System-Level Economic Impact of a Combination Influenza-COVID-19 Vaccine Versus Standalone Vaccinations in the United Kingdom (UK)

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mRNA-1083 is an investigational vaccine candidate and has not yet been approved for use in the UK or any other country.

BACKGROUND

Influenza and COVID-19 illnesses in the UK are associated with substantial morbidity and mortality, especially among older adults who have a higher risk of hospitalisation and death. Vaccines can mitigate the severity of these illnesses or can prevent infections all together.[1]

mRNA-1083 is a messenger RNA (mRNA)-based vaccine formulated for the prevention of both influenza and COVID-19 respiratory illnesses with a single injection. mRNA-1083 met its primary endpoints in its Phase 3 trial, eliciting higher immune responses against influenza virus and SARS-CoV-2 than licensed flu and COVID-19 vaccines in adults 50 years and older, including an enhanced influenza vaccine in adults 65 years and older.[2]

OBJECTIVES

Seasonal influenza and COVID-19 remain significant public health burdens globally, with morbidity and mortality significant through the winter[3]. While standalone vaccines are routinely administered, coadministration rates are low (35% in the 2023/2024 NHS season[4]) and a combination vaccine could streamline logistics, improve cost-effectiveness and enhance coverage. We developed a customisable cost calculator incorporating direct and indirect costs to estimate the system-level economic impact of a combination influenza-COVID-19 vaccine compared with separate administrations in the 65+ UK population.

METHODS

Three vaccine strategies were instituted in the model (**Figure 1**) on a UK population of healthy adults 65+ and results were compared. Vaccines were selected based on current UK recommendations[5,6].

The model included vaccine acquisition and administration costs, wastage rates, productivity loss due to time off for vaccination, and environmental costs (cold storage and last mile delivery), and shipping costs. Outputs included total programme cost, the estimated vaccine covered population, and cost per covered individual. Sensitivity analyses explored the impact of varying compliance rates and wastage differentials. In sensitivity analyses, compliance rates among the population were tested by assuming vaccine compliance percentages for the combination vaccine was equal to those of the flu vaccine. An additional equal wastage scenario was also explored.

Figure 1. Vaccination strategies modelled.
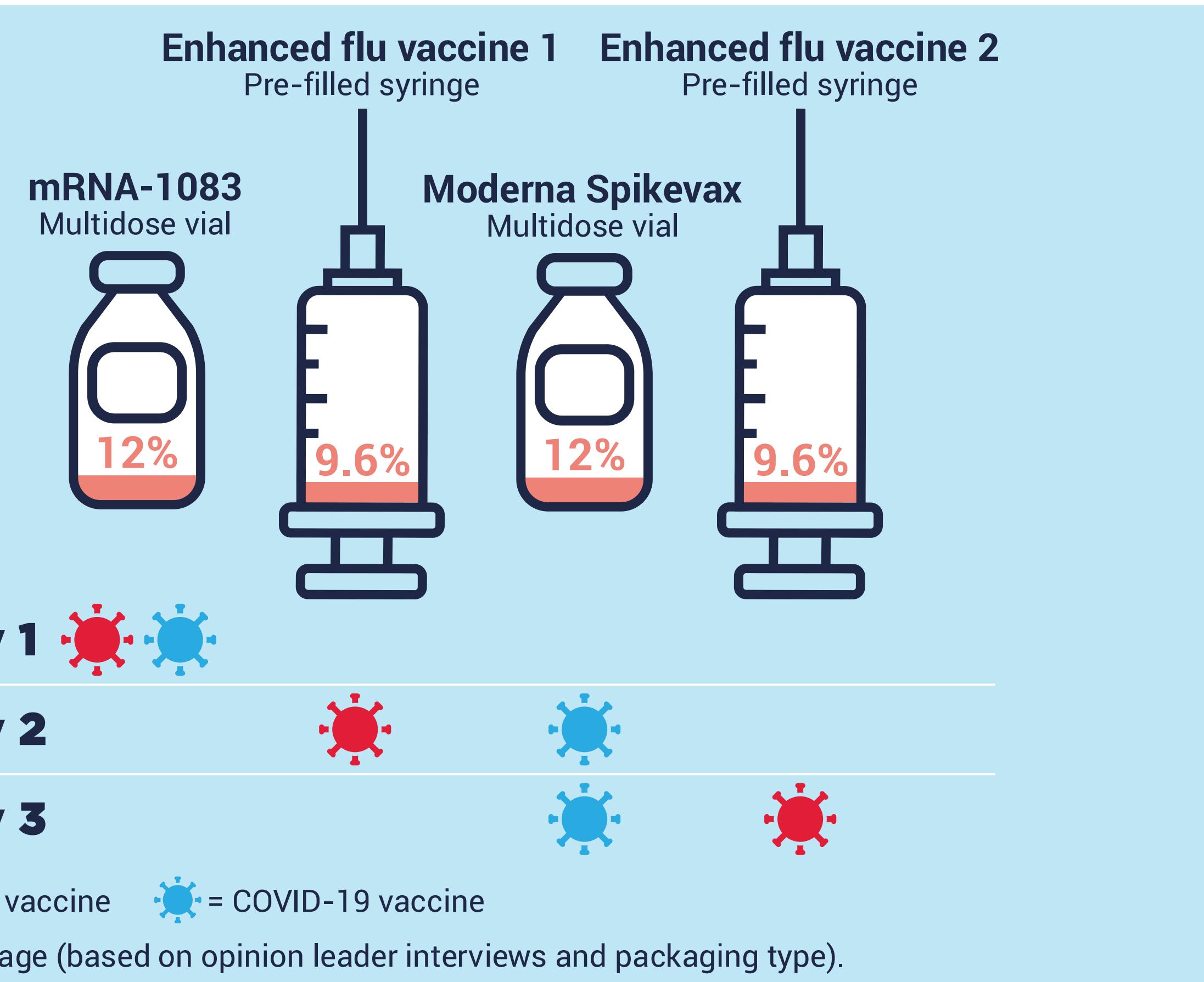
MODEL INPUTS

Vaccine administration included the costs incurred by the NHS. Costs per appointment were estimated using a bottom up costing approach. Experts involved with current flu vaccination programmes were interviewed and asked to provide the clinic and scheduling time involved in a vaccination appointment. Hourly unit costs for nurse time were then applied to these estimates.

Vaccine administration costs were included in the model and refer to the cost of the vaccine and the cost to the clinic for administering the vaccine, however acquisition costs are confidential in nature so are not presented here. Vaccine compliance rates were 70.4% for COVID-19, and 77.6% for flu.[5] In the base case it is assumed that the combination vaccine will achieve COVID-19 compliance rates.

For patients in the standalone vaccine strategies, it was assumed that 35% percent of patients would receive the vaccines in one appointment (co-administered) based on data from the 2023-2024 season[4]. Productivity loss was estimated based on the percentage of people in the labour force multiplied by the time needed to attend a vaccination appointment and average wage per hour.[8] Caregiver support was also accounted for in a portion of the population.

Environmental and shipping costs included shipping distance, cold storage, carbon emissions, picking costs, and distribution costs per pallet of vaccines. The key model inputs are reported in **Table 1**.

Table 1 . Key model inputs.

Administration costs

Patients with co-administration	35%[4]
Cost per appointment	
Clinic time (1 vaccine)	12 mins[7]
Clinic time (2 vaccines)	18 mins[7]
Admin time	15 mins[7]
Hourly cost for band 6 nurse	£64[8]
Hourly cost for band 5 nurse	£53[8]
Total cost (1 vaccine)	£26.60
Total cost (2 vaccines)	£31.90

Transportation emissions and costs

Shipping distance	Moderna	Manufacturer 1	Manufacturer 2
To distribution hub	420 km[9]	1,164 km[10]	0 km[10]
Distr. hub to delivery site	217 km[11]		

Cold storage	70°C	20°C	2 to 8°C
Emissions factor	1.578 CO2e/km[12]	1.186 CO2e/km[13]	1.010 CO2e/km[14]
CO2e per trip (100k doses)	18,905 kWh/yr[15]	4,968 kWh/yr[15]	2,023 kWh/yr[15]
Production electricity mix		0.253 kgCO2e/kWh	

Carbon cost (£/tonne)	41.84[16]		

	Per order	Per pack	Per shipper
Picking costs[17]	£4.05	£0.80	£0.80
Distribution costs[17]			£22.50

	Doses per unit	Units per pack	Packs per shipper	Shippers per pallet	Pallets per truck
Pre-filled syringe[18]	1	1	48	63	26
Combination vaccine vial[18]	10	10	36	96	26
Multi-dose vial -10R, 10 ml[18]	5	10	12	96	26

Productivity costs

% in the labour force (age 65+)	12.8%[19]

| Appointment-related productivity loss	Patient work days[20]	Caregiver work days[18]	% with caregiver[21]	Cost per work day[19]
Influenza	0.250	0.250	17.70%	£142.20
COVID-19	0.250	0.250	17.70%	£142.20

RESULTS

An estimated 65+ population of 12,924,166 was assumed to be eligible to participate in the hypothetical vaccination programme.

Initial results suggest the combination vaccine yields lower overall programme costs (-8.3% and -0.7% compared to Strategy 2 and 3) primarily due to simplified logistics and lower appointment burden. (**Figure 2** and **Table 2**). Shipping and environmental costs were 98% lower for strategy 1 compared to strategies 2 & 3, a finding driven by the lower shipping density of pre-filled syringes for the flu vaccines.

In scenario analysis, increasing the combination vaccine compliance rates to match those of the flu programme meant overall costs for strategy 1 increased, but strategy 2 again had the highest costs, and strategy 1 and 3 were relatively similar. Setting wastages to be equal improved results for strategy 1.

Figure 2 . Total costs of intervention vs comparator strategies: Strategy 1 (combination) yields the greatest savings, primarily driven by lower administration costs.
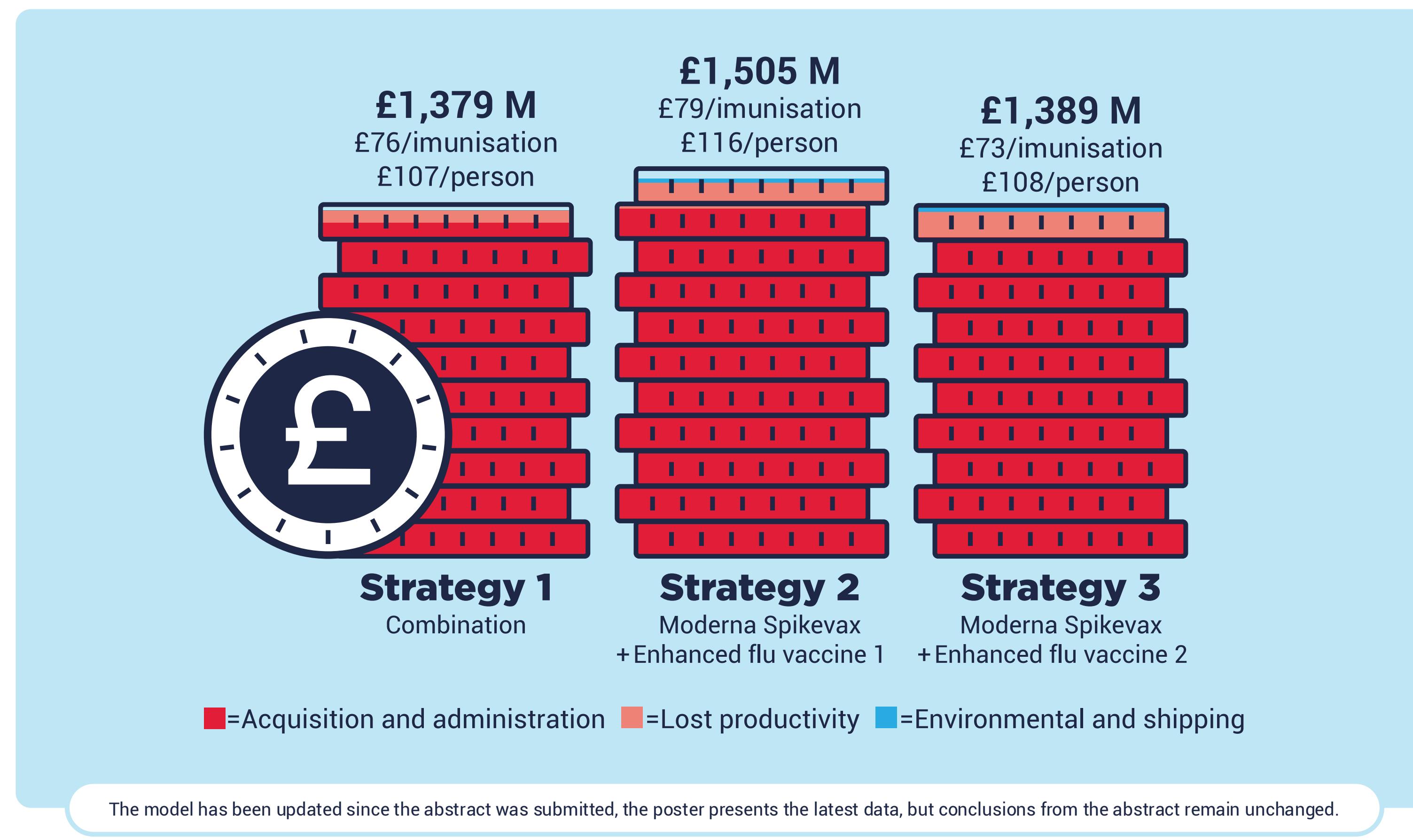
The model has been updated since the abstract was submitted, the poster presents the latest data, but conclusions from the abstract remain unchanged.

Table 2 . Cost breakdown of intervention vs comparator strategies.

	Strategy 1	Strategy 2	Strategy 3
Vaccinations administered	9.10 M	19.13 M	19.13 M
Clinic visits for vaccination	9.10 M	17.36 M	17.36 M
Vaccine acquisition and administration costs	£1,330.36 M	£1,386.70 M	£1,271.29 M
Lost productivity costs	£48.73 M	£102.44 M	£102.44 M
Environmental and shipping costs	£0.32 M	£15.70 M	£15.70 M
Total cost	**£1,379.42 M**	**£1,504.85 M**	**£1,389.42 M**
Total cost per immunisation*	**£76**	**£79**	**£73**
Total cost per eligible person	**£107**	**£116**	**£108**

*Represents cost per immunisation of flu & COVID-19

CONCLUSIONS

A combination influenza–COVID-19 vaccine may offer potential cost savings compared with standalone vaccinations, subject to regulatory approval and broader evidence review, and support the UK Government's prevention commitment. The cost calculator provides policymakers and healthcare decision-makers with a flexible tool to assess the economic and operational implications of adopting combination vaccination strategies.

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