

Ranking Vaccines

A Prioritization Framework

Phase I: Demonstration of Concept
and a Software Blueprint



INSTITUTE OF MEDICINE

OF THE NATIONAL ACADEMIES

Advising the nation • Improving health

National Vaccine Plan Priorities for Implementation

A.	Develop a catalogue of priority vaccine targets of domestic and global health importance (Goal 1).
B.	Strengthen the science base for the development and licensure of new vaccines (Goals 1 and 2).
C.	Enhance timely detection and verification of vaccine safety signals and develop a vaccine safety scientific agenda (Goal 2).
D.	Increase awareness of vaccines, vaccine-preventable diseases, and the benefits/risks of immunization among the public, providers, and other stakeholders (Goal 3).



A. Develop a catalogue of priority vaccine targets of domestic and global health importance (Goal 1).

	access to routinely recommended vaccines (Goal 4).
G.	Create an adequate and stable supply of routinely recommended vaccines and vaccines for public health preparedness (Goal 4).
H.	Increase and improve the use of interoperable health information technology and electronic health records (Goal 4).
I.	Improve global surveillance for vaccine-preventable diseases and strengthen global health information systems to monitor vaccine coverage, effectiveness, and safety (Goal 5).
J.	Support global introduction and availability of new and under-utilized vaccines to prevent diseases of public health importance (Goal 5).

Vision of the National Vaccine Program Office

Step 1

**Create and Validate
the Model**

Phase I

**Enhance the
Model**

Phase II

Step 2

**Execute and
Populate the Model**

Step 3

**Prioritize Vaccines
and Evaluate the
Catalogue Against
Ideal Attributes**

Charge to the Committee

1. Review domestic and global research and development prioritization activities relevant to identifying new preventive vaccine targets.
2. Develop an analytical framework and model for prioritizing vaccines of domestic and global importance. Engage stakeholders to inform the process of the model development and implementation.
3. Test and validate the model using two to three predetermined vaccines, including at least one vaccine candidate of domestic importance and one of global importance.
4. Prepare a report containing the analytical framework and model for evaluating and prioritizing vaccine targets along with recommendations as to how to use the model for reviewing the catalog of preventive vaccines every two to three years.

Previous IOM Reports

New Vaccine Development Establishing Priorities

VOLUME I

Diseases of Importance in the United States



NAS
R
NAE
IOM

1985

New Vaccine Development Establishing Priorities

VOLUME II

Diseases of Importance in
Developing Countries



NAS
R
NAE
IOM

1986

Vaccines for the 21st Century

A TOOL FOR DECISIONMAKING



INSTITUTE OF MEDICINE

2000

The Committee Approach

16

**Expert
Members**

5

**Committee
Meetings**

2

**Public
Meetings**

n

**Subgroup
Meetings**

2

**Modeling
Consultants**

2

**Software
Designers**

11

**Concept
Evaluators**

3

**Research
Staff
Members**

Modeling Considerations

- 1. Multi-Stakeholder Application**
- 2. Axiomatic Foundation**
- 3. Relative Priority Scaling**
- 4. Sensitivity Analysis**
- 5. Transparency**
- 6. User-Friendly Software Base**

The Multi-Attribute Framework

Input

Demographic Characteristics

Special Populations
Health Valuation
Income

Disease Characteristics

Epidemiology
Health Care Costs

Vaccine Characteristics

Development Costs
Delivery Costs

Unvaccinated
Population

Vaccinated
Population

**Computational
Submodel**
(Health and Economic
Considerations)

Input

User Selection
and Ranking

Input

Value Rank Order
Centroid Weights

**Value
Submodel**

Attributes

Health Considerations

Premature Deaths Averted Per Year
Incident Cases Prevented Per Year
QALYs Gained or DALYs Averted

Economic Considerations

One-Time Costs
Annual Net Direct Costs of Vaccine Use
Annual Net Workforce Productivity
Gained
Cost-Effectiveness

Demographic Considerations

Public Concerns

Scientific and Business Considerations

Programmatic Considerations

Intangible Values

Policy Considerations

Output

Value Score

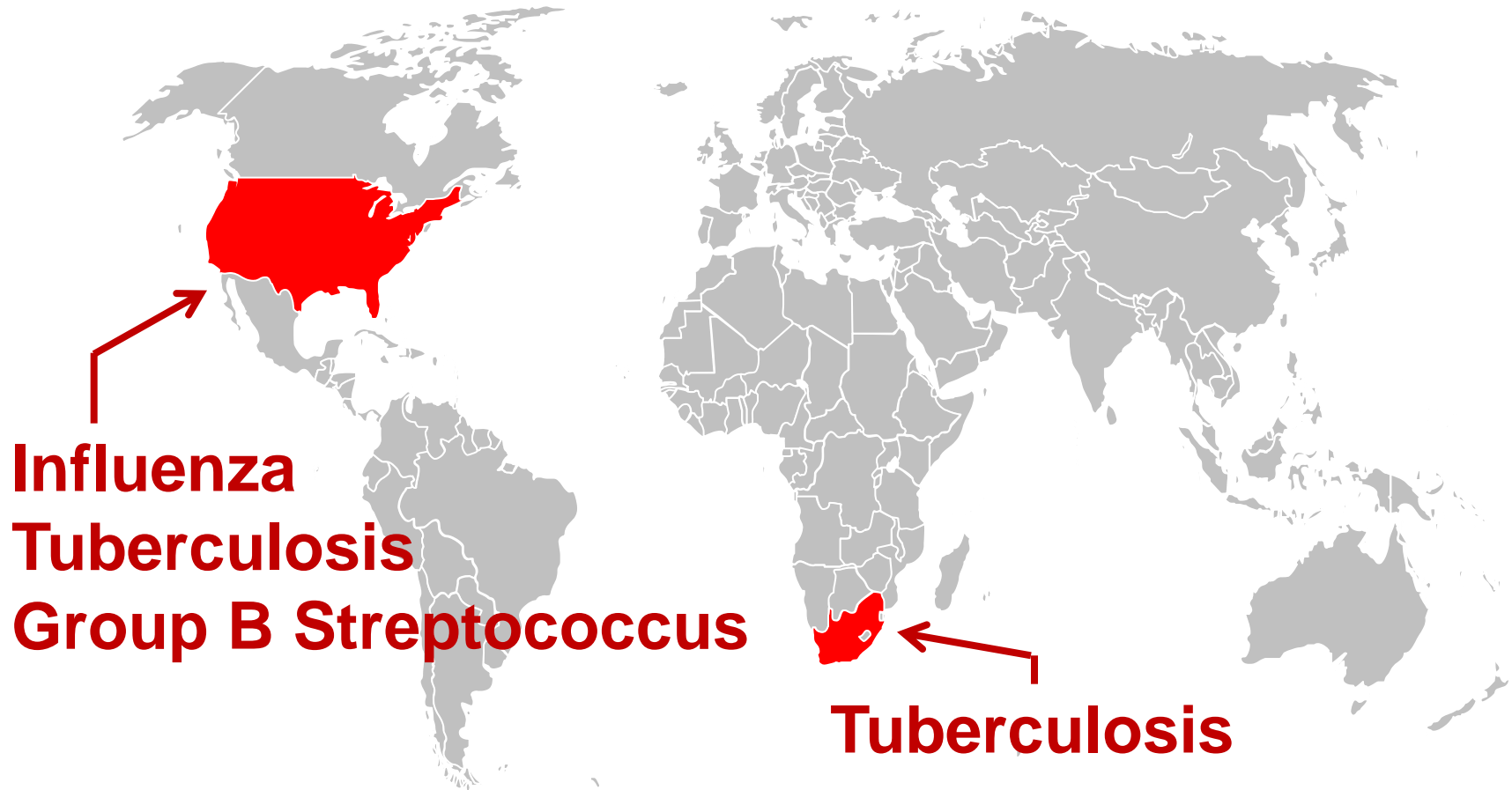
Attribute Selection

8

29

Health Considerations	<ul style="list-style-type: none"> • Premature Deaths Averted Per Year • Incident Cases Prevented Per Year • QALYs Gained or DALYs Averted
Economic Considerations	<ul style="list-style-type: none"> • One-Time Costs • Annual Net Direct Costs (Savings) of Vaccine Use • Annual Net Workforce Productivity Gained • Cost-Effectiveness
Demographic Considerations	<ul style="list-style-type: none"> • Benefits Infants and Children • Benefits Women • Benefits Socioeconomically Disadvantaged • Benefits Military Personnel • Benefits Other Priority Population
Public Concerns	<ul style="list-style-type: none"> • Availability of Alternative Public Health Measures • Potential Complications Due to Vaccines • Disease Raises Fear and Stigma in the Public • Serious Pandemic Potential
Scientific and Business Considerations	<ul style="list-style-type: none"> • Likelihood of Financial Profitability for the Manufacturer • Likelihood of Successful Licensure in 10 Years • Demonstrates New Production Platforms • Existing or Adaptable Manufacturing Techniques • Potential Litigation Barriers Beyond Usual • Interests from NGOs and Philanthropic Organizations
Programmatic Considerations	<ul style="list-style-type: none"> • Potential to Improve Delivery Methods • Fits into Existing Immunization Schedules • Reduces Challenges Relating to Cold-Chain Requirements
Intangible Values	<ul style="list-style-type: none"> • Eradication or Elimination of the Disease • Vaccine Raises Public Health Awareness
Policy Considerations	<ul style="list-style-type: none"> • Special Interest for National Security, Preparedness, and Response • Advances Nation's Foreign Policy Goals

New Vaccine Candidates



Rank Order Centroid Weighting

	Number of Attributes Selected													
Rank	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1*	0.750	0.611	0.521	0.457	0.408	0.370	0.340	0.314	0.293	0.275	0.259	0.245	0.232	0.221
2	0.250	0.278	0.271	0.257	0.242	0.228	0.215	0.203	0.193	0.184	0.175	0.168	0.161	0.155
3		0.111	0.146	0.157	0.158	0.156	0.152	0.148	0.143	0.138	0.134	0.129	0.125	0.121
4			0.063	0.090	0.103	0.109	0.111	0.111	0.110	0.108	0.106	0.104	0.101	0.099
5				0.040	0.061	0.073	0.079	0.083	0.085	0.085	0.085	0.084	0.083	0.082
6					0.028	0.044	0.054	0.061	0.065	0.067	0.068	0.069	0.069	0.069
7						0.020	0.033	0.042	0.048	0.052	0.054	0.056	0.057	0.058
8							0.016	0.026	0.034	0.039	0.043	0.045	0.047	0.048
9								0.012	0.021	0.027	0.032	0.036	0.038	0.040
10									0.010	0.017	0.023	0.027	0.030	0.033
11										0.008	0.015	0.019	0.023	0.026
12											0.007	0.012	0.017	0.020
13												0.006	0.011	0.014
14													0.005	0.009
15														0.004
Total**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

$$w_i = \sum_{j=i}^n \frac{1}{j} \quad i = 1 \dots n$$

*Highest rank = 1

**Totals may not add to 1.00 due to rounding

SMART Vaccines Beta

Step 0 of 7

Terms and Conditions

Disclaimer

SMART Vaccines Beta

A Prototype Framework for Prioritizing New Vaccines

Phase I: Demonstration of Concept

April 2012

Committee on Identifying and Prioritizing New Preventive Vaccines for Development
Institute of Medicine

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The Institute of Medicine (IOM) Committee on Identifying and Prioritizing New Preventive Vaccines for Development (Committee) of the National Academy of Sciences (NAS) is tasked with developing an analytical framework and model for prioritizing vaccines of domestic and global importance, and to engage stakeholders to inform the process of the model development and implementation. The Committee, with the assistance of consultants from Johns Hopkins University and VIM Interactive, has developed, as part of Phase I of the study, a prototype software entitled "SMART Vaccines Beta" which is ultimately intended to be a decision-assist tool and not a decision maker. In its current version, this prototype is NOT usable to assist any decision-making process. Subsequent work will be focused on improving the prototype software.

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Users

Returning
Users

To proceed, enter the following:

Your Name

Your Institution

Your Email Address

password

☒ I agree to the terms and conditions of use above.

Proceed to SMART
Vaccines Beta

Disclaimer

SMART Vaccines is intended to serve only as a **decision-support tool** and should not be used as a decision maker.

SMART Vaccines Beta

Step 1 of 7

**Selection and
Ranking of Values**

[Values](#)
[Demographics](#)
[Disease Burden](#)
[Vaccines](#)
[Value Assessment](#)
[Value Score](#)

Step 1: Select Vaccine Values and Rank Their Importance

[To Demographics](#)

HEALTH CONSIDERATIONS

Premature Deaths Averted Per Year
Incident Cases Prevented Per Year
QALYs Gained or DALYs Averted Per Year

ECONOMIC CONSIDERATIONS

One-Time Costs
Annual Net Direct Costs of Vaccine Use
Annual Net Workforce Productivity Gained
Cost Effectiveness

POLICY CONSIDERATIONS

Special Interest for National Security, Preparedness, and Response
Potential Complications Due to Vaccines

PUBLIC CONCERNS

Availability of Alternative Public Health Measures
Potential Complications Due to Vaccines
Disease Raises Fear and Stigma in the Public
Serious Pandemic Potential

DEMOGRAPHIC CONSIDERATIONS

Benefits Infants and Children
Benefits Women
Benefits Socioeconomically Disadvantaged
Benefits Military Personnel
Benefits Other Priority Population

PROGRAMMATIC CONSIDERATIONS

Potential to Improve Delivery Methods
Fits into Existing Immunization Schedules
Reduces Challenges Relating to Cold-Chain Requirements

SCIENTIFIC AND BUSINESS CONSIDERATIONS

Likelihood of Financially Profitability for the Manufacturer
Likelihood of Successful Licensure in 10 Years
Demonstrates New Production Platforms
Existing or Adaptable Manufacturing Techniques
Potential Litigation Barriers Beyond Usual
Interests from NGOs and Philanthropic Organizations

INTANGIBLE VALUES

Eradication or Elimination of the Disease
Vaccine Raises Public Health Awareness

Drop values here

(Drag to rank in order of importance)

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SMART Vaccines Beta

Step 2 of 7

Population Profile

[Values](#)
[Demographics](#)
[Disease Burden](#)
[Vaccines](#)
[Value Assessment](#)
[Value Score](#)

Step 2: Enter Population Data

[Back](#)
[To Disease Burden](#)
[Add Population](#)

Edit Existing Population:

- Select Population -

Save as new...

[Save](#)

Untitled Profile

United States (US)

 - Select Life Table -
Blank Template

United States (US)

South Africa (ZA)

[Female](#)
[Male](#)
[Special](#)
[Add Special](#)

MALE

 "Health Related
Quality of Life"

AGE	POPULATION Size (N)	LIFE TABLE				HRQoL (HUI2)	PRODUCTIVITY	
		Living (lx)	Life-Years (nLx)	Life Expectancy (ex)	Standard Life Expectancy (sx)		Hourly Wage (Parents for ages < 15)	
< 1	2,294,679	100,000	99,348	76.0	76.0	0.99	\$	17.90
1-4	8,889,066	99,276	396,817	75.6	75.6	0.99	\$	17.90
5-8	10,753,934	99,156	495,604	71.7	71.7	0.99	\$	17.90
10-14	10,838,788	99,085	495,185	66.7	66.7	0.99	\$	17.90
15-19	11,472,812	98,989	493,905	61.8	61.8	0.99	\$	16.80
20-24	11,374,397	98,573	491,150	57.0	57.0	0.89	\$	16.80
25-29	11,021,998	97,887	487,775	52.4	52.4	0.89	\$	16.80
30-34	10,581,472	97,223	484,373	47.7	47.7	0.89	\$	16.80
35-39	10,547,351	96,526	480,477	43.1	43.1	0.89	\$	15.49
40-44	10,872,790	95,665	475,151	38.4	38.4	0.89	\$	15.49
45-49	11,447,885	94,396	467,208	33.9	33.9	0.84	\$	15.49
50-54	10,825,136	92,487	455,327	29.6	29.6	0.84	\$	15.49

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SMART Vaccines Beta

Step 3 of 7

Disease Profile

Step 3: Enter Disease Burden and Costs Data

[Back](#)
[To Vaccines](#)
[Add Disease](#)

Edit Disease:

- Select Disease - ▴ ▾
- Select Disease -
- Influenza
- Tuberculosis
- Group B Strep

Influenza

[Health](#)
[Economic](#)
[Female](#)
[Male](#)
[Special](#)

Age	Population Size	Annual Incidence (per 100,000)	Case Fatality Rate (%)	Herd Immunity Threshold (%)
< 1	4,478,198	20,300	0.004 %	100 %
1 – 19	81,859,350	10,200	0.001 %	100 %
20 – 64	188,118,413	6,600	0.072 %	100 %
> 65	40,093,919	9,000	1.17 %	100 %

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Step 3: Enter Disease Burden and Costs Data

[Back](#)
[To Vaccines](#)
[Add Disease](#)

Edit Disease:

- Select Disease - ▾

Save as new...

[Save](#)

Influenza

[Health](#)
[Economic](#)

Morbidity	Cases (%)	Disutility (tol)	Disability Weight	Duration (days)
Influenza illness without outpatient visit (D1)	<input type="text" value="59.5"/> %	<input type="text" value="0.09"/>	<input type="text" value="0.01"/>	<input type="text" value="4"/>
Influenza illness with outpatient visit (D2)	<input type="text" value="40"/> %	<input type="text" value="0.13"/>	<input type="text" value="0.1"/>	<input type="text" value="4"/>
Influenza hospitalization (D3)	<input type="text" value="0.5"/> %	<input type="text" value="0.2"/>	<input type="text" value="0.3"/>	<input type="text" value="4"/>

[Add Morbidity](#)

Permanent Impairment	Cases (%)	HRQoL (HUI2)	Disability Weight
Impairment 1 (P1)	<input type="text" value="0"/> %	<input type="text" value="0"/>	<input type="text" value="0"/>
Untitled Impairment	<input type="text" value="0"/> %	<input type="text" value="0"/>	<input type="text" value="0"/>

[Add Impairment](#)

Health Care	Cost per unit	Death units	D1 units	D2 units	D3 units
Over-the-Counter medications	\$ <input type="text" value="3.00"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>
Physician visit	\$ <input type="text" value="100.00"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Step 3: Enter Disease Burden and Costs Data

[Back](#)
[To Vaccines](#)
[Add Disease](#)

Edit Disease:

- Select Disease -

Save as new...

[Save](#)

Influenza

[Health](#)
[Economic](#)

Influenza illness with outpatient visit (D2)

40

%

0.13

0.1

4

Influenza hospitalization (D3)

0.5

%

0.2

0.3

4

Add Morbidity

Health Care	Cost per unit	Death units	D1 units	D2 units	D3 units
Over-the-Counter medications	\$ 3.00	1	1	1	1
Physician visit	\$ 100.00	0	0	0	0
Outpatient visit	\$ 250.00	1	0	1	1
Emergency department visit	\$ 750.00	0	0	0	0
Hospitalization	\$ 1,200.00	5	0	0	5
Total		\$6,253.00	\$3.00	\$253.00	\$6,253.00

Add Service

SMART Vaccines Beta

Step 4 of 7 **Vaccines Profile**

[Values](#)
[Demographics](#)
[Disease Burden](#)
[Vaccines](#)
[Value Assessment](#)
[Value Score](#)

Step 4: Enter Vaccine-Specific Data

[Back](#)
[To Value Assessment](#)

Load Existing Disease:

- Select Disease - ▾

Influenza

 Vaccines [+ Add](#)

 ✕ ✎ **Untitled Vaccine 1**

 Save as new... [Save](#)
[Population](#)
[Product Profile](#)
[Complications](#)
[Female](#)
[Male](#)
[Special](#)

Age	Total Population	Target Population (%)	Vaccine Coverage (%)	Vaccine Effectiveness (%)
< 1	4,478,197	<input type="text" value="2,283,880"/>	<input type="text" value="40"/> %	<input type="text" value="60"/> %
1 – 19	81,859,350	<input type="text" value="41,748,269"/>	<input type="text" value="40"/> %	<input type="text" value="70"/> %
20 – 64	188,118,413	<input type="text" value="95,940,391"/>	<input type="text" value="40"/> %	<input type="text" value="75"/> %
> 65	40,093,919	<input type="text" value="20,447,899"/>	<input type="text" value="40"/> %	<input type="text" value="40"/> %

Step 4: Enter Vaccine-Specific Data

[Back](#)
[To Value Assessment](#)

Load Existing Disease:

- Select Disease - ▾

Influenza

Vaccines

 + [Add](#)

 ✕ ✎ **Untitled Vaccine 1**

Save as new...

Save

[Population](#)
[Product Profile](#)
[Complications](#)

Vaccine Characteristics

Length of Immunity	<input type="text" value="1"/> years of life
Doses Required Per Person	<input type="text" value="1"/> doses
Cost Per Dose	\$ <input type="text" value="10"/>
Cost to Administer Per Dose	\$ <input type="text" value="15"/>
Research Costs (approximate)	\$ <input type="text" value="100,000,000"/>
Licensure Costs (approximate)	\$ <input type="text" value="500,000,000"/>
Start-up Costs (approximate)	\$ <input type="text" value="100,000"/>
Time to adoption	<input type="text" value="5"/> years



Values

Demographics

Disease Burden

Vaccines

Value Assessment

Value Score

Step 4: Enter Vaccine-Specific Data

[Back](#)[To Value Assessment](#)

Load Existing Disease:

- Select Disease - ▾

Influenza

Vaccines

[+ Add](#)✕ [✎](#) Untitled Vaccine 1

Save as new...

[Save](#)

Population

Product Profile

Complications

Morbidity	Cases (%)	Disutility (toll)	Disability Weight	Duration (days)
Guillain-Barré Syndrome (A1)	<input type="text" value="0.000001"/> %	<input type="text" value="0.35"/>	<input type="text" value="0.44"/>	<input type="text" value="4"/>
Systemic reaction (fever or achiness) (A2)	<input type="text" value="0.011"/> %	<input type="text" value="0.25"/>	<input type="text" value="0.1"/>	<input type="text" value="4"/>
Anaphylaxis (A3)	<input type="text" value="0.00000025"/> %	<input type="text" value="0.25"/>	<input type="text" value="0.44"/>	<input type="text" value="4"/>

Add Morbidity

Permanent Impairment	Cases (%)	HRQoL (HUI2)	Disability Weight
None	<input type="text" value="0"/> %	<input type="text" value="0"/>	<input type="text" value="0"/>

Add Impairment

Deaths	Cases (%)
None	<input type="text" value="0"/> %

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[Values](#)
[Demographics](#)
[Disease Burden](#)
[Vaccines](#)
[Value Assessment](#)
[Value Score](#)

Step 4: Enter Vaccine-Specific Data

[Back](#)
[To Value Assessment](#)

Load Existing Disease:

- Select Disease - ▾

Influenza

 Vaccines [+ Add](#)

 ✕ ✎ **Untitled Vaccine 1**

Save as new...

[Save](#)
[Population](#)
[Product Profile](#)
[Complications](#)

Health Care	Cost per unit	A1	A2	A3
Over-the-Counter medications	\$ 3.00	0	0	0
Physician visit	\$ 100.00	0	1	0
Outpatient visit	\$ 250.00	0	0	0
Emergency department visit	\$ 750.00	0	0	1
Hospitalization	\$ 1,200.00	40	0	0
Total		\$48,000	\$100	\$750

Add Service

SMART Vaccines Beta

Step 5 of 7

Qualitative Attributes

Step 5: Assess Values

[Back](#)
[To Value Score](#)

Load Existing Disease:

- Select Disease - ▾

Influenza

Vaccine A

Vaccine B

Vaccine C

Vaccine D

Vaccine E

Vaccine F

Save as new...

Save

Health Considerations

Values	Assessments	
	International	U.S.A.
Premature Deaths Averted Per Year	<input checked="" type="radio"/> > 1,000,000 <input type="button" value="?"/>	<input checked="" type="radio"/> > 20,000 <input type="button" value="?"/>
	<input type="radio"/> 500,000 – 999,999 <input type="button" value="?"/>	<input type="radio"/> 5,000 – 19,999 <input type="button" value="?"/>
	<input type="radio"/> 100,000 – 499,999 <input type="button" value="?"/>	<input type="radio"/> 1,000 – 4,999 <input type="button" value="?"/>
	<input type="radio"/> < 100,000 <input type="button" value="?"/>	<input type="radio"/> < 1,000 <input type="button" value="?"/>
Incident Cases Prevented Per Year	<input type="radio"/> > 10 million <input type="button" value="?"/>	<input type="button" value="?"/>
	<input type="radio"/> 1 – 10 million <input type="button" value="?"/>	<input type="button" value="?"/>
	<input type="radio"/> 250,000 – 1 million <input type="button" value="?"/>	<input type="button" value="?"/>
	<input type="radio"/> < 250,000 <input type="button" value="?"/>	<input type="button" value="?"/>
<div>The difference in the number of incident cases of disease in one year assuming no routine vaccine use and assuming routine vaccine use against the disease in the population.</div>		
Economic Considerations	<input type="button" value="+"/>	
Demographic Considerations	<input type="button" value="+"/>	
Public Concerns	<input type="button" value="+"/>	
Scientific and Business Considerations	<input type="button" value="+"/>	
Programmatic Considerations	<input type="button" value="+"/>	
Intangible Values	<input type="button" value="+"/>	
Policy Considerations	<input type="button" value="+"/>	

Step 5: Assess Values

[Back](#)
[To Value Score](#)

Load Existing Disease:

- Select Disease -

Influenza

Vaccine A

Vaccine B

Vaccine C

Vaccine D

Vaccine E

Vaccine F

Sum of development plus licensure plus start-up costs. This attribute represents the magnitude of financial barriers to bringing the vaccine to use in the population.



One-Time Costs



Annual Net Direct Costs Savings of Vaccine Use

Assessments

International

U.S.A.

<input type="radio"/> < \$100 million	<input type="radio"/> < \$100 million	<input type="radio"/> < \$100 million
<input type="radio"/> \$100 – \$500 million	<input type="radio"/> \$100 – \$500 million	<input type="radio"/> \$100 – \$500 million
<input type="radio"/> \$500 million – \$1 billion	<input type="radio"/> \$500 million – \$1 billion	<input type="radio"/> \$500 million – \$1 billion
<input type="radio"/> > \$1 billion	<input type="radio"/> > \$1 billion	<input type="radio"/> > \$1 billion
<input type="radio"/> > 10 million	<input type="radio"/> > 10 million	<input type="radio"/> > 10 million
<input type="radio"/> 1 – 10 million	<input type="radio"/> 1 – 10 million	<input type="radio"/> 1 – 10 million
<input type="radio"/> 250,000 – 1 million	<input type="radio"/> 250,000 – 1 million	<input type="radio"/> 250,000 – 1 million
<input type="radio"/> < 250,000	<input type="radio"/> < 250,000	<input type="radio"/> < 250,000

Demographic Considerations

Public Concerns

Scientific and Business Considerations

Programmatic Considerations

Intangible Values

Policy Considerations

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SMART Vaccines Beta

Step 6 of 7

Computed Results

Step 6: Compare Your Candidate Vaccines

[Back](#)
[Rank Vaccine Values](#)

Model Unit Values

 Discounting %

 DALY Age Weight ☒ ON ☐ OFF

Vaccine List

Check two or more vaccines to compare.

Influenza

☒ Vaccine A

Tuberculosis

☒ Vaccine B

Group B Strep

☒ Vaccine C

	Vaccine A	Vaccine B	Vaccine C
Health Considerations			
Premature Deaths Averted Per Year	100	100	100
Incident Cases Prevented Per Year	101,833,848	101,833,848	101,833,848
QALYs Gained or DALYs Averted	2,352,850	2,352,850	2,352,850
Economic Considerations			
One-Time Costs	\$600,000,000	\$600,000,000	\$600,000,000
Annual Net Direct Costs of Vaccine Use	\$100,000,000	\$100,000,000	\$100,000,000
Annual Net Workforce Productivity Gained	\$500,000,000	\$500,000,000	\$500,000,000
Cost Effectiveness	\$100,000	\$100,000	\$100,000
Demographic Considerations			
Benefits Infants and Children	Yes	Yes	Yes
Benefits Women	Yes	Yes	Yes
Benefits Socioeconomically Disadvantaged	Yes	Yes	Yes
Benefits Military Personnel	Yes	Yes	Yes
Benefits Other Priority Population	No	No	No

SMART Vaccines Beta

Step 7 of 7
Priority Score

Value Score: Results of Your Comparison

[Back](#)

Candidate Vaccines	Disease	Value Score
Vaccine A	Influenza	51.1
Vaccine B	Tuberculosis	27.8
Vaccine C	Group B Streptococcus	11.1



Drag Vaccine Values to Rank
and Update Value Score

Premature Deaths Averted Per Year

One-Time Costs

Vaccine Raises Public Health Awareness

Benefits Infants and Children

Demonstrates New Production Platforms

Serious Pandemic Potential

Sample Scenarios

- **Same attributes but different *values***
 - A Health Minister vs. PAHO
 - NIH vs. A Vaccine Manufacturer
- **Same values but different *attributes***
 - One dose vs. Three dose Vaccines
 - Risk of Development vs. Cold-Chain Requirements

Additional Considerations

Data Demands and Quality

Subjective Weights (approximated)

Distribution Around Data

Steady-State Population

Disease Interactions (e.g., HIV+TB)

Phase II: SMART Vaccines 1.0

Public Feedback (Workshop)

Model Refinement

Software Enhancement

Additional Vaccine Candidates

Sensitivity and Uncertainty

Usability Evaluation

Recommendations

Ranking Vaccines

A Prioritization Framework



Phase I: Demonstration of Concept and a Software Blueprint

INSTITUTE OF MEDICINE
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**Report PDF
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Thank you