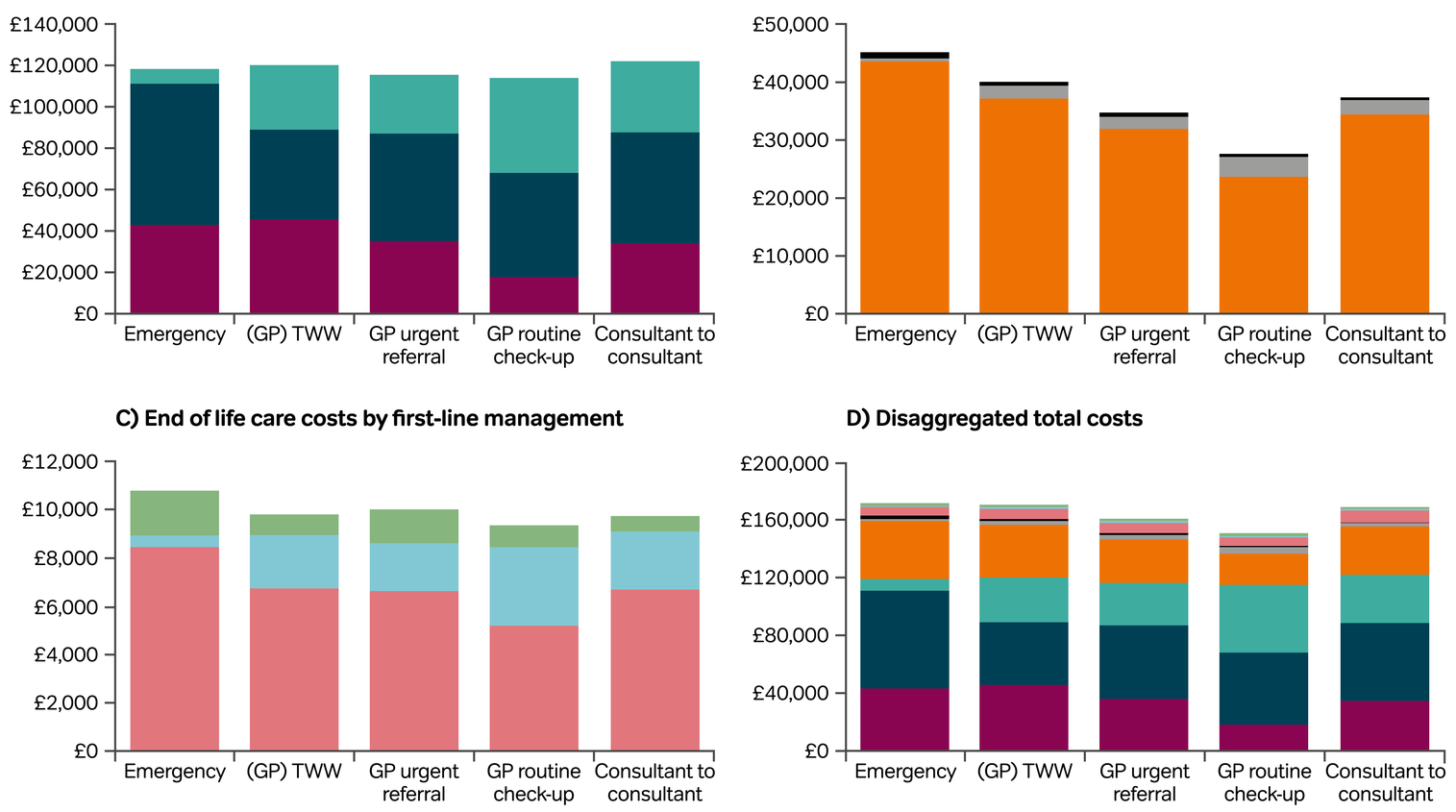



**Figure 2**: Costs per route of presentation (1 patient per route)

Reset Model

Click on the series in Figure 2 to isolate the relevant pathway and cost icons in Figure 1




CDF: Cancer Drugs Fund; D: daratumumab monotherapy; DVd; daratumumab, bortezomib and dexamethasone; CTd: cyclophosphamide, thalidomide and dexamethasone; FVd: panobinostat, bortezomib and dexamethasone; GP: general practitioner; IRd: ixazomib, lenalidomide and dexamethasone; Kd: carfilzomib and dexamethasone; MPT: thalidomide, melphalan and prednisone; Pd: pomalidomide and dexamethasone; Rd: lenalidomide and dexamethasone; SCT: stem cell transplant; TWW: two-week wait; VCd: bortezomib, cyclophosphamide and dexamethasone; Vd: bortezomib and dexamethasone; VMP: bortezomib, melphalan and prednisone; VTd: bortezomib, thalidomide and dexamethasone.

## References


**1.** National Cancer Intelligence Network (2016). Routes to Diagnosis 2006–2016 Workbook. Available at: http://www.ncin.org.uk/publications/routes_to_diagnosis [Last accessed: 26th September 2019]; **2.** Howell D, Smith A, Appleton S, *et al*. Multiple myeloma: routes to diagnosis, clinical characteristics and survival–findings from a UK population based study. British journal of haematology 2017;177:67-71;
**3.** Elliss-Brookes L, McPhail S, Ives A, *et al*. Routes to diagnosis for cancer–determining the patient journey using multiple routine data sets. British journal of cancer 2012;107:1220;
**4.** National Institute for Health and Care Excellence (NICE). British National Formulary (BNF). Available at: https://bnf.nice.org.uk/ [Last accessed: 30th October 2019]; **5.** National Health Service (NHS). National Schedule of Reference Costs 17–18. Available at: https://improvement.nhs.uk/resources/reference-costs/ [Last accessed: 9th July 2019].



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