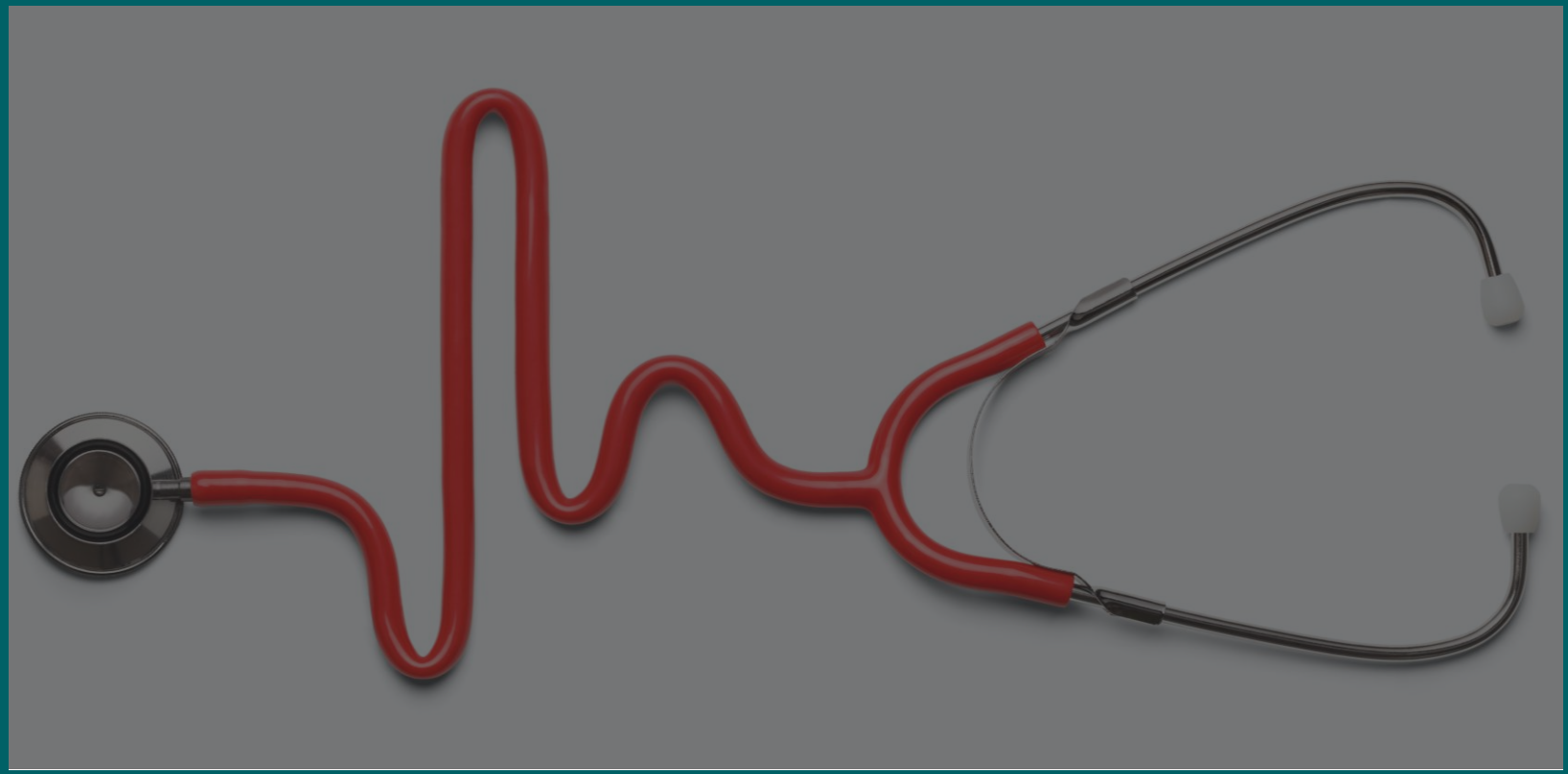
This report is sponsored and fully funded by GSK



VACCINES - FROM BURDEN TO BENEFIT

Estimating the socio-economic cost of preventable disease and the value of vaccination.

NP-GB-MLV-COCO-250001 | September 2025

Contents

Executive Summary

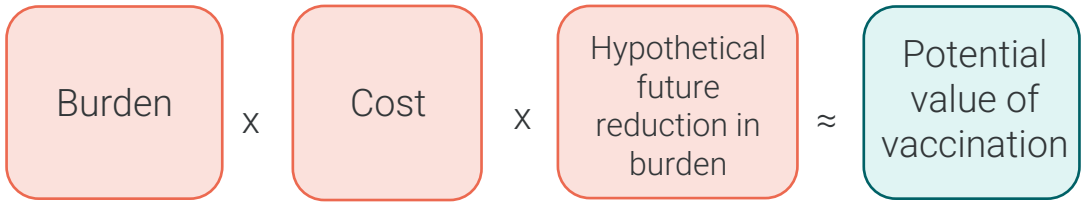
Executive summary (I): The objective of this report

This report estimates the current burden and associated costs to the NHS and wider economy annually **(in England and Wales, adults 18+)** for four infectious respiratory illnesses: **influenza, COVID-19, respiratory syncytial virus (RSV) and invasive pneumococcal disease (IPD).**

Despite these four disease areas being included in the NHS routine vaccine schedule, there is still a large remaining burden left to tackle.

A previous OHE report looked at the value of the existing National Immunisation Programme (NIP). In this report, we focus on the current (remaining) burden with the vaccines we have today, and how much additional value future improvements to vaccination could potentially generate.

The report presents a hypothetical (what-if) illustration of the additional value expected from a potential future reduction in this burden, designed to serve as a meaningful policy conversation starter.



Specifically, using 2024 as the reference year, we quantify annual (per year)…

Healthcare costs (primary and secondary care, and opportunity costs within the health system)

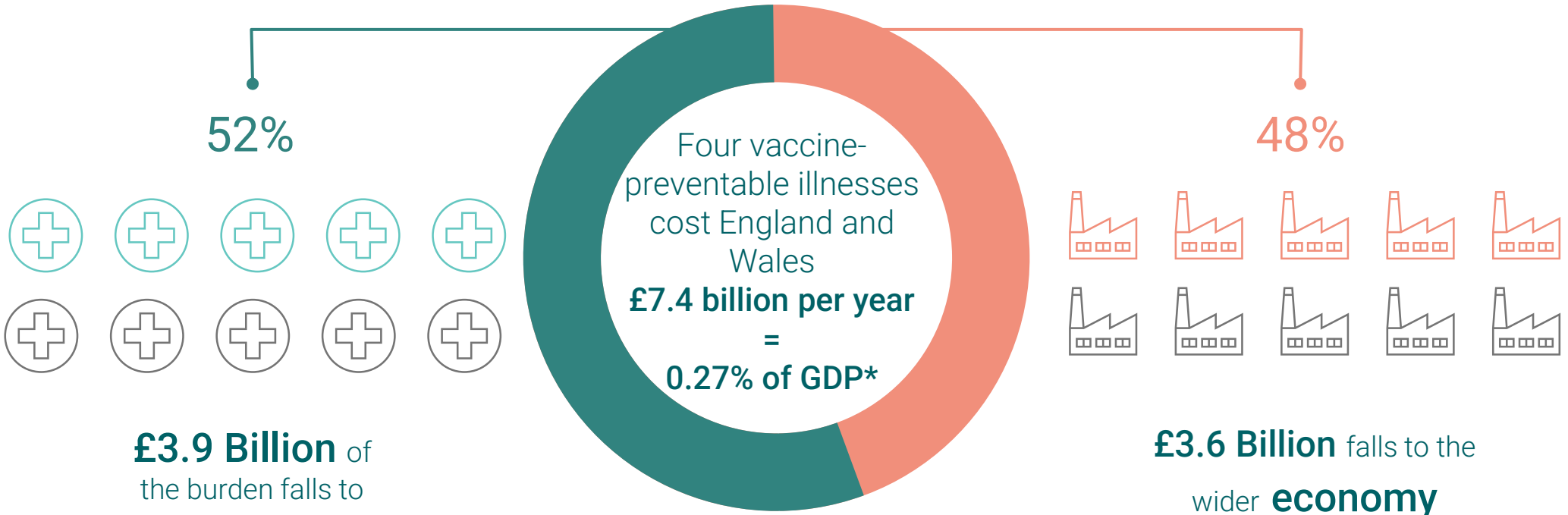
Additional elements of healthcare burden, including:

- Additional healthcare resource use for complications (Long COVID)
- Antibiotic use for viral illnesses (contribution to antimicrobial resistance (AMR))
- Increased hospitalisation risk among comorbid groups (cardiovascular disease and chronic respiratory disease) when contracting one of the 4 infectious illnesses.

Productivity costs to the wider economy (absenteeism and presenteeism)

Using data from national sources, supplemented by modelling assumptions and peer-reviewed literature.

Executive summary (II): The burden to the NHS & wider economy of the unprotected population is significant



At the same time, the UK only spends 1.07%* of health expenditure, and 0.1% of GDP, to cover immunisation programmes in the National Schedule.**

*Based on ONS estimates of total healthcare expenditure of £252bn and immunisation expenditure of £2.7bn in 2023[2] .

**Based on OECD estimates of GDP of £2,711bn[3] and ONS estimates of immunisation expenditure of £2.7bn in 2023[2].

Note: the £7.4bn total figure appears lower than the sum of the respective NHS and economy totals due to rounding.

Executive summary (III): Summary of Key Findings

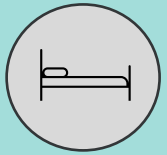
The cost to the NHS of treating the unprotected population for these 4 respiratory illnesses alone is £3.9bn and the costs to the wider economy is £3.6bn. Despite that only 1.07% of the NHS budget is spent on vaccines, and coverage rates could be improved compared to other developed countries and WHO baselines.

A 10% reduction in the current burden through either improved vaccine coverage rates, effectiveness or efficacy could deliver significant annual benefits including:

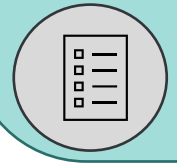
Healthcare system benefits

~757,000 fewer GP appointments

~45,000 fewer hospital admissions, and ~390,000 fewer bed days



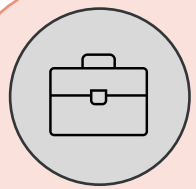
~81,000 patients off waiting lists, and ~5,200 lives saved



~£380m in direct NHS savings a year

A **10% reduction** in the burden could yield

Socio economic benefits



~1,578,000 fewer patient and caregiver absenteeism and presenteeism days

~543,000 fewer antibiotic prescriptions a year

~£360m in economic gains

Executive summary (IV) - Return on investment to vaccination

Investment in vaccination offers good value for money for health care systems…

Immunisation programmes have been shown to offer high societal returns on investment.

19x

Adult vaccination programmes can **return up to 19x their initial investment**, when incorporating economic and societal value[4].

This is based on the value of adult immunisation programmes against influenza, pneumococcal disease, herpes zoster, and respiratory syncytial virus in ten countries and not a reflection of the four respiratory illnesses in this report.

Despite this, current resources allocated to immunisation programmes is low.

1.07%

Spending on immunisation programmes comprised **1.07%*** of overall healthcare expenditure in 2023, including spending on COVID-19 vaccination services[2].

*Based on ONS estimates of total healthcare expenditure of £252bn and immunisation expenditure of £2.7bn in 2023[2].

Executive summary (V): Current health burden

The annual burden to the NHS and economy of four respiratory illnesses: influenza, COVID-19, IPD and RSV, in England and Wales, for the population 18+.

Every year, within the population of 18 years and older in England and Wales, there are...

- ~7,570,000 GP visits
- ~452,000 hospital admissions
  ~10% critical care
- ~3,897,000 hospital bed days
- ~808,000 patients on the waiting list who could be treated

...amounting to a monetary burden to the NHS of £3.9bn, consisting of…

- ~£341m Primary care staff costs
- ~£1.2b Secondary care costs
- ~£2.3b Healthcare opportunity costs*

… and causing…

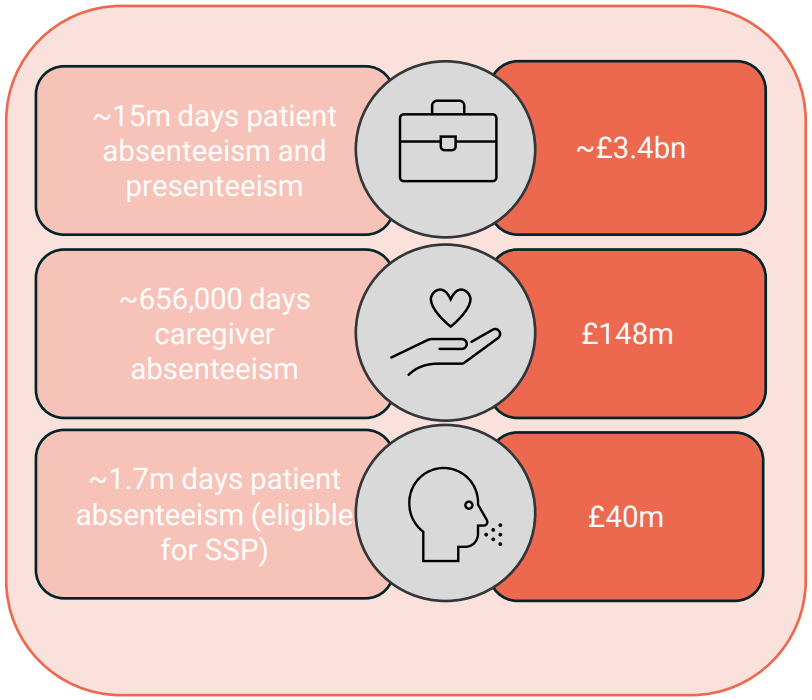
- ~52,000 related deaths

**The opportunity cost of foregoing alternative treatment opportunities of those on the waiting list.*

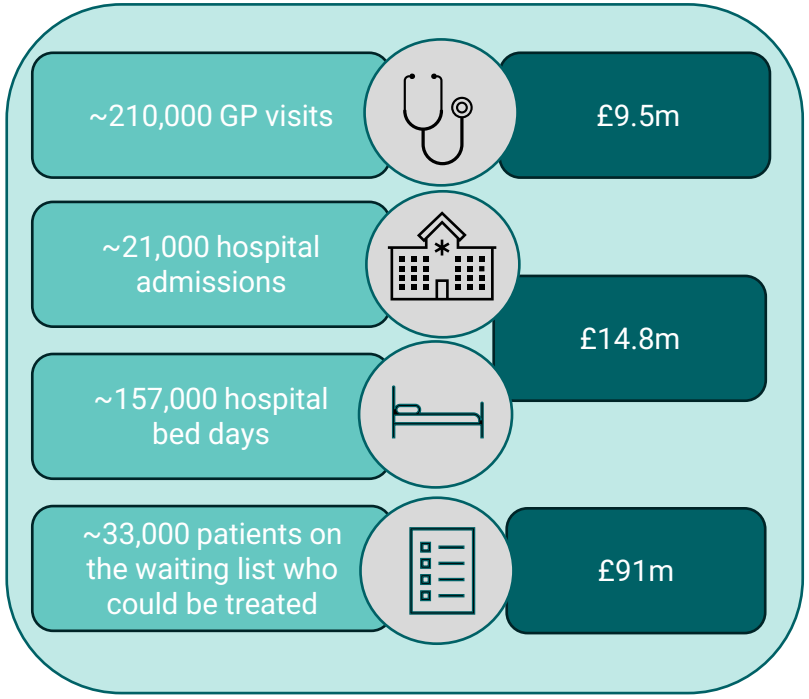
Executive summary (VI): Current wider burden

Additionally, we have quantified the productivity costs associated with the 4 respiratory illnesses; the estimated impact on AMR; the hospitalisation impact for patients with co-morbidities; and the estimated resource use for patients with Long COVID.

The burden of respiratory illness contributes to a productivity impact of £3.6bn and welfare costs of £40m.



Long COVID leads to an additional healthcare cost of £115m.



A large proportion of antibiotic prescriptions for viral respiratory illnesses are considered unnecessary, though all prescriptions contribute to the threat of AMR.

~5.4m prescriptions for antibiotics for viral illnesses (Influenza, COVID-19 and RSV) that could lead to an increase in AMR[5-7].

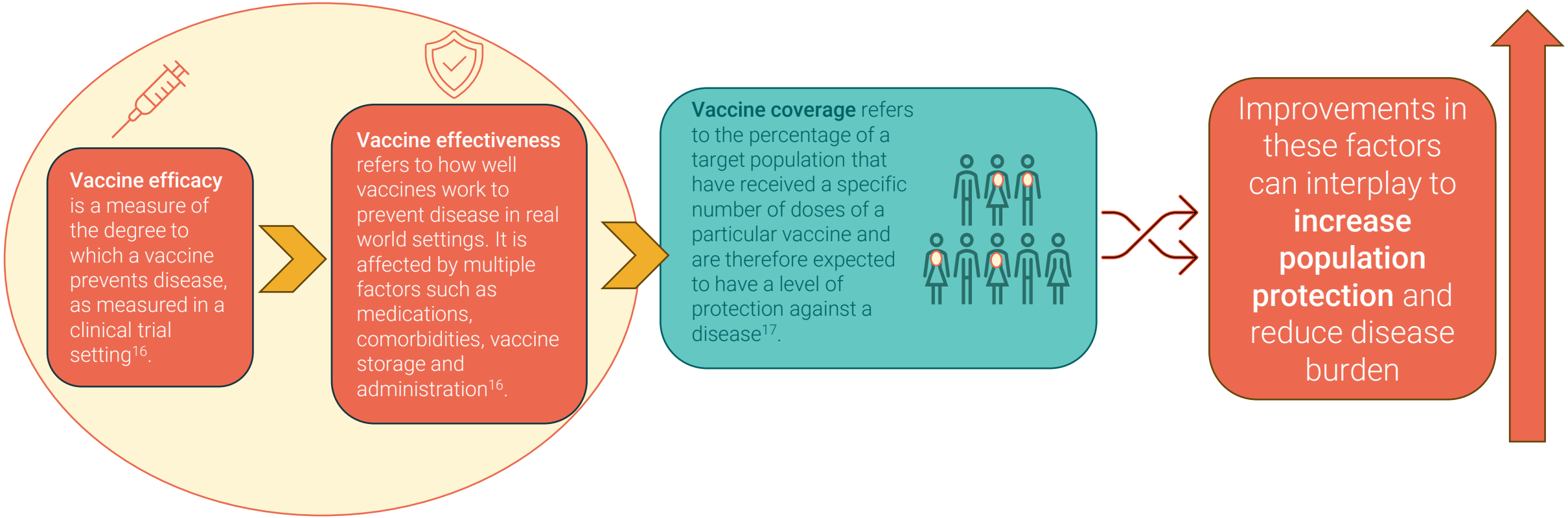
People with co-morbidities bear a greater risk of hospitalisation.

Heart conditions (Cardiovascular disease)
~6.7m[8,9] individuals with up to 4.6x[10] increased risk of hospitalisation across conditions.

Respiratory conditions (COPD and Asthma)
4.6m individuals[11-15] with up to 9.8x[10] increased risk of hospitalisation across conditions.

Executive summary (VII): What if this burden could be reduced?

A reduction in burden could arise from higher coverage with the same vaccine, a future vaccine with higher efficacy or improved effectiveness at the same coverage levels, or a combination:



Executive summary (VIII): Prevented health burden

A reduction in burden could arise from higher coverage with the same vaccine, a future vaccine with higher efficacy or improved effectiveness at the same coverage levels, or a combination. **Reducing the current annual burden by 10% could…**

...reduce health care resource use...

- ~757,000 GP visits averted
- ~45,000 hospital admissions averted
- ~390,000 hospital bed days averted
- ~81,000 additional patients treated from the waiting list

...save costs for the NHS of £384m...

- **~£34m** Primary care staff costs averted
- **~£124m** Secondary care costs averted
- **~£226m** Healthcare opportunity costs* averted

...and save lives.

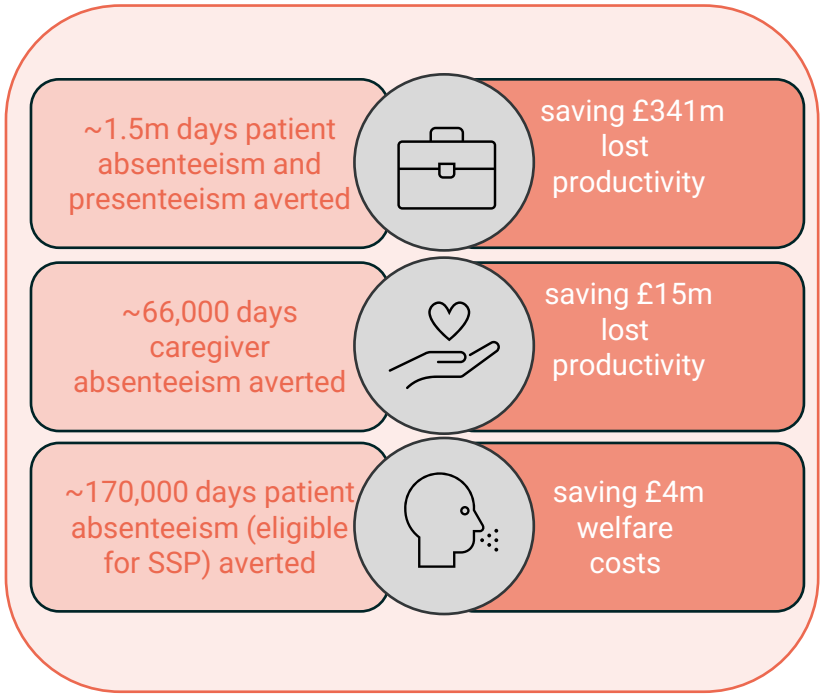
- ~5,200 reduction in related deaths

**The opportunity cost of foregoing alternative treatment opportunities of those on the waiting list.*

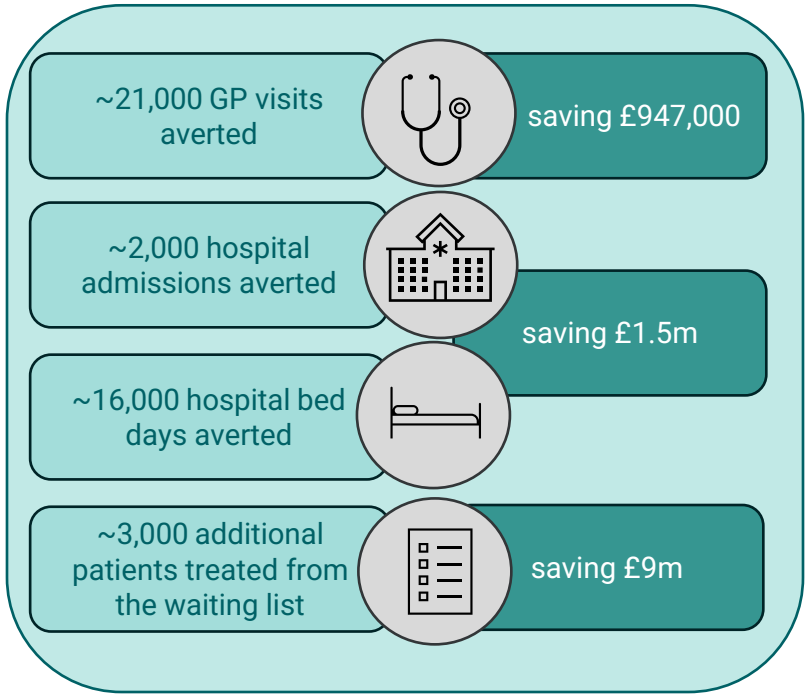
Executive summary (IX): Prevented wider burden

A reduction in burden could arise from higher coverage with the same vaccine, a future vaccine with higher efficacy or improved effectiveness at the same coverage levels, or a combination. **Reducing the current annual burden by 10% could…**

….lower productivity losses by £356m and save welfare costs of £4m...



…reduce resources for Long COVID complications saving £12m...



… and reduce prescriptions contributing to the risk of AMR.

~543,000 prescriptions for antibiotics for viral illnesses (Influenza, COVID-19 and RSV) avoided

Full Report

Background (I): About this report

- This report provides estimates of the annual burden associated with respiratory illnesses for four selected vaccination programmes from the NHS routine vaccination schedule and projected future cost/savings associated with those vaccines. The disease areas that these vaccines provide a level of protection against include **Influenza**, **RSV, COVID-19**, and **IPD**.

Respiratory illnesses can result in serious illness and death, can have a substantial impact on health care systems and national economies[18]. Hospital admissions rates due to respiratory illnesses have seen a sharp increase over the last 2 decades in England and Wales[19].

Influenza, RSV and **COVID-19** have varying levels of disease activity throughout the year, but winter spikes coincide, generating substantial morbidity and mortality and adding significant pressure on healthcare systems[20-22].

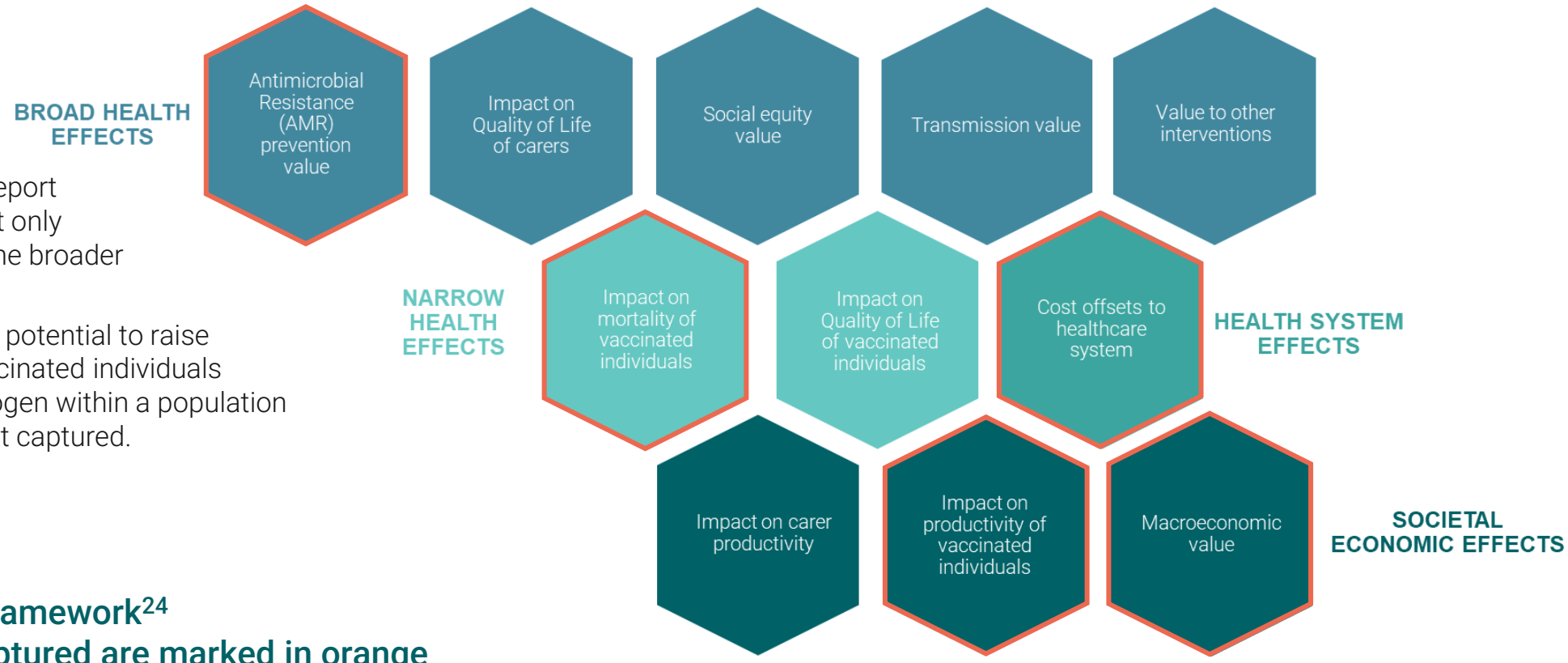
- **IPD**, including meningitis and bacteremic pneumonia, are less common but can cause significant morbidity and mortality[23].

- Despite the delivery of national vaccination programmes to provide a level of protection against influenza, RSV, COVID-19 and IPD, a **burden of disease remains, requiring further action**. Higher coverage with the same vaccine, a future vaccine with higher efficacy or improved effectiveness at the same coverage levels, or a combination can help alleviate the costs to the NHS and wider society associated with the remaining unmet burden of these preventable illnesses.

Background (II) - The Broader Value of Vaccination

Healthcare effects constitute only a fraction of the 'broader' impacts including, amongst others, societal economic impacts from reduced productivity[24]. Understanding the effects of respiratory illnesses is important to inform evidence-based public policy and investments in order to mitigate their burden.

- The burden estimated in this report is a conservative estimate as it only quantifies some elements of the broader impact of vaccination.
- For example, QoL impacts, the potential to raise social equity or value to unvaccinated individuals due to a reduction of the pathogen within a population (transmission value), are all not captured.



Source: Broader Value Framework[24]
Note: Value elements captured are marked in orange

Methodological overview

- This is a descriptive analysis, quantifying the burden (resource use, health outcomes and productivity impacts) and the cost to the NHS and wider economy using 2024 as the reference year.
- This analysis focuses on the adult population (aged 18+) in England and Wales, where data are available.
    - For the secondary care estimates, we collected data from national sources, supplemented by modelling assumptions and peer-reviewed literature.
    - For an estimate of primary care resource use, we make assumptions based on estimates from secondary literature where primary care data was not available in national sources.
    - For an estimate of the productivity impact, we use estimates from the literature on absenteeism and presenteeism for each disease area. We supplement these estimates with assumed levels of absenteeism during a hospitalisation and recovery period
- While estimates on hospitalisations are generally taken from nationally reported data, estimates on primary care and productivity impacts are based on assumptions from secondary literature. These results are therefore subject to greater uncertainty and should be interpreted with caution.
- We use scenario analysis to estimate the impact of a reduction of the burden by 10% across the key disease areas. For brevity, we include an alternative scenario of a reduction in the burden by 5% in the Appendix.
- For more detail on the methodology, see the Technical Appendix[25].

The burden of the four adult respiratory illness: Secondary care

- We estimate that, annually, the four respiratory illnesses contribute to 452,073 hospital admissions, accounting for nearly 4 million bed days and over £1.2 billion in hospitalisation costs every year. About 9.9% (44,679) of these admissions are treated in critical care.
- The opportunity cost of the bed days taken up by these patients is that it prevents the NHS from treating other patients on the current elective care waiting list. We estimate that the current hospitalisation burden prevents 808,532 additional elective care patients from being treated every year, with an opportunity cost of nearly £2.3 billion for untreated patients on the waiting list *

	Total	COVID-19	IPD	Influenza	RSV
Hospital admissions (n)	**452,073**	282,088	80,346	72,019	17,620
Critical care admissions (n, % of all admissions)	**44,679 (6.9%-14%)**	26,883 (9.5%)	11,248 (14.0%)	4,962 (6.9%)	1,586 (9.0%)
Hospital bed days (n)	**3,897,122**	2,524,766	712,611	583,647	76,098
Hospitalisation costs	**£1,238,401,930**	£776,282,336	£232,931,352	£184,136,991	£45,051,250
Additional patients who could be treated from the waiting list (n)	**808,532**	523,810	147,845	121,089	15,788
Monetary value of treating patients from the waiting list	**£2,261,462,636**	£1,465,097,672	£413,521,093	£338,684,682	£44,159,190

* Value of treating patients from the waiting list is estimated using average Net Monetary Benefit (monetised health gain minus incremental costs) per hospital bed stay (£2,797). Estimates identified from the secondary literature of the average stay in hospital for an elective care patient 4.82 days – see technical appendix[25].

The burden of the four adult respiratory illness: Primary care and mortality

- We estimate that, annually, the four disease areas contribute to nearly 7.6 million GP appointments, with a value of almost £341 million in associated primary care staff costs every year.
- In total, the disease areas results in 52,025 related deaths each year.

	Total	COVID-19	IPD	Influenza	RSV
Primary care					
GP consultations	**7,570,241**	2,975,952	132,776	3,926,590	534,923
Primary care staff costs	**£340,660,862**	£133,917,851	£5,974,950	£176,696,546	£24,071,514
Mortality					
Related deaths	**52,025**	11,805	23,543	8,194	8,482

Source: OHE analysis. See technical appendix for more details of sources and methodology[25].

The burden of the four adult respiratory illness: Productivity

- We estimate that the productivity loss due to patient absenteeism (over 7.8 million workdays) and presenteeism (almost 7.3 million workdays) costs the UK economy approximately £3.4 billion every year.
- From the employer perspective, the cost of absence in terms of Statutory Sick Pay (SSP) amounts to over £40 million every year. SSP costs are excluded from total productivity cost figures to avoid double counting costs for these absence days.
- Caregiver absenteeism (for hospitalised patients) is estimated at 655,687 workdays annually, valued at almost £148 million in lost productivity every year.

	Total	COVID-19*	IPD**	Influenza	RSV
Patient					
Patient absenteeism (days)	**7,830,151**	1,357,309	304,998	4,914,839	1,253,005
Patient absenteeism costs	**£1,765,556,373**	£306,048,477	£68,771,587	£1,108,206,564	£282,529,745
Patient absenteeism (SSP eligible) days	**1,703,606**	1,139,867	241,677	289,377	32,685
Patient absenteeism SSP costs	**£40,460,639**	£27,071,836	£5,739,828	£6,872,695	£776,281
Patient presenteeism (days)	**7,294,507**	118,655	N/A	5,667,943	1,507,909
Patient presenteeism costs	**£1,644,778,293**	£26,754,460	N/A	£1,278,017,783	£340,006,050
Caregiver* **					
Caregiver absenteeism (days)	**655,687**	432,981	113,937	83,049	25,720
Caregiver absenteeism costs	**£147,845,445**	£97,629,294	£25,690,662	£18,726,015	£5,799,474

*Notes: *calculations exclude productivity costs related to Long COVID.** We assume all IPD cases are hospitalised and attach no presenteeism costs. *** Caregiver absenteeism is limited to hospitalised cases aged 65+ who are not receiving regular care. See technical appendix for relevant calculations[25].*

Source: OHE analysis. See technical appendix for more details of sources and methodology[25].

The burden of the four adult respiratory illness: Wider health burden

COMPLICATIONS (LONG COVID)

- Long COVID, a complication associated with COVID-19, accounts for an additional 21,246 hospital admissions, 157,221 bed days and approximately £15 million in hospitalisation costs every year.
- Estimates suggest that Long COVID contributes to an additional 210,337 GP appointments, with a value of approximately £9.5 million in associated staff costs.
- Long COVID related hospitalisations prevent 32,619 additional patients on the waiting list from treatment, the cost of which amounts to over £91 million.

	Burden	Costs
GP consultations	210,337	£9,465,159
Hospital admissions	21,246	£14,752,033
Bed days	157,221	
Additional patients on the waiting list for secondary care	32,619	£91,234,132
	Total healthcare costs	£115,451,325

Source: OHE analysis. See technical appendix for more details of sources and methodology[25].

The burden of the four adult respiratory illness: Wider health burden

ANTIMICROBIAL RESISTANCE (AMR)

Prescription of unnecessary antibiotics and the use of inappropriate agents can drive the emergence of AMR, although all (necessary and unnecessary) antibiotic use contributes to the development of AMR[26,27].

- Evidence shows that patients with viral respiratory illnesses often receive unnecessary antibiotics, contributing to antimicrobial resistance.
    - There were over 5.4 million potentially inadvertent prescriptions for antibiotics annually for the viral illnesses in our analysis (COVID-19, Influenza and RSV).

	Total	COVID-19	Influenza	RSV
Antibiotic prescriptions (n)	**5,426,571**	2,136,734	2,850,704	439,133

Source: OHE analysis. See technical appendix for more details of sources and methodology[25].

The burden of the four adult respiratory illness: Wider health burden

COMORBIDITIES

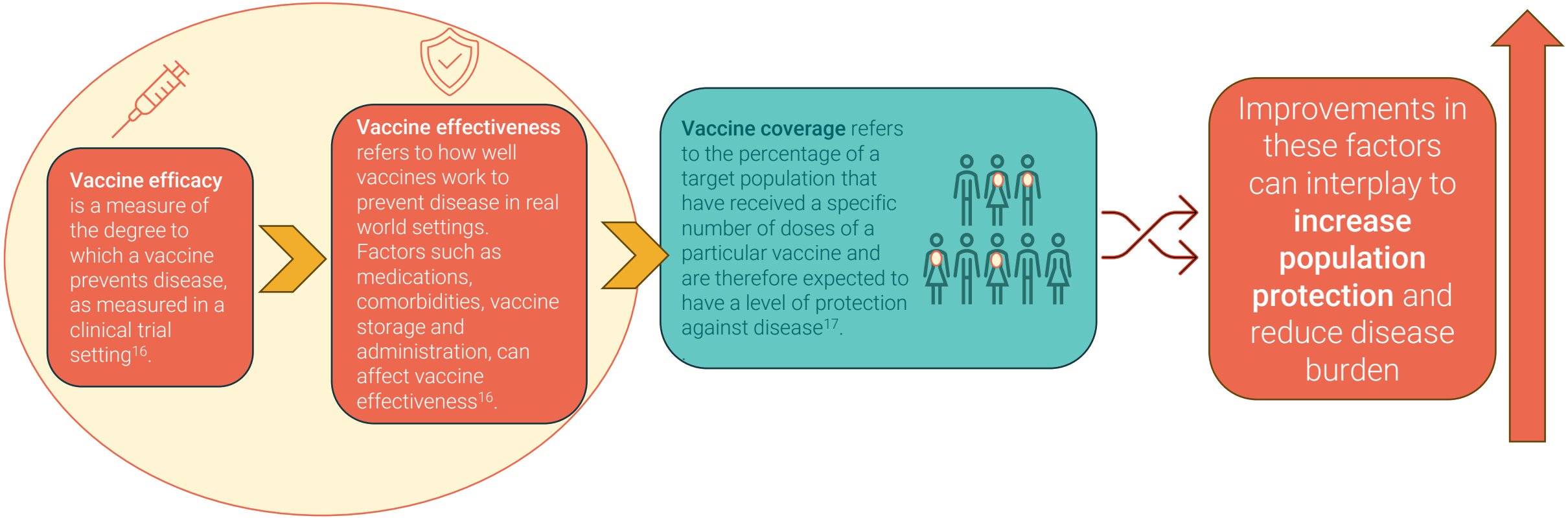
- Adults with certain comorbidities are at an increased risk of developing severe illness due to the four adult respiratory illnesses
  - There are 6,740,000 people with cardiovascular disease in England and Wales[8,9]. Depending on the contracted adult respiratory illness, those individuals face a 1.2 – 4.6x increased risk of hospitalisation when contracting one of the respiratory illnesses[10,28].
  - There are 4,637,874 people with respiratory disease (COPD and asthma)[11-15]. Depending on the contracted adult respiratory illness, those individuals face a 1 – 9.8x risk of hospitalisation[10-29].
- The burden of major illness (including respiratory disease) is projected to significantly increase with 2.5 million more people in England estimated to be living with a major condition by 2040, compared to 2019[30]. With that, the increased risk of adverse outcomes from respiratory illnesses will continue to grow.

Comorbid risk	Comorbid population size	Increased risk of hospitalisation (Relative Risk)			
	Total (n)	COVID-19	IPD	Influenza	RSV
Cardiovascular disease	**6,740,000**	3.9	4.6	1.6	1.2
Chronic respiratory disease	**4,637,874**				
Asthma	**3,301,400**	1 – 1.2	2.8	1.8	3.2
COPD	**1,336,474**	1.3 – 1.6	9.8	2.2	5.9

Source: OHE analysis. See technical appendix for more details of sources and methodology[25].

The value of prevention: increasing population protection

- We model a hypothetical scenario in which an increasing proportion of the population is protected from disease, resulting in a 10% reduction in burden.
- A reduction in burden could arise from higher coverage with the same vaccine, a future vaccine with higher efficacy or improved effectiveness at the same coverage levels, or a combination:



The value of prevention: Healthcare burden

- We observe the current levels of remaining burden across key indicators.
- The potential value of increased population protection, resulting in a 10 percent reduction in the burden of illness every year, is summarised as follows:

	Base case: current burden	10 percent reduction of burden would avert…
Hospitalisations (n)	**452,073**	45,207
Hospital bed days (n)	**3,897,122**	389,712
Hospitalisation costs	**£1,238,401,930**	£123,840,193
Patients from the waiting list who could be treated (n)	**808,532**	80,853
Value of treating patients from the waiting list	**£2,261,462,636**	£226,146,264
GP visits (n)	**7,570,241**	757,024
Primary care costs	**£340,660,862**	£34,066,086
Related deaths (n)	**52,025**	5,202
Prescriptions for antibiotics (n)	**5,426,571**	542,657

Source: OHE analysis. See technical appendix for more details of sources and methodology, and calculations for long COVID[25].
See the report appendix for an alternative estimate of the value of increased population protection, resulting in a 5 percent reduction.

The value of prevention: Productivity

- We observe the current levels of remaining burden across key indicators.
- Welfare costs, measured by SSP, are not included in the total cost figures for productivity, due to double counting of this alternative cost.
- The potential value of increased population protection, resulting in a 10 percent reduction in the burden of illness every year, is summarised as follows:

	Base case: current burden	10 percent reduction of burden would avert…
Patient absenteeism (days)	**7,830,151**	783,015
Patient absenteeism costs	**£1,765,556,373**	£176,555,637
Patient absenteeism SSP (days)	**1,703,606**	170,361
Patient absenteeism SSP costs	**£40,460,639**	£4,046,064
Patient presenteeism (days)	**7,294,507**	729,451
Patient presenteeism costs	**£1,644,778,293**	£164,477,829
Carer absenteeism (days)	**655,687**	65,569
Carer absenteeism costs	**£147,845,445**	£14,784,545

Source: OHE analysis. See technical appendix for more details of sources and methodology[25].
See the report appendix for an alternative estimate of the value of increased population protection, resulting in a 5 percent reduction.

Summary

- This report described the burden associated with adult respiratory illness for four disease areas (Influenza, COVID-19, RSV and IPD) in England and Wales. In terms of healthcare resource use, the unprotected population contracting these illnesses **cost the NHS £3.9bn annually** across primary and secondary care, including the opportunity costs for patients on the elective care waiting list. Productivity losses due to **absenteeism and presenteeism among patients and caregivers costs the national economy £3.6bn** each year.
    - For complications such as **long COVID**, we see additional healthcare costs of **around £115m**. This is just one example of a complication arising from one of the respiratory illnesses included in our analysis (COVID-19).
    - Societal impacts extend beyond healthcare and productivity costs, with use of antibiotics for viral illnesses, with their use potentially being avoidable and contributing to antimicrobial resistance.
- This report also summarises the additional risk of hospitalisation for comorbid groups with cardiovascular disease and chronic respiratory disease.
- **A 10% reduction in the current burden** could create cost savings to the **NHS of £384m** and a reduction in **productivity costs among patients and caregivers of £356m** annually.
- Decision-makers and the Pharmaceutical industry may consider strategies to reduce this burden through encouraging higher uptake and coverage, improvements to the efficacy and effectiveness of current vaccines, or a combination of both.

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Abbreviated technical appendix (I) – Healthcare burden

1. **Disease burden:** To estimate secondary care resource use (number of hospital admissions and bed days), we extracted data from the Hospital Episode Statistics (HES)[31] and NHS Wales Admitted Patient Care Statistics (APC)[32] dataset 2023/24 for each disease (and associated complications in the case of COVID-19) based on pathogen-specific International Classification of Diseases codes (see slide 33). To estimate primary care resource use, assumptions were derived from secondary literature sources[33-36]. The number of GP appointments attributable to each disease was estimated by applying age-specific ratios of population-level GP appointments to hospital admissions.
2. **Bed-days freed up by vaccination:** The freed-up bed days could be used to treat patients from the elective care waiting list. The number of additional patients treated from the waiting list were estimated based on the average alternative hospital patient length of stay from NHS England data[31].
3. **Costing:** To value the burden of hospitalisations according to the reference costing approach, we estimated direct hospitalisation costs based on relevant healthcare resource group (HRG) codes for each ICD code for the year 2023/24 (see slide 33). Additionally, opportunity costing approach that considers the forgone benefit from alternative treatment opportunities, which can be quantified in Net Monetary Benefit (NMB) terms. We converted the bed days freed by vaccination into the number of potential alternative treatments and valued them in Net Monetary Benefit (NMB) terms. The NMB is estimated using average health gains and average costs from an alternative treatment by using data from Sandman et al. 2018[37]. To estimate the cost of primary care, we valued each GP appointment at a cost of £45.00 using the Unit Costs of Health and Social Care programme Manual[38].
4. **Complications:** We quantify the additional burden of disease-related complications, following steps 1-3, focusing specifically on Long COVID as an example. The relevant HRG codes for the long COVID ICD code for the year 2023/24 are shown on slide 33.

Abbreviated technical appendix (II) – Additional burden & Scenario analysis

5. **Antibiotic use:** We calculated an estimated number of antibiotic prescriptions for the viral diseases in our analysis (COVID-19, Flu and RSV), based on the available literature[5-7].

6. **Comorbidities:** We identify increased risk of hospitalisations among individuals with comorbidities (asthma, COPD and cardiovascular disease) based on the secondary literature[10,28,29,39-45].

7. **Patient productivity:** To measure the productivity impact for employed working age cases (18-64y) with mild illness, we use incidence rate estimates from the secondary literature[11,46-48] and apply these to the estimated population size[11]. We use estimates from the literature for the number of workdays lost due to absenteeism and presenteeism[49,50]. For workdays lost due to hospitalisations, we supplement productivity loss estimates for mild disease with absenteeism during hospitalisation, calculated by adjusting the length of stay[31,32] for the average work week (5/7), and add a recovery period from secondary literature[48,51,52]. To value productivity losses according to the value of output lost, Gross Value Added (GVA) estimates are used[53]. To provide an estimate of the welfare cost borne by employers, we used the minimum required amount of statutory sick pay (SSP)[54], only applied after the third day of illness, to absenteeism periods. Productivity cost estimates and welfare (SSP) costs are presented separately to guarantee clarity and prevent double counting.

8. **Caregiver productivity:** We assume that for hospitalised cases aged 65+ who are not already receiving regular formal or informal care, a working age caregiver (18-64 years) loses some productivity during the patient's hospitalisation, subject to employment rates. For COVID- 19 and IPD, we apply a general average percentage of work time lost due to caregiving for elderly[55] to the workday-adjusted average LoS[31,32]. For RSV and influenza, we use a weighted average number of days taken off by caregivers of elderly influenza patients based on observed influenza data[49]. Productivity costs are valued using GVA[53].

9. **The value of prevention:** To analyse the effect of increased protection of the population against vaccine-preventable illnesses, we analysed a 5% and 10% reduction in the disease burden, evaluated as a X% reduction in each individual output measure of the burden, rather than a reduction in the incidence of illness.

Abbreviated technical appendix (III): ICD-10 and HRG classification codes

	COVID-19	Flu	RSV	IPD
HES & APC data				
ICD codes	B34.2, U071, U072	J10.0, J10.1, J10.8, J11.0, J11.1, J11.8, J18	B97.4, J12.1, J20.5, J21.0	G00.1, A40.3, J13.X, J18
Source	[56,57]	[58]	[59]	[51]
HRG codes	DX21A, DX11A, DX01A	DZ11, WJ03, DZ23	DZ11, WJ03, DZ23	AA22, WJ06, DZ11, DZ23
Source	[60]	[60]	[60]	[60]

	Long COVID
HES data	
ICD codes	U07.4
Source	[52]
HRG codes	WH15
Source	[60]

See technical appendix for more details of sources and methodology[25].

Appendix: 5 percent reduction in healthcare burden

- For brevity, we present an alternative estimate of the potential value of increased population protection, resulting in 5 reduction in the burden of illness every year.
- The reduction in burden is summarised as follows:

	Base case: current burden	5 percent reduction of burden would avert…
Hospitalisations (n)	**452,073**	22,604
Hospital bed days (n)	**3,897,122**	194,856
Hospitalisation costs	**£1,238,401,930**	£61,920,096
Patients from the waiting list who could be treated (n)	**808,532**	40,427
Value of treating patients from the waiting list	**£2,261,462,636**	£113,073,132
GP visits (n)	**7,570,241**	378,512
Primary care costs	**£340,660,862**	£17,033,043
Related deaths (n)	**52,025**	2,601
Prescriptions for antibiotics (n)	**5,426,571**	271,329

Source: OHE analysis. See technical appendix for more details of sources and methodology, and calculations for Long COVID[25].

Appendix: 5 percent reduction in productivity burden

- For brevity, we present an alternative estimate of the potential value of increased population protection, resulting in 5 reduction in the burden of illness every year.
- The reduction in burden is summarised as follows:

	Base case: current burden	5 percent reduction of burden would avert…
Patient absenteeism (days)	**7,830,151**	391,508
Patient absenteeism costs	**£1,765,556,373**	£88,277,819
Patient absenteeism SSP days	**1,703,606**	85,180
Patient absenteeism SSP costs	**£40,460,639**	£ 2,023,032
Patient presenteeism (days)	**7,294,507**	356,725
Patient presenteeism costs	**£1,644,778,293**	£82,238,915
Carer absenteeism (days)	**655,687**	32,784
Carer absenteeism costs	**£147,845,445**	£7,392,272

Source: OHE analysis. See technical appendix for more details of sources and methodology[25].