HHS Public Access

Author manuscript

Acad Med. Author manuscript; available in PMC 2018 May 01.

Published in final edited form as:

Acad Med. 2017 May ; 92(5): 671–675. doi:10.1097/ACM.0000000000001335.

The Pitt Innovation Challenge (PInCh): Driving Innovation in Translational Research Through an Incentive-Based, Problem-Focused Competition

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Abstract

Problem—Translational research aims to move scientific discoveries across the biomedical spectrum from the laboratory to humans, and to ultimately transform clinical practice and public

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Other disclosures: None reported.

Ethical approval: The research presented here was deemed exempt by the University of Pittsburgh's institutional review board.

The authors have informed the journal that they agree both N. Edgar Fitzpatrick and J. Maier completed the intellectual and other work typical of the first author.

health policies. Despite efforts to accelerate translational research through national initiatives, several major hurdles remain.

Approach—The authors created the Pitt Innovation Challenge (PInCh) as an incentive-based, problem-focused approach to solving identified clinical or public health problems at the University of Pittsburgh Clinical and Translational Science Institute in spring 2014. With input from a broad range of stakeholders, PInCh leadership arrived at the challenge question: How do we empower individuals to take control of their own health outcomes? The authors developed the PInCh's three-round proposal submission and review process as well as an online contest management tool to support the process.

Outcomes—Ninety-two teams submitted videos proposals in round one. Proposals included mobile applications (29, 32%), other information technology (19, 21%), and community program (22, 24%) solutions. Ten teams advanced to the final round, where three were awarded $100,000 to implement their solution over twelve months. In a six-month follow-up survey, 6/11 (55%) team leaders stated the PInCh helped to facilitate connections outside their normal sphere of collaborators.

Next Steps—Additional educational training sessions related to problem-focused research will be developed. The PInCh will be expanded to engage investment and industry communities to facilitate the translation of solutions to clinical practice via commercialization pathways. External organizations and other universities will be engaged to use the PInCh as a mechanism to fuel innovation in their spaces.

Problem

Translational research aims to move scientific discoveries across the biomedical spectrum from the laboratory to humans, and to ultimately transform clinical practice and public health policies.[1] Despite efforts to accelerate translational research through national initiatives such as the National Institutes of Health (NIH) Clinical and Translational Science Award (CTSA) program, several major hurdles remain. First, basic biomedical research is not primarily focused on clinically-relevant hypotheses, but often on hypotheses stemming from model systems. This technology-driven approach has been limited in its ability to apply biomedical discoveries to specific challenges identified in clinical practice.[2] Second, the decline in numbers of physician-scientists, who are uniquely positioned to research clinically-relevant problems, combined with an increasing separation between basic researchers and physicians,[3] has resulted in large gaps between bench research and clinical applications, termed "valleys of death."[4] Third, decreased funding for the NIH over the last decade[5] has resulted in substantial decreases in funding rates for research projects.[6] Thus, researchers often limit their NIH proposals to less risky projects, which have a higher probability of being funded[7]; this, however, may stifle creativity and dissuade high-risk, high-reward projects. This risk-averse environment limits the translation of biomedical discoveries into practice, as reflected by sharp declines in the United States' global share of life science patents, from 73% in 1981 to 59% in 2011.[8]

To address these barriers, we propose that the adoption of problem-focused research best practices (i.e., "market pull") from nonbiomedical industries can stimulate the development

of creative solutions to clinically-relevant problems. We used the tenets of incentive prize theory[9] (which uses competition to inspire problem-focused solutions) popularized by organizations such as XPRIZE to create the Pitt Innovation Challenge (PInCh), an incentive-based competition designed to stimulate biomedical innovation.

Approach

Challenge development

Incentive prizes have been used for centuries to drive problem-focused innovation in nonbiomedical fields. Some examples of the results of incentive prize-based competitions include the creation of the chronometer in the 18th century (Longitude Prize), Charles Lindbergh's first solo flight across the Atlantic (Orteig Prize), and the development of the first privately funded spaceship (Ansari XPRIZE). Compared to traditional grant mechanisms, incentive prizes are notably effective at sourcing a wide variety of nontraditional participants and approaches, as well as attracting public attention to the problem at hand.[10] In consultation with former XPRIZE designers, we created the PInCh, an incentive-based competition focusing on solving identified clinical or public health problems at the University of Pittsburgh Clinical and Translational Science Institute in spring 2014.

We implemented the PInCh as a novel problem-focused pilot funding mechanism to promote the translation of research to clinical practice. Our main goals for the PInCh were to (1) encourage scientists to focus their research on specific clinical problems; (2) create an ecosystem of innovators by stimulating the creation of multidisciplinary teams that come together to solve clinically-relevant problems; (3) incentivize creativity and risk taking in scientific approaches to clinical problems; and (4) accelerate the translation of innovative ideas that could impact human health.

We identified a topic for the PInCh's first challenge through a formal question sourcing process that solicited input from a broad group of 21 stakeholders (e.g., clinicians, basic scientists, community leaders, entrepreneurs, business leaders, and university administrators). The interviews we conducted with individual stakeholders included a description of the competition and a discussion designed to stimulate brainstorming prior to their participation in a half-day facilitated exercise to identify broad problems in health that could serve as a contest topic. PInCh leadership reviewed the facilitator's summary and recommendations to arrive at the challenge question: How do we empower individuals to take control of their own health outcomes? This question was announced and publicized throughout the university and local community using posters, eblasts, websites, and articles in Pittsburgh newspapers. We also encouraged the stakeholders who had participated in the question sourcing process to generate interest across their networks.

Challenge overview and evaluation of proposals

We developed a low-risk, high-reward paradigm for entering the competition and a relatively fast-paced (11 weeks from application deadline to announcement of awards), nontraditional review process. To incentivize teams to enter the competition, we promoted our plans for awarding $375,000 in research funding, and designed the three-round review process to

require less effort than traditional federal grant proposals. For round one, we required a two-minute video entry that described the problem to be solved, the team members and their roles, and the proposed solution. This format required teams to work together to concisely articulate their proposed solution to a specific problem. The use of videos as a medium for project proposals required entrants to develop new, creative ways to present their ideas, although the atypical submission format may have also deterred some potential applicants. All video entries were screened by a judging panel consisting of faculty and staff affiliated with the University of Pittsburgh CTSA program to determine if the proposals adequately addressed the challenge question and, if they had, whether they were suitable for consideration for one of the $100,000 awards (see below for more information on the awards). Reviews were completed using an online contest management system, Powered by PInCh, that we developed to support proposal submission and review throughout our three-round competition format.

In round two, the selected (i.e., semifinalist) teams were invited to submit a two-page description of their solution, including an overview of the solution's sustainability and a description of the targeted stakeholders. Proposals were evaluated by a ten-person judging panel consisting of clinicians, scientists, and business leaders (unique from the round one judges) on criteria including innovation, health impact, feasibility, and traditional NIH grant criteria. Judges reviewed both the videos from the first round and the written descriptions and scored proposals using the Powered by PInCh management system. Teams were selected to advance to the third and final round based on the average score of the 10 judges. To increase the visibility of the projects and the PInCh process, all semifinalist videos were posted on the contest website as entries in a people's choice contest, which was promoted through eblasts to the university community and alumni. Website visitors could vote for their favorite entry and teams were encouraged to use social media to engage interested stakeholders. The team that won the people's choice contest was automatically awarded a spot in the final round.

Finalist teams provided an additional two pages of supplementary material that included a twelve-month work plan and budget. Two members of each finalist team pitched their proposal to a panel of five judges (clinicians, scientists, and healthcare leaders) at a public event attended by members of the university and medical center, as well as members of the local philanthropic, investor, and entrepreneurship communities. Pitches were four minutes long (no slides were permitted) and were followed by four minutes of questions from the judges. At the end of the event, the judges selected three teams that were each awarded $100,000 in research funding. To establish long-term support, the winning PInCh teams also received project management support, research resources, commercialization guidance, and networking opportunities with potential investors and stakeholders. Semifinalist teams that were not selected to advance to round three were invited to give a poster presentation at the final event to compete for smaller award amounts. Through a crowd sourcing voting mechanism, final event attendees chose three of these teams to each receive a $25,000 award and project management support.

Evaluating the PInCh

Prior to announcing the teams that were selected to advance to the second round, we conducted an optional online survey, inviting each team leader to respond. Survey questions focused on team composition, reasons for applying to the PInCh, and innovative features of the submitted proposal. This survey was considered to be exempt by the University of Pittsburgh Institutional Review Board. Additionally, members of the PInCh team categorized all video entries by the type of solution proposed, the targeted stakeholder, and the health field.

Outcomes

Participation

Of the 92 teams that submitted video proposals in round one, 6 were eliminated due to lack of responsiveness to the challenge question. Twenty-nine of the 86 remaining entries were selected to advance to round two. Ten of these teams, including the winner of the people's choice award, were then selected to advance to the final round. At the final event, 3 of the 10 finalist teams were awarded $100,000 and 3 of the 19 semifinalist teams were awarded $25,000 to implement their solution over a twelve-month period. Of note, the people's choice voting resulted in 6,660 online votes within a two-week period (with only a single vote per IP address being permitted).

Solutions

The 92 proposed solutions represented a broad range of health topics and solution types (see Table 1). Twenty-nine (32%) applications proposed a mobile application and 19 (21%) proposed some other type of information technology solution. Other categories of solutions included community programs (22, 24%), intervention models (9, 10%), medical devices (7, 8%), medical treatments (4, 4%), and clinical trials (1, 1%). Some of the targeted stakeholders for the proposed solutions were community groups (28, 30%), patients with a specific condition (24, 26%), health-conscious individuals (13, 14%), and both patients and medical providers (12, 13%). Additionally, 7 (8%) proposed solutions targeted children or adolescents, whereas 4 (4%) targeted seniors. The top health field targeted was medical, which included 41 (45%) prevention, treatment, or diagnosis solutions. Thirty-one (34%) solutions targeted lifestyle, via diet, general well-being, exercise, diet and exercise, and behavioral solutions. Seventeen (19%) solutions (directed toward both patients and practitioners) targeted education.

Team composition

The PInCh garnered participation from 260 individuals, with an average of 2.8 individuals per team. We examined team composition through a survey, which was completed by 29 (32%) of the 92 team leaders (see Table 2). Teams were multidisciplinary in background and were comprised of both university and external community members. Approximately half of the responding teams (14, 48%) included graduate and undergraduate students and almost a third (9, 31%) had postdocs, residents, or fellows. In addition, 14 (48%) teams included a member of an external or community organization and/or a small business or contractor.

Thus, the PInCh successfully facilitated connections both within and outside of the university.

Innovation

One of our goals with the PInCh was to incentivize creativity and risk taking in scientific approaches to clinical problems. In our survey (completed by 29 [32%] of the 92 team leaders), 23 (79%) team leaders indicated that their proposal represented either entirely new work or a new direction for existing work, while 21 (72%) reported new collaborators on their proposal and 21 (72%) reported proposal of a new method (see Table 3). Twenty-five (86%) team leaders indicated that they participated because they liked the idea of thinking outside the box while another 25 (86%) wanted to pitch a new idea, indicating that the PInCh tapped into a desire to generate and propose creative ideas. In addition, 28 (97%) team leaders indicated that they would participate in a PInCh call again and 24 (83%) indicated that they benefited from participation, independent of winning.

A six-month follow-up survey of PInCh participants yielded responses from 11 (12%) of the 92 team leaders, with 10 (91%) indicating that their team is continuing to move forward on the project regardless of whether they won funding in the competition. In addition, 6 (55%) team leaders stated the PInCh helped to facilitate connections outside their normal sphere of collaborators, indicating that the PInCh process aided in forming new connections.

Conclusions

We developed an incentive-based, problem-focused funding mechanism that includes a video submission, a pitch-style presentation to a live audience, and project management support for the award winners. The winners of the three $100,000 awards were (1) Spark, a Parkinson’s disease focused mobile application that supports patient independence; (2) Sealion, an at-home therapy to heal diabetic skin ulcers; and (3) Quit Ninja, a tool for smoking cessation support. The winners of the three $25,000 awards were (1) Circle backs, a cloud-based application to decrease hospital readmission; (2) IOTAS, a peer-staffed text help line for teens with sexual health questions; and (3) MedGuardian, a prescription notification system to improve compliance and safety. The competition brought forth new collaborations and new ideas for the problems addressed, and the projects that won awards were able to be sustained through both internal and external support.

Next Steps

The PInCh generated interest in a problem-focused approach to research and brought together new teams to propose novel solutions. Overall, the inaugural PInCh met our goals, including encouraging scientists to focus their research on specific clinical problems, creating an ecosystem of innovators by stimulating the creation of multidisciplinary teams that come together to solve clinically-relevant problems, and incentivizing creativity and risk taking in scientific approaches to clinical problems. We feel the process was particularly successful because low barriers to entry attracted a large cohort of applicants, and the novel application process inspired creativity. However, the projects solicited by this mechanism often had unique complexities that required expertise in navigating intellectual property

rights and strong project management skills. In light of the enthusiasm surrounding the inaugural PInCh, a second PInCh was held in fall 2014, yielding similar outcomes. Combined with the 92 proposals we received during the inaugural PInCh, we have received more than 150 health-related innovation proposals (with participation from ~500 individuals) within one year, indicating that there is clearly a desire and need in the academic community for new approaches and funding sources to stimulate innovative ideas.

To promote the ongoing engagement of our ecosystem of PInCh innovators, we hosted two educational training sessions to assist teams involved in the competition—(1) Business Basics and (2) The Art of the Pitch—prior to the second round of proposal submissions. Feedback on these sessions was excellent as these skills are outside the expertise of most academic researchers but critical for an endeavor into translational research. We plan to develop additional educational sessions related to problem-focused research, funded by our CTSA grant, to continue to build our innovation ecosystem.

Another objective of the PInCh was that participation itself would be a benefit. Our goal was to increase visibility for all of the projects, not just those that won. Each team that participated had a short, engaging video summary of their project that could be used to introduce their project to an interested party (e.g., potential investors or foundations). We were also able to engage local organizations, disease advocacy groups, small companies, and community organizations and link them to PInCh teams. The visibility gained through the PInCh generated connections between PInCh participants and several organizations and companies, such as Google, the Michael J. Fox Foundation, and the Gordon and Betty Moore Foundation, that provided additional support to advance projects. We will expand the PInCh to engage investment and industry communities to facilitate the translation of solutions to clinical practice via commercialization pathways.

External organizations have expressed interest in using the PInCh funding mechanism to generate innovative ideas in their space, and several groups have successfully used the Powered by PInCh platform to manage their own competitions (e.g., UpPrize). We will continue to engage with these organizations and other universities to use the PInCh as a mechanism to fuel innovation in their spaces. Long-term goals of the PInCh are that the successful application of this mechanism (in Pittsburgh and elsewhere) will shift the focus of health science research to solving clinically-relevant and difficult research problems. Thus, going forward we plan to expand our local innovation ecosystem by providing education and training related to research translation to PInCh participants. In addition, we are initiating collaborations with other NIH-funded CTSA program hubs to expand the use of the PInCh mechanism to other geographic locations and research disciplines, and to promote new investigator collaborations across institutions to stimulate problem-focused approaches that will accelerate the translation of innovative ideas.

Acknowledgments

The authors thank Dr. Margaret McDonald, Dr. Lisa Barsom, Michele Baum, Lisa Pilewski, Dr. Marc Malandro and the staff of the University of Pittsburgh Innovation Institute, and Dr. Mark Redfern and the University of Pittsburgh Office of the Provost for their contributions to the implementation and broad dissemination of the Pitt Innovation Challenge (PInCh) across the University of Pittsburgh innovation ecosystem.

Funding/Support: The development and operation of the PInCh program were supported by the National Institutes of Health Clinical and Translational Science Award Grant UL1TR000005. Award funding, project management, and other resources came from institutional sources including the University of Pittsburgh Office of the Provost, the University of Pittsburgh Innovation Institute, and the University of Pittsburgh Clinical and Translational Science Institute.

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Table 1

Characteristics of the 92 Proposed Solutions From Round One of the Pitt Innovation Challenge Program, Clinical and Translational Science Institute, University of Pittsburgh, Spring 2014

Proposal characteristics	No. (%)[a]
Type of solution	
Mobile application	29 (32)
Other information technology solution	19 (21)
Community program	22 (24)
Intervention model	9 (10)
Medical device	7 (8)
Medical treatment	4 (4)
Clinical trial	1 (1)
Other solution	1 (1)
Targeted stakeholders	
Community group	28 (30)
Patients with a specific condition	24 (26)
Health-conscious individuals	13 (14)
Both patients and medical providers	12 (13)
Children or adolescents	7 (8)
Patients (in general)	4 (4)
Seniors	4 (4)
Health field	
Medical	41 (45)
Lifestyle	31 (34)
Education	17 (19)
Other	3 (3)
Health field (breakdown)	
Medical: Prevention	20 (22)
Medical: Treatment	16 (17)
Medical: Diagnosis	5 (5)
Lifestyle: Diet	9 (10)
Lifestyle: General well-being	8 (9)
Lifestyle: Exercise	7 (8)
Lifestyle: Diet and exercise	5 (5)
Lifestyle: Behavioral	2 (2)
Education	17 (19)
Other	3 (3)

[a] Percentages may not total to 100 due to rounding.

Table 2

Survey Results on Team Composition Demographics From 29 Team Leaders, Pitt Innovation Challenge Program, Clinical and Translational Science Institute, University of Pittsburgh, Spring 2014

Team composition demographics	No. (%)
Position[a]	
Faculty	29 (100)[b]
Graduate or undergraduate student	14 (48)
Postdoc, resident, or fellow	9 (31)
Small business or contractor	14 (48)
External or community organization	14 (48)
Other educational	9 (31)
Discipline	
Clinical science	20 (69)
Public health	18 (62)
Social science	15 (52)
Basic science	13 (45)
Education	12 (41)
Engineering	11 (38)
Entrepreneurship	10 (34)
Business	6 (21)
Law	2 (7)
Dentistry	1 (3)
Fitness/Rehabilitation	1 (3)
Nutrition	1 (3)

[a]The faculty; graduate or undergraduate student; postdoc, residents or fellow; and other educational positions were considered university team members and small business or contractor and external or community organization positions were considered external community team members.

[b]A minimum of 1 faculty member per team was required.

Table 3

Survey Results From 29 Team Leaders, Pitt Innovation Challenge Program (PInCh), Clinical and Translational Science Institute, University of Pittsburgh, Spring 2014

Survey results	No. (%)
Innovativeness of proposal	
Entirely new topic or new direction for existing work	23 (79)
Extends current work	6 (21)
Innovative feature[a]	
New collaborators	21 (72)
New method	21 (72)
New topic	14 (48)
New technology	14 (48)
Reason for applying[a]	
Wanted to pitch a new idea	25 (86)
Liked the idea of thinking outside the box	25 (86)
Sounded fun	12 (41)
Represented a chance to work with new people	17 (59)
Impact community	1 (3)[b]
Practical side to research	1 (3)[b]
Innovative ways to help subjects	1 (3)[b]
Educate community	1 (3)[b]
Seek evidence-based intervention and prevention programs for building safe and healthy relationships	1 (3)[b]
Value added research in field	1 (3)[b]
Wanted to help my clients in a better, sustainable way	1 (3)[b]
Would you participate in a PInCh call again	
Yes	28 (97)
No	1 (3)
Did you benefit from participation, independent of winning[c]	
Yes	24 (83)
No	4 (14)

[a]Teams could select or provide more than one answer for this question.

[b]Write-in comment.

[c]One team leader did not answer this question.