

Attachment 6A - Pandemic Influenza Vaccine Prioritization Plan

6A.1 Background

Pandemic influenza threatens to cause mass illness and death in California as well as significant economic and social disruption. Vaccination is a key prevention strategy for controlling influenza and represents a critical control measure for decreasing the health consequences of a pandemic; however, supply will be limited early in the pandemic. The California Department of Health Services (CDHS) developed a pandemic influenza prioritization process plan to determine which target populations in California will be designated for initial vaccination.³

A comprehensive vaccine priority plan is critical for the State because:

- California will likely face a pandemic influenza outbreak sometime in the future; and
- a vaccination strategy will help limit the number of persons who may become ill and die, and will also limit the degree of social and economic disruption within the State.

The CDHS Immunization Branch (IZB) formed the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization⁴ comprising public health and medical care professionals, emergency planners, hospital administrators, physicians, academics, infectious disease experts, a bioethicist, and the University of California, Berkeley Center for Infectious Disease Preparedness (CIDP). This group developed a process to advise CDHS on vaccine and antiviral related issues during a pandemic. CDHS contracted with the University of California, Berkeley Center for Infectious Disease Preparedness (CIDP) to help develop a prioritization plan.

6A.1.1 No Comprehensive Prioritization Process Currently Exists

In November 2005, the U.S. Department of Health and Human Services (HHS) released national vaccination priority recommendations. These recommendations are broad-based and HHS advised state and local health departments to create highly specific prioritization plans that specifically define priority groups, identify occupational categories and sub-categories within each broad priority designation, and select implementation strategies to deliver vaccine to priority groups. Several international organizations, foreign countries, and states have prepared pandemic influenza vaccination prioritization plans, but these plans fail to use a multidimensional approach.⁵

A review of currently published state and federal prioritization plans revealed that they are limited in two key areas: 1) defining and incorporating the appropriate inputs into the prioritization process; and 2) articulating a well-developed methodology. These two limitations are discussed below.

³ See the CIDP [Pandemic Influenza Vaccine Prioritization Plan](http://www.idready.org/pandemic_influenza/index.html) webpage for complete project overview and all supplemental documents (Weblink: www.idready.org/pandemic_influenza/index.html).

⁴ A subgroup of the CDHS Joint Advisory Committee on Public Health Preparedness.

⁵ A review of international, national, and state vaccination plans yielded seven documents from the following sources: the World Health Organization (WHO), the United States, Canada, Germany, Minnesota, Utah, and Wisconsin.

6A.1.1.1 Lack of Consideration for Prioritization Inputs

Existing state and federal plans do not clearly and consistently identify intervention goals, determine vaccination criteria, and define target populations to be prioritized. Systematically considering these three components is critical to the prioritization process. Existing state and federal plans demonstrate the following limitations regarding prioritization inputs.

- **Lack of consensus on intervention goals:** There is no consensus on the main goals of an influenza mass vaccination intervention. The specified goals within existing plans include minimizing health consequences (e.g., reducing mortality and morbidity, slowing disease transmission, maintaining healthcare systems, protecting those at highest risk); minimizing social disruption (e.g., ensuring integrity of social infrastructure, maintaining vital community services, maintaining essential services); and minimizing economic loss. While most plans include these goals, they are not consistently defined and are prioritized differently between plans. Furthermore, no plan clearly states the rationale for choosing these three intervention goals, or their relative importance.
- **Inconsistent vaccination criteria:** A lack of consensus on intervention goals has led to ambiguity about the criteria for determining who qualifies for vaccination. Approximately half of the state and federal plans reviewed do not document any criteria used in the prioritization process. The plans that document criteria offer no rationale for the criteria chosen and no plan evaluates any given criteria to identify which was most important to the prioritization process.
- **Ambiguous target group definitions:** Though current state and federal plans recommend similar groups and individuals for prioritization, the plans define their target groups differently and many plans do not clearly link these population groups to the criteria that qualify these groups to receive vaccine.

6A.1.1.2 Incomplete Documentation of Prioritization Methodology

Existing state and federal plans demonstrate the following limitations regarding documentation:

- **Lack of a systematic analytical process:** No state or federal plan presents a systematic and transparent decision-making process with evidence-based justifications. All plans document the target groups recommended for prioritization along with a list of rationales that supports the inclusion of that group.
- **Lack of ranking schemes:** The HHS recommendations and three state vaccination plans develop rank-ordered lists, but none of these plans describe the process used to assign specific rankings nor do they describe an implementation strategy for allocating vaccine within and between the target groups.

6A.1.2 Principles of the Prioritization Planning Process

Given the lack of a detailed federal plan or an analytically rigorous prioritization process for the State to leverage, CDHS developed its own rigorous approach toward prioritization planning with five key principles.

- The plan will be systematic and based on a logical methodology to identify alternatives

and project outcomes.

- The plan will be justifiable and based on epidemiologic, social science and ethics literature and supported by best practices research.
- The plan will be flexible and can be adjusted based on the changing epidemiologic characteristics of a pandemic.
- The plan will be adaptable and can be applied to different populations in different settings.
- The plan will be transparent and clearly defined with expert opinion and feedback.

6A.1.3 Choosing an Analytical Method

CDHS developed the Decision Analysis Scoring Tool (DAST). The DAST is a multi-dimensional decision-making tool that simultaneously analyzes multiple goals, criteria, and alternatives to develop an optimal prioritization scheme. This tool will assist CDHS in making decisions regarding who should receive vaccine during the different stages of an influenza pandemic.

The DAST, based on an Analytic Hierarchy Process (AHP), is a “choice-based” modeling technique that helps decision-makers allocate resources across competing alternatives.⁶ The DAST uses the AHP process to evaluate target groups within competing vaccination criteria and assigns a numerical score to each population group based on how well it matches the criteria. The DAST will produce a rank-ordered list of target groups prioritized for influenza vaccination to be implemented within the state.

6A.2 Assumptions

CDHS used the following assumptions to develop a comprehensive prioritization plan for California.

- Demand for influenza vaccine will far outstrip supply during the early stages of a pandemic. The demand for vaccine will equal the entire California population (about 37 million) multiplied by the number of recommended vaccine doses. The supply will equal approximately 480,000 doses per week.⁷ Therefore, approximately one percent of the California population will be able to receive a dose of vaccine per week after distribution begins.
- Shortages of antiviral medications will dictate their use for treatment rather than prophylaxis. Therefore, the distribution and use of antivirals will likely not affect demand for vaccine.
- CDHS will be responsible for distributing vaccine to the local health departments (LHDs) during the early stages of an influenza pandemic. The federal government will control

⁶ “Choice-based” modeling is a technique that forces decision makers to choose an option from a list of alternatives based on their opinions or preferences.

⁷ The Centers for Disease Control and Prevention (CDC) estimates that once the pandemic influenza virus strain is identified it will take about four to six months to produce the vaccine. At this time, 3-5 million doses will be supplied for the U.S. population and distributed to the states. CDC will distribute this vaccine supply based on total state population as well as statewide target group population estimates.

and allocate vaccine and the healthcare sector will not be able to directly purchase vaccine.

6A.3 Decision Analysis Scoring Tool (DAST) Methodology

The DAST process is conducted in four stages.

6A.3.1 Stage 1. Identify and Define DAST Inputs

The key inputs into the prioritization process (intervention goals, vaccination criteria, direct determinants, and target groups) were identified and defined. These inputs are incorporated into the DAST survey and will be used to generate a rank-ordered prioritization list. Figure 1 presents a schematic of the process for defining DAST inputs.

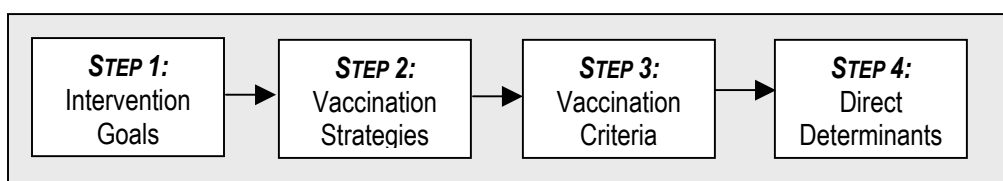


FIGURE 1: Defining DAST Inputs

6A.3.1.1 Identify Intervention Goals

- **Selecting intervention goals**

Selection of intervention goals that the State seeks to optimize is a critical step in the prioritization process. These goals inform both the selection of vaccination strategies and the development of vaccination criteria. The three primary goals for vaccine intervention are:

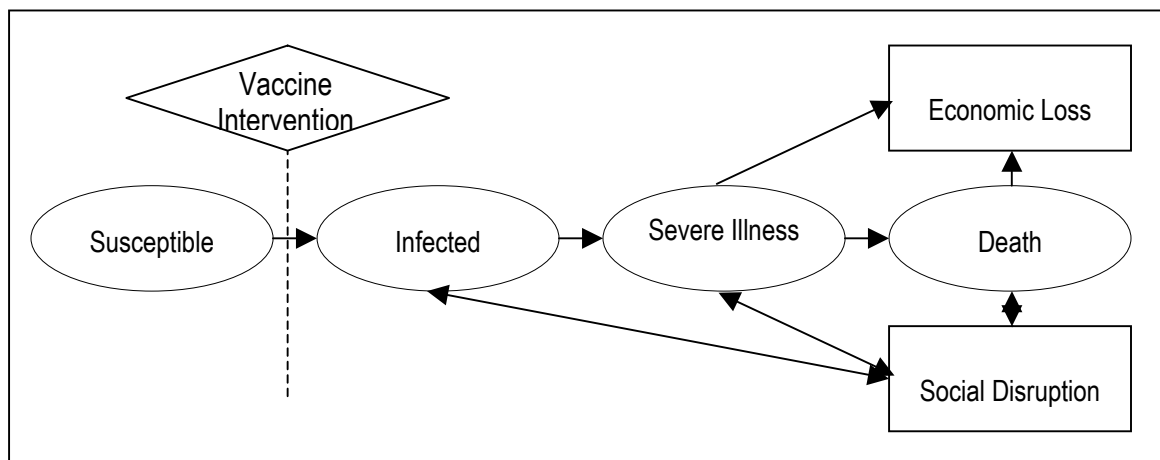
- minimizing health consequences: the ability of the intervention to reduce the number of severe illnesses and deaths caused by complications of pandemic influenza;
- minimizing social disruption: the ability of the intervention to reduce disruption in essential community services and to minimize social chaos and distress caused by pandemic influenza; and
- minimizing economic loss: the ability of the intervention to reduce the extent of economic losses caused by reductions in production and consumption of goods and services due to a pandemic.

- **Rationale for primary focus on minimizing health consequences**

The primary goal of the CDHS Pandemic Influenza Vaccination Plan is to minimize health consequences by slowing transmission and preventing influenza infection and severe illness. Vaccines provided to populations before they become infected increase the likelihood of avoiding disease leading to direct consequences (e.g., severe illness and death). Focusing intervention efforts on reducing the direct health consequences reduces indirect consequences (e.g., economic loss and social disruption).

CDHS used an epidemiologic model based on pandemic influenza was used (Figure 2). This model details the transmission dynamics of pandemic influenza, as well as the interactions between health consequences, social disruption, and economic consequences. This model serves as the methodologic framework for the development of the CDHS prioritization process.

FIGURE 2: Pandemic Influenza Transmission Model



6A.3.1.2 Select Vaccination Strategies⁸

All possible approaches toward allocating limited medical resources are identified and translated into relevant vaccine rationing strategies, then evaluated to determine their appropriateness for use during a pandemic.

- **Identifying rationing approaches and converting them into strategies**

There are two main theoretical approaches to rationing limited medical resources – utilitarianism and egalitarianism. Utilitarian approaches aim to create the greatest good for the greatest number of people. These principles aim to raise the general welfare of society rather than allocate resources to those in greatest need. Within this context, egalitarian approaches focus on maintaining or restoring equality for the persons in need of medical care. CDHS identified five utilitarian and five egalitarian principles to develop into relevant vaccination strategies. Both the theoretical approaches and relevant vaccination strategies are described below.

⁸ Refer to Supplemental Document: “An Analysis of Theoretical Approaches to Rationing” available at www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_A.pdf for a complete discussion and evaluation of rationing strategies.

Theoretical Utilitarian Approach	Relevant Vaccination Strategy	Description
Principle of medical success	Ration by probability of successful immunization	This strategy would favor those for whom vaccination has the highest probability of preventing severe influenza illness and/or death.
Principle of immediate usefulness	Ration to those who perform essential emergency response roles	This strategy favors groups of individuals who are involved in the emergency response. Based on professional role.
Principle of conservation	Not applicable	Rationing to “conserve resources” does not apply to the vaccine situation because everyone will receive the same number of doses. Since there is no differentiation in amount of resources required by each person, this strategy can be eliminated from further analysis.
Parental role principle	Ration to those who perform a caretaker role	This strategy favors individuals who provide primary home care for children, elderly, and the unwell.
Principle of general social value	Ration to those who perform an essential community role	This strategy favors groups of individuals who are essential to maintaining social and economic continuity. Based on professional role.
Theoretical Egalitarian Approach	Relevant Vaccination Strategy	Description
Principle of saving no one	Do not ration vaccine	This strategy means that no vaccine would be distributed.
Principle of medically neediest	Ration by medical and prevention needs	This strategy favors those groups who are most likely to transmit influenza virus to susceptible populations as well as those groups at high risk of developing severe illness and/or death.
Principle of general neediness	Ration to those with minimal access to medical care	This strategy favors those who have poor access to medical care services based on their income, wealth, employment levels, and residency status.
Principle of queuing	Ration via queuing	This strategy gives priority to those who are first in line for the vaccine.
Principle of random selection	Ration via lottery	This strategy would give everyone within California an equal chance of being selected for vaccination.

- **Evaluation of Strategies**

Selection of relevant vaccination strategies to achieve all three intervention goals is essential. In addition, the strategies must meet appropriate ethical, legal, political feasibility, and implementation standards. Therefore, five tests were developed to determine which rationing strategies were used as DAST inputs. The five tests are described below:

1. **Does the strategy meet the intervention goals?**

Each strategy must reduce the number of illnesses and deaths in order to be included for further analysis. As described previously, focusing on reducing health consequences will also minimize social and economic consequences.

2. **Is the strategy fair and just?**

Assessments of “justice” were based on bioethicist Gerald Winslow’s assessment of the ten theoretical principles toward allocating scarce medical resources detailed in his book *Triage and Justice*.⁹

3. **Is the strategy legal?**

Strategies that are legitimate exercises of public health authority defined in the California Health and Safety Code were considered “legal.”

4. **Is the strategy politically feasible or appropriate given the circumstance?**

Political feasibility was determined by whether the strategy would be accepted by the majority of the population, including both constituents and political representatives.

5. **Can the strategy be practically implemented given the emergency circumstances?**

Ease of implementation was judged based on whether the target groups designated for vaccination under the appropriate strategy could be easily identified.

All tests were evaluated on a points-based rating scale (Reference Document 6A.7.1 *Summary of Rationing Strategy Tests* describes the rating methodology and presents the results from this analysis). To be included in the DAST model, each strategy must pass all five tests. Four of the nine strategies passed and were deemed appropriate.¹⁰ They are listed below:

- rationing to those who perform an essential emergency response role;
- rationing by medical and prevention needs;
- rationing by probability of successful immunization; and
- rationing to those who perform an essential community role.

⁹ Winslow, Gerald. *Triage and Justice*. Berkeley: University of California Press, 1982.

¹⁰ This analysis was reviewed by a bioethicist to validate the second test “justice” and by CDHS IZB to validate the third and fourth tests, “political feasibility” and “implementation.”

6A.3.1.3 Develop Vaccination Criteria

To understand who will qualify for prioritization under the vaccination strategies listed above, vaccination criteria for each of the four vaccination strategies were developed. Emphasis was given to criteria that focused on minimizing health consequences. Members of the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization approved the definitions and provided feedback. The criteria identified for each of the strategies is listed below:

Relevant Strategy	Criteria
Medical and prevention needs	<ul style="list-style-type: none"> ▪ Risk of transmission ▪ Risk of infection ▪ Risk of complication
Probability of successful immunization	<ul style="list-style-type: none"> ▪ Vaccine effectiveness
Performs essential emergency response role	<ul style="list-style-type: none"> ▪ Provides DIRECT service essential to carrying out an effective emergency response ▪ Provides SUPPORT service that is necessary for carrying out an emergency response
Performs essential community role	<ul style="list-style-type: none"> ▪ Provides DIRECT service essential to maintaining social and economic continuity

6A.3.1.4 Identify Direct Determinants of Each Criterion

Each criterion is further broken down into direct determinants that detail the characteristics that target groups must demonstrate to qualify for vaccination under that criterion. (6A.7.2 Criteria Definitions presents the definitions and direct determinants for all seven criteria.)

6A.3.1.5 Identify Target Population Groups¹¹

CDHS identified populations meeting one or more of the DAST criteria that will be considered for prioritization during the different stages of an influenza pandemic. The target population groups were selected based on health-related characteristics and professional roles.

Role-based target groups perform roles that are essential to the emergency response and/or to maintain critical infrastructure. These groups are classified by the industry in which they work, the occupational setting where they work, and in some cases, the occupation or job title they hold. Health-characteristic related target groups include persons with certain health-related characteristics that place them at high risk of developing influenza complications and/or persons who can transmit influenza to high risk persons. These target groups are classified by their health status or health characteristic and in some cases by their age.

¹¹ Refer to Supplemental Document B “Target Population Group Profiles” available at www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_B.pdf for detailed descriptions and population estimates of each of the target groups.

The target population groups fall into five main categories:

Population Category	Target Population Description
I. Health-related characteristics	Includes persons with a variety of health characteristics that may place them at higher risk of developing influenza complications or at higher risk of transmitting the virus to persons unable to receive the vaccine.
II. Professional roles within HEALTH industries	Includes members of the healthy adult population participating in the labor force within health service and public health professions.
III. Professional roles within PUBLIC ADMINISTRATION, JUSTICE, and SAFETY INDUSTRIES	Includes members of the healthy adult population participating in the labor force within public administration, justice, and safety professions.
IV. Professional roles within NON-HEALTH COMMERCIAL industries	Includes members of the healthy adult population participating in the labor force within non-health and commercial industries.
V. Other healthy populations	Includes persons with NO underlying health characteristics that put them at high risk of influenza complications and those who are NOT EMPLOYED in the professional occupations and industries identified above.

(6A.7.3 List of Target Groups presents the list of target population groups.)

6A.3.2 Stage 2. Develop and Administer DAST Survey

6A.3.2.1 Develop DAST Survey

A cross-sectional survey was developed to test the model with the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization.¹² The survey process is based on the principles of the Delphi method.¹³ The three main objectives of the survey are to:

- determine the relative importance of the identified criteria in achieving the intervention goals;
- determine how well each target group meets the relevant vaccination criteria; and

¹² Refer to Supplemental Document C “DAST Survey Questionnaire” (Phase I) available at www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_C.pdf for the complete survey questionnaire.

¹³ The Delphi technique is a multistage process that seeks input from a panel of experts through multiple rounds in order to reach consensus on complex decisions. Once completed, the survey responses are analyzed and presented to the decision makers to provide information and elicit feedback. This iterative process facilitates consensus by allowing all panel members to participate and creating an environment where respondents can provide confidential feedback via a survey questionnaire [13, 13].

- assess the strength and usability of the survey to prioritize populations for influenza vaccine.

6A.3.2.2 Establish Prioritization Score Calculation Method¹⁴

To generate a prioritization list from the data collected in the DAST survey, the analytical method to calculate the rankings is performed in two steps: (1) calculate criterion scores; and (2) calculate prioritization scores.

1. Calculate criterion scores

The target group's criterion scores include two key inputs, the criterion weight and the strength of match between target group and criterion. The criterion weight serves as the numerical point value for the criterion. The criterion weight is determined from information collected in the DAST survey. Criteria with higher weights are considered more important and have the greatest affect on determining a target group's criterion scores.

The strength of match between the target group and a specific criterion depends on how many direct determinants the target population fulfills. The more direct determinants the group fulfills, based on data from the DAST survey, the greater the strength of the match. Fulfilling a critical determinant will have a greater impact on the strength of the match than fulfilling a non-critical determinant. To calculate a target group's criterion score, the criterion weight is multiplied by the strength of the match, and this process of calculating criterion scores is repeated for each criterion.

Figure 3 below shows a simple example of how points are allocated to "Public Safety and Justice – Police Protection/Law Enforcement" target group on the "Provides Direct Emergency Response Service" criterion.

FIGURE 3: Point Allocation Example

"Provides Direct Emergency Service" Criterion Weight (8.18)	*	Strength of Match (53%)	=	Total Points (4.67)
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2. Calculate final prioritization scores

Each target group's criterion scores are summed across all seven criteria to determine a group's "final prioritization score." This calculation process was repeated for all target groups.

¹⁴ Refer to Supplemental Document D "Prioritization Score Calculation Method" available at www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_D.pdf for a detailed explanation of how prioritization scores are calculated.

6A.3.2.3 ADMINISTER SURVEY

A self-administered pilot survey was distributed via email to the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization.

6A.3.3 Stage 3. Analyze DAST Results and Develop Priority List

The results from the pilot DAST survey were analyzed and prioritization scores were determined. A sensitivity analysis was performed to determine the robustness of the survey results. Finally, the list was re-organized into a rank-ordered prioritization list based on the target groups' final prioritization scores. CDHS made no prioritization decisions on the basis of this pilot survey. The process requires that large numbers of persons representing many different occupational, health, and public group complete the survey. The survey process will be completed by August 2006.

6A.3.3.1 Analyze DAST Survey Results¹⁵

- **Derive criteria weights**

The pilot survey data was analyzed to determine the average weight for each criterion. The survey instrument asked respondents to rate the importance of the criteria on an eleven point scale (0=least important and 10=most important). Most of the respondents felt that all the criteria were important but some criteria were deemed more important than others. 'Providing direct emergency response services' was considered the most important criterion with a value of 8.8 points. This was followed by 'risk of transmission' (7.9) and 'providing support emergency response services' (7.1). 'Risk of complication' and 'providing essential community services' were approximately of equal importance (6.6). 'Vaccine effectiveness' (6.3) and 'risk of infection' (5.9) were least important.

- **Calculate criterion scores**

The data from the survey was analyzed to determine the average number of points that each target group received for each criterion. As described above, the criterion scores are based on the weight of the criterion and the strength of the match.

- **Calculate prioritization score**

Each target group's criterion scores were summed across all seven criteria to determine a group's final prioritization score.

- **Evaluate survey instrument**

The final section of the survey asked respondents to evaluate the survey questionnaire and determine its usability. Overall respondents determined that the survey fulfilled its key objectives and provided sufficient information to adequately answer the questions. Eighty-two percent of respondents expressed confidence in using the DAST survey

¹⁵ Refer to Supplemental Document E "DAST Survey Analysis" available at www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_E.pdf for the complete analysis of survey results and calculation of final prioritization scores.

results to produce a rank ordered prioritization list. This demonstrates that most of the respondents support the DAST methodology and are likely to accept the results.

6A.3.3.2 Rank-order the Target Population Groups

The prioritization scores from the pilot survey were rearranged into a rank-ordered list of priority groups. Those with the highest scores were ranked first and should be the first to receive the vaccine. Medical care and emergency response professionals dominate the top third of the priority list. These target groups received points on more vaccination criteria than the other groups and they received more points per criterion than the other groups. For example, the top twenty groups fulfilled six of the seven criteria and had an average “strength of match” rate of 70 percent on these criteria.

Medical care system support workers, select essential workers, and select individuals with medical and prevention needs comprise the middle third of the priority list. These groups met between four and six criteria and had an average “strength of match” rate of 55 percent on these criteria.

The remaining essential workers, remaining individuals with medical and prevention needs, and the remaining healthy adult population dominate the bottom third of the priority list. These groups met between two and six criteria and had an average “strength of match” rate of 47 percent.

6A.3.3.3 Perform Sensitivity Analysis¹⁶

A Monte Carlo sensitivity analysis was performed to estimate the affect of the criteria weights on the target group rankings. The objective of this analysis was to determine the range of prioritization scores each population group received when the criteria weights were simultaneously altered. We assumed the criteria weights followed a normal distribution, with the baseline value equaling the mean weight given by DAST respondents.

Each target population’s prioritization score is sensitive to uncertainty in all of the criteria under which they qualified for vaccination. This is largely due to the small sample size upon which the analysis was conducted. Generally, uncertainty in the weight of the ‘vaccine effectiveness’ criteria had the largest impact on the prioritization scores; however, there is little pattern in how the other criteria affected each of the 69 prioritization scores.

The Monte Carlo simulation revealed that simultaneously varying the criteria weights over a range of plausible values has little impact on the rankings. Sixteen target groups (23.2 percent of total) changed ranking. The majority of these (11 target groups) moved only one spot. Three groups moved two spots, one group moved three spots, and one group moved four spots. The remaining groups had minor differences in their final prioritization score, but maintained their original rank.

¹⁶ Refer to Supplemental Document F “DAST Sensitivity Analysis” available at www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_F.pdf for the complete sensitivity analysis results and discussion.

6A.3.4 Stage 4. Recommend Implementation Strategy

The final stage of the DAST methodology is to select the best strategy to allocate the vaccine using the DAST prioritization list. An analysis was performed to select the 'optimal' vaccine implementation strategy for the State.¹⁷ The "optimal" strategy is one that takes into account multiple components and best meets the relevant implementation criteria.

6A.3.4.1 Identify Implementation Options

The CDHS vaccine implementation plan comprises six components. Each component consists of several implementation options. The analysis examined each component separately to select the option that fulfills the implementation criteria listed in the next section. A summary of the implementation components and options is presented below.

Component	Component Description	Component Option	Component Option Description
Organization of Priority List	"Organization of priority list" refers to whether the target groups will be categorized (by setting or health characteristic) or left as 69 distinct entities.	1. Distinct target groups	Target groups remain as 69 distinct entities (as defined on the DAST survey).
		2. Categorized target groups	Target groups will be grouped by work setting or health characteristic
Degree of Coverage	"Degree of coverage" refers to the portion of a target group that must be vaccinated before moving onto the next group.	1. Full coverage	Vaccinate 100% of a target group before moving onto vaccinating the next target group.
		2. Partial coverage	Vaccinate part of a target group (1-99%) before moving onto vaccinating the next target group.
Stratification of Priority List	"Stratification of priority list" refers to the order in which target groups will be prioritized for vaccine.	1. Strict rank order	Vaccinate target groups based on DAST rank order.
		2. Tiered grouping	Organize target groups into "tiers" based on DAST rank order. All target groups within a tier are equally prioritized.
Distribution Approach	"Distribution approach" refers to the method that will be used to allocate	1. Standard distribution	Allocate incoming shipments of vaccine supply equally across

¹⁷ Refer to Supplemental Document G "Implementation Strategy Analysis" (to be developed) available at (Weblink TBD) for complete analysis results and discussion.

Component	Component Description	Component Option	Component Option Description
	incoming shipments of vaccine to equally prioritized target groups.		target groups of equal priority.
		2. Proportionate distribution	Allocate incoming shipments of vaccine supply based on the number of people within a target group.
Dose Allotment	“Dose allotment” refers to the number of doses the target group will receive before moving onto the next group.	1. Full allotment	All target groups within a tier receive two doses (full allotment) prior to distributing first doses to the next tier.
		2. Partial allotment	All target groups on the priority list in all tiers receive one dose (partial allotment) prior to distributing a second dose to any target group.
		3. Full allotment for “critical” or “most needy” tiers	Target groups in the critical or most needy tiers will receive two doses (full allotment) first. Target groups within non-critical tiers will receive the vaccine after this occurs.
Distribution Mechanism	“Distribution mechanism” refers to the mechanism that will be used to administer the vaccine to individuals within a target group.	1. Queue (first-come, first-serve)	Establish a line and select individuals for vaccine who are first in line.
		2. Lottery	Establish a lottery to randomly select persons within target group.

6A.3.4.2 Identify Implementation Criteria

The implementation strategies were evaluated on six criteria. These criteria were broken down into a series of characteristics, which describe the elements that the implementation option **must demonstrate** in order to meet that criterion.

Not all characteristics are relevant to all options. The implementation options which best meets the *relevant* characteristics of each criterion will be recommended to the CDHS for use during a pandemic influenza emergency. A brief discussion of each implementation criterion is presented below.

- Meets intervention goals: Strategy minimizes health, economic and social consequences by promoting an effective pandemic emergency response and preserving critical infrastructure in the State. Specifically, optimal strategy favors the highest ranked target groups, promotes workers interdependencies and promotes an effective emergency response.
- Just/Fair: Optimal strategy balances promoting equal access to the vaccine with efficiently allocating the limited amount of vaccine.
- Legitimate: Optimal strategy is a legitimate use of public health power.
- Politically Acceptable: Optimal strategy is rational, simple, places no undue burden on the public, and has been approved for use by other jurisdictions.
- Feasible to implement: Optimal strategy requires a limited amount of additional analysis, incurs reasonable costs, and can be efficiently administered by responsible agencies.

6A.3.4.3 Recommend Optimal Implementation Strategy

CDHS is currently evaluating the implementation options against the relevant criteria. CIDP has developed a draft implementation strategy for the DAST priority list. These draft recommendations must be evaluated and approved by the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization and CDHS before being included in the prioritization annex.

Component	Recommended Option
Component 1 Organization of Priority List	<i>To be determined</i>
Component 2 Degree of Coverage	<i>To be determined</i>
Component 3 Stratification of Priority List	<i>To be determined</i>
Component 4 Distribution Approach	<i>To be determined</i>
Component 5 Dose Allotment	<i>To be determined</i>
Component 6 Distribution Mechanism	<i>To be determined</i>

6A.4 DAST Limitations¹⁸

The limitations of the DAST methodology are presented below along with a series of recommendations on ways to minimize them in a subsequent administration of this tool.

¹⁸ Refer to Supplemental Document H “Discussion of DAST Limitations” available at www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_H.pdf for a complete discussion of the limitations of the DAST methodology and recommendations regarding how to minimize these limitations.

	Limitation	Description	Methods to Minimize Limitation
Stage 1. Identify and define DAST inputs	Potential for missing inputs	Soliciting feedback from a homogenous group of stakeholders may have resulted in the development of an incomplete list of goals, criteria, or target groups.	Administer DAST survey to a larger and heterogeneous sample of respondents and incorporate feedback into the DAST.
	Potential for overly complex input definitions	While effort was made to define inputs in layperson terms, it is possible that the definitions and descriptions of the inputs (goals, criteria, target groups) are too technical for respondents lacking medical knowledge.	Respondents' comments asking for clarification on key inputs will be incorporated into the DAST.
	Inconsistent target group categorization	Because some groups are defined as an entire industry (food manufacturing) whereas medical care and public health groups are defined within a specific setting or occupation (medical care practitioners in hospital settings), it is difficult for survey respondents to evaluate target groups on the same criteria	Separate priority group list into a "between group" list (that defines groups exclusively at the industry level) and a series of "within group" lists (that define target groups at the occupational level within an industry or setting.)
Stage 2. Develop and administer DAST survey	Small and homogenous survey sample	The DAST prioritization list incorporated the judgments of only 11 experts. This sample size is too small to accurately measure the relative importance of criteria weights and to calculate the target groups' final prioritization scores.	Administer survey to a larger a more representative sample of emergency preparedness experts in the State.
	Survey instrument may not accurately reflect range of individual opinions	The survey instrument provided a limited range of answer categories and this forced respondents to make an absolute assessment of whether target groups matched or did not match a direct determinant	Survey instrument could provide a greater range of answer categories to incorporate strong and weak opinions.

	Limitation	Description	Methods to Minimize Limitation
Stage 3. Analyze DAST results and develop priority list	Difficult for some respondents to assess relative importance of criteria	Because the rating scale exercise asked respondents to assign points to criteria on an eleven point ordinal scale, it was difficult for respondents to determine the criteria's relative importance to one another.	Follow-up with respondents who evaluated the rating exercise unfavorably and incorporate their feedback into the DAST survey instrument.
	High level of uncertainty in determining whether target groups meet certain criteria	Respondents may have felt that the information needed to evaluate target groups on certain criteria was not known and could not be reasonably estimated and therefore they did not answer the questions.	Obtain feedback on how respondents used detailed information provided with the questionnaire to evaluate target groups. Organize group discussions with influenza preparedness experts to determine which professional groups play a role in the State's pandemic response effort.
	Inability to estimate epidemiologic impact of an influenza pandemic	Epidemiologists cannot predict the epidemiologic impact of the next pandemic with any great certainty. Therefore, the current DAST results may not reflect the epidemiologic impact of a pandemic.	Incorporate pandemic epidemiologic data into the DAST when it becomes available.
	Inability of DAST to evaluate individuals who fall into multiple target groups	<i>DAST divides target populations into mutually exclusive groups.</i> In reality, individuals can belong to multiple target groups. This simplification in the model would lead to some individuals receiving a lower DAST prioritization score than their status merits.	Individuals that are in multiple groups will be categorized with the group that receives the highest prioritization score and is ranked the highest.

	Limitation	Description	Methods to Minimize Limitation
	Use of survey questionnaire does not allow for consensus decision making	Use of a confidential self administered survey questionnaire does not allow group members to share knowledge on the roles and risks of target groups nor does it allow members to express strong opinions or influence others decisions in order to gain a consensus.	Create a structured group level discussion that allows members to share knowledge on the roles and risks of target groups as well as allow members to influence others decisions to gain a consensus.
Stage 4. Recommend Implementation on Strategy	Lack of well-documented implementation strategies in other jurisdictions	No existing vaccination plan includes recommendations on how the jurisdiction will implement their prioritization list to allocate vaccine. In particular, the plans did not detail the degree of coverage each target groups should receive, the distribution approach, dose allotment, or distribution mechanism.	Interview key decision makers within the CDC and HHS to determine if implementation recommendations will be included in the upcoming federal pandemic influenza preparedness plan. Lead a focus group or survey local emergency responders to determine whether these recommendations will be politically acceptable and can be implemented during a pandemic

Limitation	Description	Methods to Minimize Limitation
<p>Certain criteria are more important determinants of an optimal implementation strategy than others</p>	<p>The implementation analysis did not determine the relative importance of the five implementation criteria to one another. For this reason, the numerical scores for the options within each component are conservative estimates that mask the importance of select criteria.</p>	<p>Survey CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization members by developing a question which asks respondents to rate the importance of the criteria and use the average point values to derive the criterion weights and calculate the scores for each option. Engage in a structured group discussion with the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization and CDHS IZB to determine whether some criterion should be deemed more important or “dominant” than others within each component’s analysis.</p>
<p>Certain characteristics are more important determinants of implementation criterion than others</p>	<p>Each of the six implementation criteria was broken down into a series of characteristics. For this reason, the numerical scores for the options within each component are conservative estimates that mask the importance of select characteristics.</p>	<p>Engage in a structured group discussion with the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization and high level staff within CDHS IZB to determine whether some criterion should be deemed more important or “dominant” than others within each component’s analysis.</p>

Limitation	Description	Methods to Minimize Limitation
Inability to estimate and quantify the effectiveness of implementation options	The implementation analysis did not use economic and/or epidemiologic models to predict the effectiveness of implementation options. As a result, the current implementation recommendations can be questioned on their ability to meet the intervention goals and their feasibility.	Develop an economic and epidemiologic simulation model to determine the cost effectiveness/ cost benefit of vaccinating the target groups on the DAST list under each implementation option.

6A.5 References

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6A.6 Vaccination Plan Supplemental Documents

A. [An Analysis of Theoretical Approaches to Rationing](#)

This document presents a complete discussion of the theoretical approaches to rationing limited medical resources, a detailed description of how they were converted into relevant vaccine allocation strategies, and a full evaluation of the rationing strategies.

(Weblink: www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_A.pdf)

B. [Target Population Group Profiles](#)

This document contains detailed profiles of the 69 target population groups that likely meet one or more of the vaccination criteria. These target groups appear on the DAST survey.

(Weblink: www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_B.pdf)

C. [DAST Survey Questionnaire \(Phase I\)](#)

This document is the complete paper version of the DAST survey that was administered to the CDHS Joint Advisory Committee on Pandemic Influenza Vaccine and Antiviral Prioritization on June 21, 2005.

(Weblink: www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_C.pdf)

D. [Prioritization Score Calculation Method](#)

This document reviews how the results of the DAST survey will be used to derive vaccine prioritization scores for target groups.

(Weblink: www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_D.pdf)

E. [DAST Survey Analysis](#)

This document reviews the results from the DAST survey in greater depth.

(Weblink: www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_E.pdf)

F. [Sensitivity Analysis](#)

This document reviews in detail how population group prioritization scores vary when the criteria weights are simultaneously altered.

(Weblink: www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_F.pdf)

G. **Implementation Strategy Analysis (to be completed)**

This document evaluates implementation options on relevant criteria in order to select an “optimal” implementation strategy for the State. (Weblink: TBD)

H. [Discussion of DAST Limitations](#)

This document describes the limitations of the DAST methodology and presents recommendations on improvements that can be made to minimize these limitations.

(Weblink at: www.idready.org/pandemic_influenza/SUPPLEMENTAL_DOC_H.pdf)

6A.7 Reference Documents

6A.7.1 Summary of Rationing Strategy Tests

Each strategy was allocated between zero and two points, with zero points indicating that the strategy does not pass the test and two points indicating that the strategy is completely acceptable based on the given criteria. Receiving one point indicates that either there are some reservations about the strategy or that the acceptability of the strategy is uncertain.

TABLE 1: FILTERING THROUGH STRATEGIES TO RATIONING LIMITED MEDICAL RESOURCES

Strategy	Test 1: Minimizes illness/death	Test2: Fair/just strategy	Test 3: Legal	Test 4: Politically feasible/ appropriateness	Test 5: Feasible to implement	Final Score	Pass or Fail
Utilitarian Strategies							
Ration by probability of successful immunization	2	2	2	2	1	9	Pass
Ration to those who perform essential emergency response role	2	2	2	2	2	10	Pass
Ration to those in a caretaker role	1	0	2	0	0	3	Fail
Ration to those who perform essential community role	1	1	2	1	2	7	Pass
Egalitarian Strategies							
Do not ration vaccine	0	--	--	--	--	0	Fail
Ration by medical and prevention needs	2	2	2	2	2	10	Pass
Ration to those with limited access to medical care	1	2	2	0	0	5	Fail
Ration via queuing	1	1	2	0	2	6	Fail
Ration via lottery	1	2	2	0	2	7	Fail

6A.7.2 Criteria Definitions

Below are more detailed descriptions of each of the criteria. These descriptions include the criteria definition, the direct determinant, and the scaling questions, which were used to identify the target population groups who will be prioritized for vaccination under that criterion.

Category	Category Definition	Criteria	Criteria Definition	Direct Determinant
1. Medical and prevention needs	This category favors those groups who are most likely to transmit influenza virus to susceptible populations and/or those groups at high risk of developing severe illness and/or death.	Risk of complication	Once infected, the probability of developing severe illness and/or dying as a result of the disease. ¹⁹	<ul style="list-style-type: none"> ▪ Age ▪ Co-morbidity (other conditions affecting immune response)
		Risk of transmission	Once infected, the probability of transmitting the virus to a susceptible contact at high risk of influenza complications. ²⁰	<ul style="list-style-type: none"> ▪ Duration of infectiousness ▪ Frequency, closeness, and duration of contact with susceptible populations
		Risk of infection	The probability of becoming infected through close and/or prolonged contact with potentially infectious cases. ^{21,22}	<ul style="list-style-type: none"> ▪ Frequency, closeness, and duration of contact with potentially infectious cases
2. Probability of successful immunization	This category favors those for whom vaccination has the highest probability of medical success, e.g., preventing severe influenza illness and/or death.	Vaccine effectiveness	Ability of vaccine to prevent illness and death from pandemic influenza by promoting an effective immune response. ²³	<ul style="list-style-type: none"> ▪ Co-morbidity (other conditions affecting immune response) ▪ Age

¹⁹ Risk of complication will be based on epidemiologic evidence collected during interpandemic years. Risk of complication may change depending on the epidemiology of the influenza pandemic.

²⁰ Risk of transmission (Basic Reproductive number) is a function of number of susceptible contacts per unit time*transmission probability per contact*duration of infectiousness (Formula: $R_0 = cpd$). Therefore it cannot be determined whether the contact rate or the duration of infectiousness is the dominating factor.

²¹ Probability of influenza infection cannot be determined. Therefore, onset of disease e.g. symptoms can be used to determine probability of infection.

²² For group comparison purposes, assume that there is complete disease susceptibility across all populations. Therefore, anyone who becomes infected with the influenza virus also develops disease

²³ Vaccine effectiveness depends on degree of similarity between inactivated virus and actual virus circulating in population. Estimates are based on vaccine efficacy during interpandemic years.

Category	Category Definition	Criteria	Criteria Definition	Direct Determinant
3. Performs essential emergency response role	This category favors those groups who provide essential services in launching a pandemic emergency response.	Provides DIRECT emergency response service	Provides DIRECT service essential to carrying out an emergency response.	Includes groups who perform the following activities: <ul style="list-style-type: none"> Directly provide services necessary to ensure vaccine is produced, distributed, disseminated, and administered among population Provide direct patient care and essential medical services Directly provides public health and/or front line emergency response services Role requires at least two years of advanced training and role cannot be easily or quickly replaced
		Provides SUPPORT emergency response service	Provides SUPPORT service that is essential to carrying out an emergency response.	Includes groups who perform the following activities: <ul style="list-style-type: none"> Directly SUPPORT those who provide services necessary to ensure vaccine is produced, distributed, disseminated, and administered among population Directly SUPPORT those providing patient care services by maintaining an operational medical care delivery system Directly support those providing public health and front line emergency response services by maintaining an operational emergency response system Role requires at least two years of advanced training and role cannot be easily or quickly replaced
4. Performs essential community role	This category favors those groups who directly provide a service that is essential to maintaining social continuity and reducing the threat of social chaos.	Provides essential community service	Directly contributes to social and economic continuity.	Includes groups that <ul style="list-style-type: none"> Perform life saving or live preserving roles outside of the pandemic emergency response Provide services in order to meet basic needs (food, water, energy, healthcare, shelter) of California residents and to ensure that the state functions Provide services in order to meet the basic financial needs of California residents and to ensure that the state functions Role requires at least two years of advanced training and role cannot be easily or quickly replaced

6A.7.3 List of Target Groups

Division I: Health-related characteristics²⁴

This group includes persons with a variety of health characteristics that may place them at higher risk of developing influenza complications as well as those who can transmit influenza to high risk persons. Specific groups within this division are the following:

A. People with underlying chronic medical conditions

1. Persons ages 2-17 years
2. Persons ages 18 -64 years
3. Persons ages 65+ years

B. Pregnant Women (all ages)

C. Infants and Toddlers

D. Primary household contact of children <6 months

1. PHHC ages 2-17 years
2. PHHC ages 18 - 64 years
3. PHHC ages 65+ years

E. Primary household contact of severely immunocompromised persons

1. PHHC ages 2-17 years
2. PHHC ages 18 - 64 years
3. PHHC ages 65+ years

Division II: Professional roles within HEALTH industries²⁵

Includes members of the healthy adult population (18+) participating in the labor force within medical care, public health, and commercial health professions. Specific groups within this division are the following:

A. Medical care service industry: This industry includes professionals working in the following medical care settings: general medical and surgical hospitals, psychiatric and substance abuse hospitals ambulatory care facilities, and nursing and residential care facilities.

1. Medical Care Practitioners
2. Medical Technicians and Aides
3. Medical Scientists and Laboratory Technicians
4. Mental Health and Social Service Providers
5. Healthcare System Support and General Support

²⁴ Health-characteristics are based on CDC descriptions of populations at high risk of influenza complications during interpandemic years.

²⁵ Industry, setting and occupation descriptions are based on the North American Industry Classification System (NAICS) definitions for 2002. See United States Census Bureau for complete list of industries and their definitions. <http://www.census.gov/epcd/naics02/naicod02.htm#N22>

B. Public Health Departments: Includes professionals working in a public health department setting. Includes public health workers employed in federal, state, and local health jurisdictions that have a role within the incident command structure (ICS) for infectious disease emergencies.

1. Pre-event Public Health Emergency Responders
2. Event oriented Public Health Emergency Responders
3. Non-emergency Public Health Professionals

C. Commercial Health Industries: Includes professionals working in the following commercial health settings:

1. Medical and diagnostic laboratories
2. Manufacturing - Medical and pharmaceutical manufacturing
3. Retail Trade - Pharmacies
4. Retail Trade - Other health and personal care stores
5. Death Care Services

Division III: Professional roles within Public Administration, Safety, and Justice

Includes members of the healthy adult population (18+) participating in the labor force within public administration, justice and safety professions. Specific groups within this division are the following:

A. Public Administration: Includes professionals working in the following government settings:

1. Executive Offices
2. Legislative Bodies and Offices
3. Tribal Governments
4. Public Finance Services

B. Public Safety and Justice: Includes professionals working in the following industries:

1. Judicial and Legal Services
2. Police Protection
3. Fire Protection/EMT
4. Corrections
5. Emergency and Disaster Management Services

Division IV: Professional roles within NON-HEALTH commercial industries

Includes members of the healthy adult population (18+) participating in the labor force within non-health and commercial industries. Specific groups within this division are the following:

A. Agriculture Industry

B. Information Industry

C. Educational Services

D. Financial and Insurance Services**E. Community Care Services**

1. Religious Organizations
2. Emergency Relief Services
3. Non-emergency Social Assistance Services

F. Transportation and Warehousing Services

1. Postal Services
2. Air, Rail, Water, and Truck Transportation & Support Activities
3. Transit and Ground Passenger Transport
4. Couriers and Messengers
5. Warehousing and Storage

G. Manufacturing Industries - Food Manufacturing only**H. Retail Trade - Food, Beverage, and Grocery Stores only****I. Utility Industries****J. Waste Management and Remediation Services****Division V: Other healthy populations**

Includes persons with NO underlying health characteristics that put them at high risk of influenza complications and those 18+ who are NOT EMPLOYED in the professional occupations and industries identified above. Specific groups within this division are the following:

A. Healthy Children, Ages 2 - 5**B. Health Children, Ages 6 – 17****C. Healthy Adults, Ages 18 – 64****D. Healthy Adults, Ages 65+**