Structure and Outcomes of Innovation Tools to Solve Challenges in Public Health: An Exploratory Multiple Case Study Evaluation

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Problem Statement

In recent decades, public health and health care have experienced an abundance of innovation and entrepreneurship. This innovation has improved life expectancy, quality of life, diagnostic and treatment options, as well as increased the efficacy and cost effectiveness of the healthcare system.\textsuperscript{1} Despite these advances, many challenges remain unresolved at the hospital, national and global levels. These challenges have not been solved through existing strategies and need creative solutions.

In past decades, healthcare organizations, government institutions and non-governmental organizations generated ideas through a closed innovation model.\textsuperscript{2} This model followed the logic that successful innovation should remain internal and requires control. Further, this model asserts that an organization’s leadership includes the best and brightest minds and is the most equipped to discover the greatest ideas for improvement. The organization’s leaders would work individually to try to solve their organization’s problems. However, as challenges in healthcare become more widespread, complicated and intertwined, this closed-door method of innovation became obsolete. As a result, a new model of open innovation was created in which healthcare organizations leverage innovative ideas from the masses through various types of funding instruments.

Research prizes, grants and innovation tournaments are three tools used by both public and private agencies to stimulate research and innovation. Henceforth, this study uses the general term “innovation tools” to refer to all such mechanisms. Prizes are an example of a “pull” mechanism because they reward successful innovation, in contrast to traditional grants and other
“push” mechanisms that reduce the cost or risk to developers. Prizes are especially effective in healthcare technology R&D because they do not require sponsors to choose among the many developers. Rather, sponsors must define their goal product and leave the door open for all interested developers. This model has the potential to bring new minds and ideas to difficult problems.\(^3\) Research prizes pay for results and require the researcher to take on a significant amount of risk.

Research grants are different from prizes in that they pay out based on the idea and generally do not require the researcher to take on a significant amount of risk. Grants take many different forms but usually refer to research funding obtained through a competitive process, in which potential research projects are evaluated and the most promising receive funding.\(^4\)

A third and relatively new approach for creating advanced solutions to the most critical public health problems is innovation tournaments. Innovation tournaments are defined as the process of creating, selecting, and developing opportunities such that exceptionally promising opportunities are identified.\(^5\) A number of innovation tournaments have been performed over the last few years in many industries, from energy to entertainment. For example, General Electric created a competition to find a breakthrough idea to create cleaner, more efficient and economically viable grid technologies, and to accelerate the adoption of smart-grid technologies.\(^6\) Other companies such as Netflix\(^7\) and Dow Chemicals,\(^8\) as well as social organizations such as Ashoka,\(^9\) have created innovation tournaments to foster new ideas.

A number of studies have been completed, mostly within the field of economics, which describe the theoretical basis of these innovation tools.\(^10,11,12,13,14\) These studies detail how to define a research opportunity/challenge, solicit and incentivize the right participants, evaluate the
entries and award effective prizes.\textsuperscript{15} However, most of the existing literature does not put the theories into context, or evaluate the lessons learned from recent innovation tools in public health.

This study will examine three recent cases in which innovation tools were used in three different sectors of public health: healthcare/hospital, national and global in order to understand their design, how they solicit entries, moderate the tournament, evaluate ideas, award winners and encourage participation.

The objective of this mixed methods study is to examine existing models for innovation through competition that have been implemented by notable health care organizations in order to answer the following questions:

1. In what circumstance was each innovation tool used, and how did this influence how it was conducted?
2. How was each innovation tool structured, and how did this format influence innovative ideas produced?
3. What insights and lessons may be learned from each of the three case studies, and how can these be applied to other health-related innovation challenges?

\textbf{Literature Review}

In recent decades, innovation has been widespread in public health. This innovation has improved life expectancy, quality of life, diagnostic and treatment options and the efficacy and cost effectiveness of the healthcare system. For example, in 2003, the National Human Genome Research Institute at the National Institutes of Health (NIH) completed the sequencing of the
human genome, allowing doctors to test a patient’s predisposition to diseases and scientists to develop a deeper understanding of disease processes to produce biotechnological advances. In addition, health care delivery systems have also been revolutionized through innovations such as the Accountable Care Organization (ACO), a provider-led organization with a mission to manage the full continuum of care and to be accountable for the overall costs and quality of care for a defined population. Evidence suggests that ACOs provide higher-quality, more efficient care than other care delivery systems.

Despite these and other revolutions in public health, many challenges still remain unsolved at the hospital, national and global levels. Hospitals and their partners look for new ways to improve the patient experience of care, improve the health of populations and reduce the per capita cost of health care, collectively known as the “Triple Aim.” The United States government is searching for novel ways to extend healthcare coverage to 34 million Americans, address insurance industry abuses, decrease healthcare spending, improve healthcare through health information technology (HIT), curb waste, fraud and abuse in Medicare, Medicaid and other health care programs and establish a new public-private partnership to improve quality, safety, and affordability of healthcare for all Americans. In addition, global health experts search for ways to improve and create new vaccines, control insect vectors that spread disease, improve nutrition, limit drug resistance and cure infection in the world’s most vulnerable populations.

With so many challenges facing the public health and healthcare industry at all levels, it is important that innovative strategies are created. Innovation is defined as “a new match between a need and a solution.” As previously mentioned, health care innovation can come through either practices or medical technology. Innovation in health care practices usually comes
from organizational leadership in a top-down approach, while innovation in medical technology (drugs, vaccines, diagnostics, medical equipment, etc.) is usually created through research and development (R&D). Neither of these strategies alone, however, is equipped to handle the expansive challenges in health care. Research indicates that ideas initiated through leadership alone are less inventive than ideas created by those in the field. In addition, exploration into the financial return of research shows higher R&D spending does not correlate with higher innovation.

While innovation often seems serendipitous or out of control, many organizations have turned to many different innovation tools to deliberately manage the innovation process. Different innovation tools are being used in a number of industries to generate new ideas, products and practices. For example, the professional services organization Deloitte conducts an annual innovation tournament called “Innovation Quest” to identify innovative ideas seen at client sites and bring them back to Deloitte so that more clients can benefit from them. In the first phase, all of Deloitte’s 43,000 employees are invited to submit ideas. Subject-matter experts review submissions and choose those to move on to the second round. The second round is focused on collaboration; those who submitted ideas build a diverse team to give feedback on the idea. In the final round, all Deloitte employees vote for the winner. To date, more than 90 ideas have been chosen, with the winners receiving monetary rewards and exposure to senior leadership. Other companies such as General Electric, Netflix and Dow Chemical put on similar tournaments to foster novel and creative ideas for their respective companies.
Tools to Promote Innovation in Public Health and Healthcare

This study will examine three innovation tools. This section describes those three tools.

Gates Grand Challenges Explorations

The Bill and Melinda Gates Foundation sponsors several initiatives that champion scientific creativity and support novel ways to fight diseases plaguing the world’s poor. One such initiative, the Gates Grand Challenges Explorations, aims to solicit bold, unorthodox ideas around chosen topic areas in global health. It targets leading thinkers from various disciplines, including those who have not traditionally been involved in health research, to work on solutions to important problems in the developing world. Grand Challenges Explorations was created in 2007 and has since awarded 850 $100,000 Phase 1 grants in 57 countries. The grant proposal is only a two-page explanation of the idea with no supporting data required. To accentuate the emphasis on the idea itself, reviewers are blinded to the name, profession and nationality of the applicant. In addition, the grants are reviewed not by experts in the field, but instead by individuals in science, engineering, business and other fields with strong track records in high-risk research.

Center for Medicare and Medicaid Innovation (CMMI)

To lower health care spending while improving quality of health care, the Patient Protection and Affordable Care Act of 2010 (ACA) broadened the powers of the Centers for Medicare & Medicaid Services (CMS) to include a range of cost cutting and quality-enhancing tools, the most significant being the Center for Medicare and Medicaid Innovation (Innovation Center). The Innovation Center was created primarily to test new payment and delivery systems. The ACA appropriated $10 billion for the Innovation Center every 10 years. In order to find
the most important, innovative and influential solutions to cost cutting and quality improvement, the Innovation Center created the Innovation Challenge, which awards between $1 million and $30 million in grants to applicants who propose “compelling new models of service delivery/payment improvements that hold the promise of delivering the three-part aim of better health, better health care, and lower costs through improved quality for Medicare, Medicaid and Children’s Health Insurance Program (CHIP) enrollees.”

To receive an Innovation Challenge grant, participants must complete an application that includes standard forms and a cover letter, project abstract, project narrative, budget and budget narrative. A team consisting of staff from Health and Human Services (HHS) and other outside experts review all applications. The team evaluates applications based on recommendations from the review panel; the geographic diversity of the awardees; the range of service delivery and payment methods proposed; reviews for programmatic and grants management compliance; the reasonableness of the estimated cost to the government and anticipated results; and the likelihood that the proposal project will result in the benefit expected.

To date, the Innovation Challenge has completed two rounds of grants, awarding 26 first-round grants on May 8, 2012, and 81 second-round grants on June 25, 2012. A total of 107 grants were awarded in the first year of the Innovation Challenge out of the nearly 3,000 submissions from all sectors of the health care industry. In total, the awardees will receive approximately $895 million to implement their proposals. Individual awards vary from $1.1 million to $60.8 million.
Penn Medicine Innovation Tournament

Hospitals have also used innovation tournaments to find ways to improve clinical care. Penn Medicine is one of the world’s leading academic medical centers, consisting of the Raymond and Ruth Perelman School of Medicine at the University of Pennsylvania and the University of Pennsylvania Health System. Together, Penn Medicine is a $4.3 billion business. Penn Medicine aspires to create innovative ideas to significantly improve the patient experience. Often these ideas are created by physicians and leadership alone, but because many aspects of the care delivery process involve nurses, administrators and patient transporters, Penn Medicine finds it important to include these groups in the ideation process. In November 2011, Penn Medicine created an innovation tournament with the goal of engaging the entire Penn Medicine staff to identify and select new ideas that generate value for the patients of the health system. The tournament aimed to leverage the ideas and experiences of the Penn Medicine employees to come up with new ideas that would significantly improve the patient experience. There was no monetary prize for winning, because leadership felt that it would not increase submission creativity and that large cash prizes may hinder the free and open sharing of ideas.

In its implementation, the tournament was broken down into three phases. Phase 1 focused on gaining a large number of submissions from a diversity of groups within the health system. Employees were informed of the tournament through a communication campaign consisting of flyers, posters and a strong online presence. A website was created that allowed employees to submit ideas, view ideas, and rate ideas on a scale of 1-5. A total of 1739 ideas were submitted and over 5000 employees participated by commenting and rating ideas. The submissions were evaluated by a combination of a panel of 29 experts from various parts of the health care system and the employees’ ratings on the website based on the ideas’ potential to
improve patient experience and if it could be implemented in six months. Ideas moved on for having a high mean score or by having significant high percentage scored (many 4s and 5s). Two hundred ideas were chosen to move to Phase 2.

In Phase 2, the 200 ideas were split into five workshops. Participants were asked to pitch their ideas using a poster and a 90-second pitch. After the pitches, participants voted on the best submissions and groups of five were created around the best ideas. After that, the best 6-10 ideas were presented again. The best two submissions from each workshop were selected to move on to Phase 3.

In Phase 3, the top 10 ideas were presented to an audience of about 200 Penn Medicine employees and a judging panel of 15, which included the CEO, CMO and other executive leadership. The final ten ideas were evaluated on two questions: “How new or novel is this idea for public health care delivery?” and “What is the potential for this idea to improve the patient experience at Penn Medicine?” Two winning ideas were selected for implementation.37

Methods

Research Design

This analysis used a multiple-case study design involving three cases: Gates Explorations, the Center for Medicare and Medicaid Innovation and the Penn Medicine Innovation Tournament. Cases were selected because they were prominent examples of methods to elicit innovation in three distinct levels of public health: healthcare/hospital, public/national governmental, and global health. The methodology comes from Robert Yin’s Case Study Research: Design and Methods (2009).38 This study examined the elements of innovation
tournaments and how they are used to advance innovation in health. As discussed in the Introduction, this study will address the following research questions:

1. In what circumstance was each innovation tool used, and how did this influence how it was conducted?
2. How is each innovation tool structured, and how does this format influence innovative ideas produced?
3. What insights and lessons may be learned from each of the three case studies, and how can these be applied to other health-related innovation challenges?

The three case studies will be analyzed with respect how each case navigates the six-part process framework designed by Wooten (2013, p. 4).39

1. Defining Challenge—What does the contest look like?
2. Soliciting entries—Who can participate?
3. Moderating—What is the in-process feedback/information loop?
4. Evaluating—How are entries judged?
5. Awarding—What prize is at stake for the winner(s)?
6. Participating—How does an agent (person/team entering the contest) choose to engage (effort, strategy, etc.)?
Data Collection Methods

This study will use two methods: (1) semi-structured telephone interviews with key informants and (2) review of key documents about the innovation tournaments, including annual reports and data on grants awarded. Three public health innovation tournaments were selected as the case studies.

Interviews

Within each case study, the subjects for interviews will be purposefully sampled. A total of 10 people will be interviewed: one person from the leadership of each innovation tournament and another three winners from each tournament (with the exception of Penn Medicine where one winner will be interviewed due to the small number).

In each case study, I will interview one person who is both in a director position over the innovation events and also on the board overseeing its creation. The names and positions of the interviewees will not disclosed in order to maintain the anonymity of the evaluations of the three cases.

In addition to interviewing the leaders, I will interview three winners from each event. Penn Medicine has only completed one innovation tournament with two winners, so one will be randomly chosen for the study. Because Centers for Medicare and Medicaid Innovation and the Gates Foundation Explorations have large numbers of recipients, I will purposely choose three recipients that represent different types of innovation. The interviews will be transcribed.
Document Review

The study will also examine organizations’ annual reports, through published data on the winning projects, and any other important documents related to the tournaments. Interviewees applications will also be reviewed.

Data Analysis

Within-Case Analysis

This study will first design a within-case analysis for each case using both interview data and all documents collected. A codebook will be created based on the six-part process framework as coding categories: defining challenge, soliciting entries, moderating, evaluating, awarding and participating. Within these broad categories, codes will be created. First, readers will complete initial coding by generating numerous category codes as responses are read, labeling notes and listing relationships and trends. Then readers will use focused coding to eliminate, combine, or subdivide coding categories.

Two researchers – the main researcher and a colleague -- will create hard copies of all documents collected from each case and take notes. The same two readers will review the transcribed notes from the interviews. The data from each interview will be coded using the same codebook and coding strategy.

Within-case analyses will examine how each innovation tournament conducts each of the six phases described by Wooten (2013). In addition, the within-case analyses will portray how the context of the tournament (healthcare/hospital, public/government, global) appears to be shaping the way the tournament is constructed and carried out. Further examination will describe
lessons learned from each tournament and how these lessons could be applied to future health tournaments.

_Cross-Case Analysis_

Subsequently, the cross-case analysis will compare and contrast how each of the innovation tournaments conducts each of the six phases described by Wooten (2013) and how these strategies influence tournament results.

_Results_

The results are organized by the research aims previously discussed in the following order: (1) the circumstance in which each innovation tool was used and how this influenced how it was conducted; (2) how each innovation tool was used and how this format influenced the innovative ideas produced; and (3) what insights and lessons can be learned and applied to other healthcare-related innovation challenges.

_Circumstances of innovation tool_

_Gates Grand Challenge Explorations_

The Bill and Melinda Gates Foundation is one of the largest private foundations in the world. One of its primary aims is to enhance healthcare and reduce extreme poverty globally. To further this aim, the Gates Foundation and other partners collaborated in 2003 to create the Grand Challenges in Global Health Initiative, which was a half a billion-dollar initiative. The Foundation brought together stakeholders from around the world to identify the largest challenges in global health and then solicited proposals from leading healthcare and development researchers to solve these challenges. In 2005, the Foundation funded 45 of these proposals for
multi-millions of dollars. This grant was thought to be successful, but the Foundation began thinking that another type of grant model might prove successful results as well. One leader from the Gates Foundation said,

The idea was that really anybody can have a great idea, it doesn’t have to be someone who is at Harvard or the London School of Tropical Medicine, it can be anyone from anywhere. It could be a graduate student, it could be a guy in his garage, it could be a car mechanic, so that was the motivation for starting the Grand Challenges exploration which has a lower barrier to entry and a much lower price tag associated, rather than the original multi-million grant.

Grand Challenge Exploration grants come from the idea that sometimes the most creative ideas emerge from unlikely sources. Another leader from the Global Health Discovery Program at the Gates Foundation discussed how the Grand Challenge Explorations reflect a fundamental value of “thinking critically and not being satisfied with the status quo.” Because the Gates Foundation already had more traditional and less risky grant models in place, the Grand Challenge Exploration was seen by Gates leadership to provide an outlet to test high risk, high reward ideas.

*Center for Medicare and Medicaid Innovation*

The Patient Protection and Affordable Care Act created the Center for Medicare and Medicaid Innovation in 2010 in order to test innovative payment and delivery system models to improve quality while decreasing the cost of care in Medicare, Medicaid and the Children’s Health Insurance Program (CHIP). One of the leaders of CMMI said that at first CMMI was unsure if by law they were allowed to issue grants, but once they were approved to do so, they
were eager to “have a vehicle to cast new models for delivering and paying for care.” The CMMI team saw that there was a lot of great work that was going on across the country in terms of innovation in healthcare delivery and financing and they were eager to find a way to tap into that work. As a result, she led a team to put $1 billion aside from the CMMI budget to create a broad funnel grant solicitation that would not only further innovative solutions to healthcare challenges but also “partner the organization with innovators in the field” to accelerate transformation.

Because the Innovation Award is run through the Center for Medicaid and Medicare (CMS), a part of the Department of Health and Human Services (HHS), the Innovation Award had to follow HHS grant guidelines. These guidelines did not dictate the scope or topic of the award, but they did create guidelines for how grants were solicited, the application requirements and other important components.

**Penn Medicine Innovation Tournament**

Penn Medicine is “committed to remain a world-leading institution in three equally valued and inter-related missions of patient care, education and research.” Because healthcare is changing so dramatically due to the healthcare reform bill as well as other changes in healthcare delivery, Penn Medicine wished to create a way to leverage all of the talents and expertise from its frontline workers and develop innovative ways to improve care. At the same time, two professors from the Wharton School of Business at the University of Pennsylvania were writing a book called *Innovation Tournaments* about an innovative approach to solving problems, not just in healthcare, but also in multiple types of organizations.

The leader from Penn Medicine discussed how the health system was using a top-down approach to innovation. “We had some processes in place, so there is a process improvement
group that basically you can apply to get awarded a process improvement grant to follow these things forward but for the most part it has to happen organically in their departments.” The leadership of Penn Medicine was looking for a more systematic way to enable their staff, employees and clinicians to have more input into the process of healthcare delivery innovation and want to do so through an innovation tournament.

**Structures of Innovation Tools**

The structure of the innovation tools were organized by the six-part process framework:

1. **Defining Challenge**—What does the contest look like?
2. **Soliciting entries**—Who can participate?
3. **Moderating**—What is the in-process feedback/information loop?
4. **Evaluating**—How are entries judged?
5. **Awarding**—What prize is at stake for the winner(s)?
6. **Participating**—How does an agent (person/team entering the contest) choose to engage (effort, strategy, etc.)?

The structure of each innovation tournament according to this framework is broadly described in Table 1. A more detailed description of each phase can be found in Appendix 1.
Table 1. Structure of three innovation tools used to solve public health challenges.

<table>
<thead>
<tr>
<th></th>
<th>Gates Grand Challenges Exploration</th>
<th>Center for Medicare and Medicaid Innovation Award</th>
<th>Penn Medicine Innovation Tournament</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defining Challenge</strong></td>
<td>Specific</td>
<td>Broad</td>
<td>Broad</td>
</tr>
<tr>
<td><strong>Soliciting Entries</strong></td>
<td>Open to the public</td>
<td>Open to public</td>
<td>Closed to public. Open to all Penn employees</td>
</tr>
<tr>
<td><strong>Moderating</strong></td>
<td>No feedback</td>
<td>No feedback</td>
<td>Feedback in each of 3 rounds</td>
</tr>
<tr>
<td><strong>Evaluating</strong></td>
<td>Blind, external &amp; internal review</td>
<td>Not blind, external review</td>
<td>Not blind, internal review by employees and leadership</td>
</tr>
<tr>
<td><strong>Awarding</strong></td>
<td>$100,000 each</td>
<td>Based on the project’s budget, with $1 billion total being awarded over the two rounds.</td>
<td>No monetary award</td>
</tr>
<tr>
<td><strong>Participating</strong></td>
<td>Little engagement between participants or between participants and organization</td>
<td>Some engagement between participants and between participants and organization.</td>
<td>Employee participation was key in all three phases of tournament.</td>
</tr>
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**Defining Challenge**

*Gates Grand Challenge Exploration*

Each round has 4-6 specifically defined topic areas. Each topic area has a one-page description of the topic, as well as examples of types of work they will and will not fund. The topic areas are based on foundation priorities and chosen internally. Foundation teams come to the Grand Challenge Exploration leadership when they have a problem they do not have an answer to but know that through this innovation tool they could get some answers. In the interview, a leader from Gates said, “It may be a gap in knowledge or a field that they believe to
be stagnant that they want to expand interest in.” One GCE winner found the process of priority setting to be unclear however. He said,

I think the process of priority setting needs more transparency for how the priorities are set, against some global strategy whether the MDGs or identified global burden of disease associated priorities. For the most part, they tend to be in that space but once in a while you have a couple of categories where clearly they’re looking for very out of the box ideas that might not be useful right now.

Center for Medicare and Medicaid Innovation

The Health Care Innovation Awards were divided into two rounds. The first round was looking broadly at innovative ideas to test new payment and service delivery models to deliver better care and lower costs. The second round sought proposals focusing on four different categories: (1) models that are specifically designed to rapidly reduce Medicare, Medicaid, and/or CHIP costs in outpatient and/or post-acute settings, (2) models that improve care for populations with specialized needs, (3) models that test approaches for specific types of providers to transform their financial and clinical models, and (4) models that improve the health of populations. The leader I interviewed from CMMI said that “we wanted to solicit the best ideas around the country, so we decided to write a very open-ended or broad funnel approach.”

Penn Medicine Innovation Tournament

The Penn Medicine Innovation Tournament was looking for ideas relating to reducing costs while maintaining or improving quality. It was left intentionally broad so that it would
include all departments and employees of the hospital. The tournament leader said, however, that if he could make a change to the tournament,

I think I’d have a more narrow theme. I think if it is too broad you get a lot of diverse and different ideas but they’re all in different realms. The benefit of these types of tournaments is to identify a very narrow theme instead of improving patient experience which is very broad, something like how do you reduce readmissions for heart failure or all sorts of specific things. That’s what you see in all these other innovation tournaments, that’s one thing.

Soliciting Entries

*Gates Grand Challenge Explorations*

The Gates Grand Challenge Explorations were open to the public. Applicants from all different disciplines and geographic areas were encouraged to apply. Both leaders I spoke to expressed a deep commitment to geographical diversity, so the Foundation staff has done a significant amount of geographic focused marketing and reported significant increases in applications from these regions as a result.

The Foundation also works to create few barriers to entry, so that people from many different backgrounds and parts of the world feel encouraged to apply. First, the foundation reviews all applications blind, so that only the idea is evaluated rather than the work history of the applicant or her affiliations. In addition, the application is only two pages, which does not require a significant time commitment. This small application also aims to reward good ideas, rather than those who are simply good at writing proposals.
One winner of the GHE found fault in the commitment to engage non-traditional public health researchers in this model. He said, “The space of public health innovation is actually very complex and it takes more than just a great idea to transform the way global health activities operate.”

**Center for Medicare and Medicaid Innovation**

The Innovation Awards are open to anyone who has developed innovations that will drive improvement in population health, quality of care and total cost of care. Applications involve a financial plan, operational plan, actuarial review and executive overview. Because the Innovation Award is run according to HHS guidelines, the solicitation of grant proposals is a very formal procedure. There is a formal release of the applications done at the Secretary level. All participants in this study heard about the award through their organization’s leadership and were encouraged to apply.

**Penn Medicine Innovation Tournament**

The Penn Medicine Innovation Tournament was closed to the public but all Penn employees were encouraged to participate. The leader from Penn Medicine described the approach taken by the Penn Medicine leadership to encourage applications:

So we had a sort of multi-modal campaign. So one aspect was obviously email—so we sent emails to everybody through the listserv. Another way was through our website, so our main Internet portal which had a lot of traffic on it. Another was posters throughout the institution to advertise for it a little bit. And the final, which was very important, was that we did a roadshow where we went out to leadership meetings to basically get leaders
from different department to get their staff to participate, so we think that that was
important as well.

Overall a total of 1700 Penn Medicine employees participated in the Innovation
Tournament by submitting ideas and even more participated by evaluating ideas in Phase 1.

**Moderating**

*Gates Grand Challenge Explorations*

Due to the high-quantity of applications, no feedback is given to applicants that were not
chosen.

*Center for Medicare and Medicaid Innovation*

Due to the high-quantity of applications no feedback given to applicants that were not
chosen.

*Penn Medicine Innovation Tournaments*

Feedback is a vital part of the innovation tournament model. Feedback is given at each
phase of the tournament. In phase 1, all employees are encouraged to rank the 1,700 proposed
ideas on a 1-5 scale. This system allowed employees who did not necessarily have a good idea to
propose in the tournament to still participate. In phase 2, ideas were presented in a workshop in
which other participants gave feedback to each project. Teams were also put together based on
shared interested discovered in Phase 2, so constant feedback and improvement of the idea
occurred through team meetings and discussions.
Evaluating

Gates Grand Challenge Explorations

The GCE entries go through three phases of evaluation. Each round receives anywhere from 1,500-3,000 applications. These entries first go through an initial screening process that looks at the responsiveness to the call. One of the leaders recalled that about 30-70% of the proposals make it through this initial round into the two different types of reviews. The reviews are done concurrently. One of the two reviews is conducted by the Innovation Panel, which consists of people that are “experts in innovation.” These are people who have a proven track record in innovation in their field of work and are not directly involved with that area of research. The Innovation Panel judges each get one “Gold Pick,” which automatically make move on to the awarding stage, and two “Silver Picks,” which move on to the internal review. While the proposals are passing through the Innovation Panel, they also move through the Parallel Panel. The Parallel Panel is made up of topic-specific researchers. This panel does not choose whether a proposal is awarded; they simply comment on each proposal so that the internal reviewers can make an educated decision on the proposal. Finally, the “Silver Picks” are brought back to the internal reviewers, staff that work for the Gates Foundation, with the comments from the Parallel Panel for final awarding decisions.

One of the reviewers on a GHE panel commented that the evaluation is particularly difficult due to the short application:

I’ve reviewed submissions and it really is hard to assess something in two pages. So that’s the down side of it. It is hard to tell in two pages what’s a good solid idea and providing enough information for someone else to assess it and score it. That’s the downside. Your assessment of the project is purely on the idea. You are not judging the
capacity or anything else because you don’t have that information. Is this a viable possibility; is this something that could lead to something bigger or more sustainable? So what you are judging is only the concept.

*Center for Medicare and Medicaid Innovation*

Grant policy dictates that the Healthcare Innovation Awards program itself cannot be involved in the reviewing. Reviewers who are external to the innovation center in order to ensure objectivity and independence do the reviewing. The leader from CMMI elaborates,

So in the case of the innovation awards, our grants office, the office of acquisitions and grants management, that’s the grants office for CMS, they maintain contracts with organizations that can convene review panels, they sign conflict of interest statements, etc. and that is administered by contact from the CMS grants office.

*Penn Medicine Innovation Tournament*

The evaluation techniques used by the innovation tournament further the concept of bottom-up innovation. The leader from Penn Medicine said,

We think the executives probably have a lot of influence, if not too much influence over all the decisions to get made anyway, so if you allow the executives to select these you are missing out on the opportunity to select things that perhaps they have not thought about, so that’s one thing because you fly it through the same lens as every other decision you’re not going to generate new ideas.

In phase 1 of the tournament, both fellow employees, as well as judges from the leadership graded ideas on a 1-5 scale. Ideas with high mean scores or high amounts of 4s or 5s
moved on to phase 2. Of the 1,700 ideas submitted, 200 moved on to phase 2. Phase 2 was divided into two workshops, each with 100 participants. Each participant presented their idea and then all the participants voted on the best ideas. At this point, participants who had not moved on to phase 3 were encouraged to join the team of those that did move on. The top 10 ideas from phase 2 moved on to phase 3. Phase 3 consisted of both crowd voting, in which the members of the crowd could text in to different teams to express their interest, as well as final voting by a group of executives. It is important to include executives of Penn Medicine because their buy-in is essential to move forward with the projects. The leader said, “If they’re more excited about it then there is more of a chance of these projects happening, so there is a sort of balance.”

**Awarding**

*Gates Grand Challenge Explorations*

The GCE is broken down into two rounds, phase 1 and phase 2. In Phase 1, applicants must submit a two-page application with no data. These awards are purely based on the idea that is explained in the short application and can be used to test a hypothesis or collect preliminary data. Winners of the GHE are awarded $100,000. One winner of a GHE noted one benefit of this aware: said,

I think that phase 1 is just to get some proof of concept data of your idea, that’s what phase 1 is about, so this money that they give for phase 1 is really good to test an idea, test a hypothesis, and the way the proposal is, not needing primary data, is different than other grants, but to get the primary data you need a bit of money. And the way the Gates Foundation works, they give you a good way to do that. Give people who don’t have the money to get that proof of concept data a way to do that. [Most grants] require a
minimum of a preliminary data and I am talking about federal money and federal agencies like NSF, NIH or USDA. They all require a minimum of preliminary data.

Other winners, however, stated some concerns with the model. For example, one winner was concerned with scalability: Another winner is skeptical of the value of the award. He argued, We are very sort of skeptical and a little bit annoyed by this use of pool of innovation funding and I think because in my area of expertise, we complain that nothing is put to scale, what is partly to blame for that is that the seed funding that goes into the building of a lot of these systems is so small that nothing is actually built to scale, so you are building for demonstration and inspiration and not sustainability. They are good enough to demonstrate something and that’s it, they’re not made to extend or expand over hundred of thousands of subscribers. It is a very different thing to build a prototype, like a Wright Brother flyer, versus a Boeing 747. There is a big difference and you can extend that analogy to health systems. And what it also does is that what you are trying to say that we are stimulating innovation but really what you’re doing is the concern of pilot-itus.

In addition, this winner explained that small grants such as the GHE might actually have negative consequences on the global health field. He said, Very often what these small grants do is that they end up taxing other resources, so you have funding to do other things that is being diverted to sustain this underfunded activity. So let’s say its $100,000 innovation award, you can’t do very much with that money unless you’re in a laboratory or building something on a bench. Once you get into the
implementation prices go up through the roof. You have to hire people, etc. so you end up taking money away from other projects to sustain this concept.

A third winner also commented on the challenges associated with a small award amount. He discussed how unlike a traditional grant that would cover all of his costs, the GCE requires that he has to take on some of the risk himself:

You have to figure out how to successfully conduct the research in a remote part of the DRC, which requires travel and a lot of other infrastructure issues. It is not something that someone would normally do, especially a for-profit institution, and expect your costs to be covered. We certainly will be investing a lot of our own resources in this. The $100,000 doesn’t cover the total costs, but it is a good incentive.

**Center for Medicare and Medicaid Innovation**

In the application for the Healthcare Innovation Award, a budget is submitted. Once the application is highly ranked by the external review and recommended for funding, it would come back to the Office of Grants Management who would look at the budget. The Office of Grants Management would then take a look at the budget and make sure all the expense are consistent with HHS grant policy and that all expenses are truly necessary to achieve the goals of the grant. One applicant said that once he submitted his application, “the first real communication that I had [with CMMI] was when they called me and asked me if I could take 20% out of my budget.” The award amount is based on the proposed budget and any changes made thereafter. Over the two rounds, a total of $1 billion was awarded.
Penn Medicine Innovation Tournament

The Penn Medicine Innovation Tournament was a process to create an innovative idea rather than pilot it or put it into practice. As a result, there was no money needed to carry out the project in prize or grant form. In addition, the tournament had no monetary prizes associated with it. The leader from Penn said that, “In general, when you apply monetary prizes to things you’ll actually disincentive innovation in some ways and people end up doing it for different reasons.”

Participating

Gates Grand Challenge Exploration

The GCE had little engagement between participants or between the participants and the organization. One researcher said that once the GCE grants are awarded, It is up to the researcher. They don’t really follow-up on how the research is going. You have to write or report a financial report and a scientific report after 18 months from the starting date of the project but they don’t really follow-up.

Center for Medicare and Medicaid Innovation

In CMMI, here is some engagement between participants through quarterly meetings based on topic area and the website. There is also interaction with CMMI staff through the project manager and the financial officer. The leader from CMMI said that, Once the award is made, if the grant type is a cooperative agreement, and the healthcare innovation award is a cooperative agreement, then there is lots of dialogue between the program staff and the awardee around strategy that could improve the process of the
awardee or the design of the intervention and that is ongoing in a cooperative agreement. That’s the difference between a straight grant and a cooperative agreement; a cooperative agreement is a special type of grant where we cooperate to get the best possible outcome.

One of the winners of the Innovation Award discussed the various ways that CMMI set up collaborative and helpful spaces. He said,

They set up regular meetings and webinars. They set up groups—I was just on a call today, a quarterly meeting with the other awardees on acute and critical care. So they are very helpful in that respect.

*Penn Medicine Innovation Tournament*

Employee participation in all three phases of the tournament was key to its success. Not only did participants evaluate each other in each phase of the tournament, but following the workshop in phase 2 they were encouraged to combine into teams. One of the winners of the tournament discussed how helpful it was to create teams in building the idea:

Having other people’s spin on the matter thought of other ways to use my idea beyond what I thought of. That’s how it evolved. My initial idea was that the kiosk could do check in and check out at the front desk. It could collect co-pays and do everything a human does. You could swipe your credit card. Well some other people thought of you could use these kiosks to do patient education, patient surveys, also make it speak in foreign languages for people who don’t speak English. It could speak in Spanish and other languages. These are things that like when you go to Wawa or airports, they are
using kiosks to some of these other things. So the idea did evolve beyond my initial concept when other people brought in their ideas.

**New Model for Organizations to Choose the Optimal Innovation Tool**

Each of the three cases studied used different innovation tools in order to meet the challenges they wished to solve. When deciding what innovation tool to use, each organization thought through their goals, as well as the potential participants and the amount of risk necessary to achieve the desired result. Figure 1 shows a flow chart for deciding the type of innovation tool to use in different circumstances.

If an organization were to use the flow chart to decide which innovation tool to use, the leadership would ask the three questions at the top of the chart. First, does the organization have a clear, achievable goal in mind? If the organization is looking to solve a very specific challenge, like creation a new diagnostic tool for malaria, then it would answer “yes” and follow along the top section of the chart. If, however, the organization was looking at a more broad topic like quality improvement in hospitals, it would answer “no” and follow the lower section of the chart.

Next, the leadership would have to decide if there were many of few problem solvers in the field they are working in. If it were a very specialized challenge with few researchers involved in the area, then the answer would be few. Conversely, if there were many researchers in the chosen field, the organization would choose “many.” Finally, the organization must understand whether the participants they are working to attract are willing to accept some costs and outcomes risk.

Based on these three criteria, organizations can predict the best innovation tool to solve their public health challenge.
As previously mentioned, the Gates Foundation already had traditional grants aimed at solving global health challenges in its portfolio. However, the Foundation believed that it is not only the highest caliber public health researchers from the top universities that have great ideas that could revolutionize this field. With that idea in mind, the Global Health Discovery Team decided to create another grant model. First, they recognized that they had clear goals in mind based on the Foundation’s priorities. However, unlike their other innovation tool, the Gates
Grand Challenges, the team wished to leverage ideas from many different problem solvers from many different fields and geographic locations. Finally, in order to get the best ideas back, the Foundation team decided to take on some risk. The Foundation reads applications completely blind without any proof of concept or preliminary data needed and judge solely the idea expressed in the proposal accepting that many of the ideas might not succeed.

Because of these circumstances, the Gates Foundation created the Gates Grand Challenge Exploration to work as a prize-grant hybrid. The GCE defines a goal narrowly according to 4-6 needs designed by the Foundation. It then judges based on only the idea itself, rather than how likely the idea is to accomplish. The Foundation awards USD $100,000 to the winning proposals in a grant format. This award is small enough that it forces researchers to take on some of the financial burden of the research project in hopes of finding proof of concept data or creating a replicable pilot that would earn them the larger prize of USD $1 million in phase 2. Because of this design, the GCE has many characteristics of a grant but also the incentive structure of a prize.

*Center for Medicare and Medicaid Innovation*

The CMMI Award is very different from the Gates Grand Challenge Exploration in both its goals and model. The CMMI Award has a very broadly defined challenge rather than a specific, achievable goal. Further, the award searches for proven innovators in the fields of provider groups, health systems, payers and other private sector organizations, faith-based organizations, states, local governments, public-private partnerships and for-profit organizations. Because the Award is targeting those that have already developed innovations that will drive significant improvements in population health, quality of care and total cost of care, there is a
small audience for the call. Because of these two circumstances, the CMMI Innovation Award created a traditional grant.

*Penn Medicine Innovation Tournament*

Penn Medicine had a broadly defined aim and wanted to create an innovation tool that would properly leverage its large employee base and create a collaborative environment. Penn worked with two professors from the Wharton School of Business to create a new model for innovation called innovation tournaments. Tournaments, as previously mentioned, are defined as the process of creating, selecting and developing opportunities such that exceptionally promising opportunities are identified.

**Discussion**

This study compared three tools to foster innovative solutions to public health challenges. The study analyzed the environments and goals of each organization to better understand how and why each innovation tool was conducted. Next it examined the structure of each innovation tool according to the process framework discussed earlier in the paper. The cases were then compared and contrasted to recognize how the processes of each case reflected the goals of the organization that conducted them.

Based on the environment and goals of the organization, an organization can choose the best innovation tool to fit their needs. This study first analyzes the benefits and challenges of different methods of creating an innovation tool at each stage of the process model. At the “defining challenge” stage, the leader from Penn Medicine said that if he could change one thing about the Innovation Tournament he would have created a more specific challenge question
rather than leaving it broad. Conversely, the leader from CMMI applauded the grant’s use of a broadly defined challenge as a way to get many different players and ideas centered around the same general goal of increasing healthcare quality while decreasing cost working together.

Further, the cases provided an interesting insight into the soliciting entries phase of an innovation tool. The Gates Grand Challenge Exploration solicits entries from all types of people, not just traditional public health researchers, from all corners of the globe in their effort to solve global health challenges. The Gates Foundation looks to examples of innovations coming from unlikely sources like the Argentine car mechanic who created a device to ease births of babies who are stuck in the birth canal. However, some winners of the GCE point out that the space of public health innovation is very complex and that it takes more than just a great idea to transform the way global health activities operate. Like Gates, CMMI has created an innovation tool that was open to the public, however it applied only to those whom had developed innovations or pilots that are shown to drive improvement in population health, quality of care and total cost of care. This excludes all those who are not working in traditional healthcare settings that have a record of success. Penn Medicine’s Innovation Tournament is not open to the public and targets only Penn Medicine employees to participate. This was successful at leveraging employees’ insight into the daily challenges of the hospital but excluded the unique perspectives of patients and the public.

At the moderating stage, Penn Medicine’s Innovation Tournament excelled in providing valuable feedback at each stage of the tournament that, according to participants and leadership, led to significant positive change in the quality of ideas presented. Neither the CMMI Innovation Awards nor the Gates Grand Challenge Explorations gave considerable feedback to
any applicants in order for them to improve their projects due to the large quantity of applications.

The evaluating stage was also done differently for each stage based on their objectives. The Grand Challenge Explorations evaluated the proposals blindly in order to lower the barrier to entry. The proposals were then subject to an external review by innovation experts and subject matter experts and then internally reviewed to make sure they were meeting the needs of the Gates Foundation. The Penn Medicine Innovation Tournament was not evaluated blindly and was reviewed internally by other employees and the leadership in order to, like the Gates Foundation, find the innovative ideas that best met the needs of the organization. CMMI evaluated its proposals through an external review in order to keep the process as objective as possible.

The awarding phase was where the differences between the three innovation tools was most apparent. This was also the phase that correlated the most with the goals of the tournament. The CMMI Innovation Award was a traditional grant and therefore was interested in funding the winning projects according to the project’s budget. The Innovation Award does not require the winner to take on any of the financing and therefore none of the risk, but in return requires strict stewardship of the money overseen by a financial officer. Conversely, the Gates Grand Challenge Exploration funds winners $100,000 is phase 1, which is, in most cases, not enough to fully fund the proposed project. This prize-grant hybrid requires the winner to take on some of the risk at the onset of the project in order to have the opportunity to win a larger amount of money, $1 million, in phase 2. Gates awards small increments because it funds very out-of-the-box, risky projects that, according to a leader from the Gates Foundation, are “almost certain to fail” in hopes of finding one truly innovative, revolutionary idea. Those projects that are
successful in phase 1 have the opportunity to get more funding in phase 2 to continue with the project. The Penn Medicine Innovation Tournament is a completely different model in that it crowd sources ideas but does not provide seed funding to materialize these ideas. The winners received not prize money and instead, the hospital took of the costs of creating the innovations itself.

Finally, the three cases encourage participation in different ways. The Penn Medicine Innovation Tournament greatly valued employee participation throughout the competition. The tournament received 1,700 proposals from employees but 5,000 employees participated by ranking ideas or joining teams of ideas that moved on in the process. Employee participation and crowd sourcing was the backbone of the innovation tournament model. The Gates Grand Challenge Explorations and the CMMI Innovation Awards demanded less participation throughout the process. In fact, neither of the innovation tools gave feedback throughout the process or allowed revisions or improvements of proposals once they were submitted. Once the winners were selected, there was some participation and collaboration for winners but it was underutilized. For the most part, winners from the GCE and the Innovation Awards worked independently from other winners and applicants.

This is the first research study that comparatively analyzes different innovation tools to understand the mechanisms that decide what model an organization should use to foster public health innovation. By interviewing leadership and winners from three different types of innovation tools, this study was able to understand the logic for choosing innovation tools as well as the pros and cons of each innovation tool. This study first sought to understand the circumstance and goals of each innovation tool and then broke down the process of each tool to recognize how each component worked to fulfill these aims. From this information, this study
was able to generate a flow chart to help organizations decide which innovation tool is most appropriate to fit their challenges.

The leadership from each of the three case studies, as well as many of the winners interviewed expressed interest in the topic and earnest for the need for more research to be done on financing mechanism for public health research. As the flow chart in Figure 1 shows, not every health care innovation challenge is best solved by traditional health grants like the NIH study sections. Rather there are many different innovation tools to fit the needs of an organization such as contracts, grants, prizes and innovation tournaments. There is limited research on the types of innovation tools and even less research on comparing them. As there are a growing number of challenges in healthcare, more research is needed in this area to help organizations decide on the best innovation tool to meet their needs.

This study design sought to sample a variety of innovation tools used at three different levels of public health: global, national and organizational. The study’s sample size was too small to cover all types of innovation tools. In addition, it only analyzed one of each type of tool, which allows for some bias. It is unknown whether the cases studied were “typical” grants, prizes and innovation tournaments. Finally, the study also focused on different innovation tools that focused on three different levels of public health. It is possible that the challenges at the three different levels of public health are so different that the innovation tools to solve them would vary significantly.

This exploratory study is the first step in understanding the different types of tools used to solve challenges in public health and healthcare. Further studies will be required to build upon this study to better understand the different types of tools and when each is best used.


