



Innovating on innovation training with the Virtual Magic Wand (VMW) program: a qualitative study

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Abstract

To identify and solve unmet needs and bring new therapies to patients, clinicians at all levels must engage in innovation. The Magic Wand Initiative, a program based at Massachusetts General Hospital—Wellman Center for Photomedicine, created a 10-months course called the Virtual Magic Wand (VMW) program that is a curriculum that teaches the biomedical innovation pathway to dermatologists and engages them in this creative process. This study aims to identify the impact of the VMW program on participants and consider the potential benefits of an innovation curriculum. The authors conducted semi-structured interviews in which alumni of the VMW program were asked about their experiences with innovation before, during, and after the program. Using grounded theory methodology, data were analyzed using deductive coding methods. The most cited benefit of the program was the opportunity to network ($n = 12$, 100%)—specifically, the mentorship opportunities ($n = 10$, 83%) and specialty-specific peer groups ($n = 9$, 75%). Other benefits included a change in mindset regarding their clinical work ($n = 11$, 92%) and learning the process of innovation (83%). Among barriers, lack of time ($n = 7$, 58%), knowledge ($n = 6$, 50%), and resources ($n = 5$, 42%), were the most mentioned. All alumni interviewed have stayed engaged in the field of biomedical innovation after their completion of the VMW program. These findings show that the VMW program positively impacted the lives and careers of participants. This study identified some of the systemic reasons that deter physicians from regularly engaging in innovation and provides guidance for how to design other innovation programs and further support the advancement of medicine.

Keywords Clinician-led innovation · Dermatology innovation · Problem-based innovation · Physician networking · Physician burnout · Virtual seminars

Introduction

There has been a decline over the past three decades in academic clinicians involved in problem-based biomedical research and innovation [1]. Physicians have a front-row seat to patient problems, placing them in a unique position to

innovate. COVID-19 has further accelerated the need for new medical solutions to clinical problems. However, most physicians do not receive formal innovation training and, therefore, lack the skill set to embark on the process [2].

Engaging more clinicians in innovation would benefit both patients and society. Dermatologic products and technologies are quickly growing in popularity, especially via social media channels, and the market is ripe for interested entrepreneurs and investors. The Dermatology Entrepreneurship Conference, initiated by a nonprofit organization called Advancing Innovation in Dermatology, offered the first dermatology-focused hackathon [3]. Hackathons have also proven to be increasingly popular, though they often lack continuity and are not commonly attended by physicians.

The Magic Wand Initiative (MWI) was launched to educate and empower creative clinicians to identify and solve problems affecting patient care. The MWI was launched in 2013 by Drs. Rox Anderson and Lilit Garibyan in the

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Department of Dermatology at Massachusetts General Hospital, a Harvard Medical School teaching hospital [4]. The purpose of the program is to increase clinician involvement in problem-based innovation in dermatology. Due to the success of this program within dermatology, it has been expanded to other specialties such as general surgery, orthopedic surgery and anesthesia. This program expanded into a virtual format (Virtual Magic Wand program) in 2018 to allow clinicians across the country to participate in innovation training. This is done through monthly virtual seminars held over the course of nine months, during which clinicians identify, define and present on a problem worth solving derived from clinical care. Prominent dermatologists and thought leaders are invited to brainstorming sessions to help participating clinicians in the program vet and frame the problem worth solving. The course also provides didactic sessions on topics such as intellectual property and design thinking (Table 1). The program has grown from 7 participants in 2018 to 22 participants in 2022 from across the U.S. and Canada. Studies on the program have shown that the innovation skills taught during the VMW program reduce burnout and bring more joy to daily work [2]. To identify the impact of the VMW program on participants and decipher the potential benefits of this innovative curriculum, we conducted structured interviews of 12 alumni.

Methods

Data collection

Qualitative research methods were selected for this study to interpret nuanced responses about the participants' experiences. We used grounded theory, a method that derives theory as data is collected as opposed to conducting research to reject or accept a hypothesis, as a basis for the study. All recruitment and data collection procedures were completed by a trained research assistant (RA) from June through December 2021 (R.A.D.) We performed

Table 1 Virtual Magic Wand sample syllabus

1. Introduction to MWI and assignment	1 h
2. Brainstorming	1 h
3. Making a pitch and effective presentation skills	1 h
4. Pitching your problem I	1.5 h
5. Where are they now? (presentations from past VMW participants)	2 h
6. Design thinking + stakeholders	1.5 h
7. Intellectual property and regulatory consideration	1.5 h
8. Pitching your problem II	1 h
9. Commercializing a product	1 h
10. Refine your problem worth solving—team pitch final	1 h

qualitative analysis of semi-structured interviews from past participants of the VMW program (12/33 alumni). The RA recruited participants via email and interviews were conducted via video call. The alumni interviewed were those who responded to our recruitment email. The participants represented a range of genders, current roles, and geographic locations (Table 2).

At the beginning of the video interview, we verbally consented participants. Each participant acknowledged that the interviews were voluntary and were asked if they were comfortable with being recorded. They affirmed understanding that the purpose of the interviews was research. The RA prefaced the interviews by stating the purpose of the data collection and her role in the research process. Interviews typically lasted 15–20 min and followed a standard discussion guide (Table 3).

Data analysis

Audio recordings of interviews were fully transcribed and coded (R.A.D.) on Dedoose (SocioCultural Research Consultants, LLC, Los Angeles, CA), allowing emergent themes to be explored in subsequent groups. Interviews aimed to find commonalities between the experiences of dermatologists. The contents of the transcripts were confirmed by participants. Theoretic sufficiency, the point at which additional data sampling will not lead to additional information, was observed after 12 interviews. We utilized the 32 items on the Consolidated Criteria for Reporting Qualitative Research (COREQ) Checklist to ensure thorough reporting. We also used the Standards for Planning and Reporting Qualitative Research (SRQR). These checklists are available upon request.

Table 2 Interviewee characteristics

Setting	Sex	Location
Chief of dermatology, founder/president	M	Washington DC
Private practice	F	Jackson, WY
Private practice	F	San Francisco, CA
Chief medical officer, founder	M	New York, NY
Academic hospital	F	Boston, MA
Academic hospital	F	Iowa City, IA
Private practice	F	Pasadena, CA
Academic hospital	F	Salt Lake City, UT
Mohs fellow	F	San Francisco, CA
PGY-4 dermatology resident	M	College Park, MD
Academic hospital	F	Raleigh, NC
Private practice	F	Philadelphia, PA

Table 3 Standard discussion guide

1. What are you doing now?
2. How did you hear about the VMW program?
3. How has it contributed to your career?
4. What drives you to do this work?
5. What is the biggest area (related to your role) you are curious about and why?
6. What advice would you give a clinician wanting to pursue medical innovation?
7. Why do you think it is important for clinicians to innovate?
8. What do you think is a barrier to clinician innovation?
9. Have you been able to raise money? How did you validate your idea?
10. What resources have you found to be most helpful?
11. If you had unlimited money and time, what project would you want to work on?
12. Would you recommend VMW program to a colleague/friend?
13. What is unique about VMW program?

Results

Decoding the study identified two major recurring themes which included (1) the benefits of the VMW program and (2) the barriers related to clinician-led innovation. It was found that the major benefits of the program were the network, the mindset shift that allowed participants to better identify problems, and the exposure to the innovation pathway. Regarding reasons clinicians do not engage in innovation as much as they would like, the most common reasons were lack of time, knowledge, and resources. All the alumni stayed engaged in the dermatology innovation ecosystem following the program's completion.

Theme 1: Benefits of the VMW program

Network

All participants ($n = 12$, 100%) spoke positively about the network the program gave them. Many alumni ($n = 10$, 83%) expressed that being exposed to leaders in their field and active innovators created excitement about innovating.

Many interviewees also cited the invaluable resource of working exclusively with other physicians in their specialty:

- “The major difference between VMW and other innovation programs is the focus on people with the same background who see the same problems. During presentations, I understood exactly what the clinicians were talking about since I had the same problems myself. Talking to the same subspecialty and connecting with physicians who are more advanced and who have contributed to the field has been really helpful.” (Medical & Cosmetic Dermatologist, San Francisco, CA)

Ten participants (83%) expressed gratitude for the time donated by leaders who are innovators in dermatology and

how it inspired them. Participants highlighted the benefits of being surrounded by program leaders and guest speakers who are experts in the field and who helped guide them in problem definition and articulation.

Changed mindset to identify problems

All but one of the dermatologists spoke about how the VMW program allowed them to see the world differently ($n = 11$, 92%). Specifically, they noted how they were more attuned to problems, more likely to collaborate with other departments, and more likely to believe in themselves as agents of change. When asked about finding time to innovate, one participant noted the act of innovating as a way to relax. She also felt it made her clinical duties feel more enjoyable, as she was seeking out problems worth solving, and felt she was a better clinician by being involved in innovation.

Many participants noted how part of their shift in thinking fostered their ability to become entrepreneurs:

- “One of the nice byproducts of this was just seeing some of my classmates come up with new products and feeling like any of us can do it...it was very inspirational to be able to see people have an idea and then run with it.” (Dermatologist & CEO, Washington, DC)

Learned innovation techniques

After the benefits of connecting with like-minded individuals and a changed mindset, the instruction on the innovation process was the third most commonly mentioned benefit of the VMW program ($n = 10$, 83%).

One idea reinforced several times throughout the VMW course is the focus on problems rather than solutions. The authors appreciated many of the interviewees mentioning this concept:

Table 4. Table

Type of barrier	Additional illustrative quote
Time	“I think our clinician workforce faces a lot of pressure, right? Not only in terms of the scope of our practice and not just meaning clinical practice, but the scope of responsibility in terms of billing and documentation, running small businesses, trying to have a personal life outside of clinical practice. It's time, right? And I think over the years, clinicians, there's more and more that are asked as clinicians. And it's about when do you find this time and how can you carve out that time that doesn't sacrifice your personal life or your family life? That doesn't sacrifice income. And that's hard. It's like, how do you create time out of thin air, right? And it's about how can we just reprioritize this? How can we better engage providers and clinicians to participate in this? Is there any way that we can offset or lift that administrative burden or minimize the burden of time constraints on them to participate.”
Lack of knowledge	“It's [innovation work] something I've always been drawn to, but I feel like I tend to be a little bit shy about stuff like this.”
Lack of resources	“I'm really fortunate in my department, I do have some time carved out to do innovative projects that are really unstructured, like just innovative time that I'm paid for. And I'm really lucky for that. So for me, I can't say that's my current barrier, because it's not and I'd be lying to say it is. But I think that that is a common barrier. Maybe that's what I mean, like, I think when I talk to other people about why you're not why they're not doing it, they would say that.”

- “The biggest contribution the VMW program has had for me is how to think about problems. In the past I would have said: ‘Here's a problem I see but I can't do anything about it.’ Now I say: ‘What are the things that make it a problem? Why hasn't it been solved yet? How do I think through it? Why does the problem still exist?’ Thinking about that is key to moving forward to finding solutions.” (Medical & Cosmetic Dermatologist, San Francisco, CA)

Additional illustrative interviewee quotes demonstrating the gains the participants experienced can be found in Table 4.

Theme 2: Barriers related to clinician-led innovation

Time

Over half of the participants ($n=7$, 58%) noted time as the biggest barrier to innovation. Some feel an obligation to other duties, such as administrative tasks or family life.

Lack of knowledge

Half of the physicians ($n=6$, 50%) felt they lacked the knowledge about entrepreneurship to go forward with the idea.

Lack of resources

Even if the physician had an idea and the commitment to dedicate the time to an innovative project, almost half ($n=5$, 42%) of those interviewed felt that they lacked resources. Other physicians noted that employers often do not want to take on the risk of an innovative project when a stream of patients is a sure way to generate income for their shareholders.

Additional illustrative interviewee quotes demonstrating the prominence of the aforementioned barriers can be found in Table 5.

After the VMW program

All alumni interviewed have stayed engaged in the field of biomedical innovation after their completion of the VMW program. Two (17%) participants have become leaders in the Magic Wand organization. One participant took on a leadership role within the dermatology innovation network and is mentoring dermatology residents interested in innovation. Four (33%) participants are currently working on an innovative idea. One is serving as a medical consultant for a startup, while another co-founded a medical environmental nonprofit. Another is implementing innovative projects within their academic medical care system. Two VMW alumni interviewed started their own startup companies. One of these founders noted how helpful the program was in the creation of his company:

- “I think the idea...was significantly improved via the VMW program. Getting more eyes and brains on the idea refined the final product and I received guidance on the best way to take it to market.” (Dermatologist & Founder, New York, NY)

Several of the VMW alumni interviewed were residents when they were enrolled in the course and expressed interest in continuing their innovation work as they progress through their careers. Each participant took distinct lessons from the course and has created their own path in the years since.

Table 5. Table

<i>Type of Benefit</i>	<i>Additional illustrative quote</i>
Network	“This program just makes it [innovation] much more accessible to people who I think sometimes can feel like they're alone in terms of their curiosity and their creativity”
Connecting with other dermatologists	“I think it really focuses on clinicians. And certainly the fact that it focuses on dermatologists is very helpful just because we understand the needs of our patient population. So the fact that it's clinician focused is probably the most unique aspect of it.”
Mentorship	“MWI does a great job of taking experienced people who have completed innovative ideas within dermatology and formalized the process. The MWI leadership then made it available to people outside of their home institution and implemented it across the country, which is pretty remarkable.”
Learned the process of innovation	“It breaks down innovation into manageable, digestible parts. It recognizes innovation as an important part of the future of medicine and of maintaining our passion in medicine. And it speaks to something I really love. So that's what I think is unique about it. You don't see these things all the time. I mean, you see stuff like, you see stuff like, you know, maybe parts of it, like how to get a patent or how to do this or that. But what the magic wand does is it starts you at the very beginning. It starts you with identifying a problem in your daily life.”
Refine a problem	“After going through Magic Wand Training, I'm more attuned to problems, even if they're not problems worth solving. The best problems affect all stakeholders. It's changed the way I approach problems. I now evaluate from an entrepreneurship perspective if there's a viable path forward to a solution. A solution won't make it anywhere if it doesn't affect many stakeholders.”
Changed mindset	“It's been nice to have those tools as to how to approach them [challenges], and also even to think of approaching them in the first place.
Reduce burnout	“I think that is a tool against burnout and keeps you creative and thinking about how things can always be improved. It gives me a lot of energy and it's so exciting.”
Understanding the power of being a physician	“It's important for people to feel like they're not powerless. It's important to feel that this is not just happening to you, that you have, you have the power to do something. And that I believe, and little in my belief, this, that that decreases burnout, by empowering physicians to make a difference, and not be powerless in their careers. But then the other really important thing is that, you have to remember that when you're a physician, you have this perspective that other people don't have, you are seeing patients day in and day out. And you know, what problems are really happening to patients. Whereas, you know, people who are, you know, in biotech companies and have PhDs, they also offer something, obviously, the, you know, engineering background or whatever. But I think physicians have to remember that their perspective is unique, and that it's important that we continue to offer it.”

Discussion

This qualitative in-depth interview study revealed the noteworthy benefits of the VMW program and the barriers commonly experienced by clinicians who want to engage in innovation. The participants most commonly mentioned the importance of the network that the VMW program provided, as well as shifts in their attitudes toward innovation training and toward their capacity as innovators. The participants noted that lack of capacity, information, and means were the main obstacles that hindered their desired engagement in innovation work.

The VMW program connected participants to fellow dermatologists who were also interested in innovation; featured prominent speakers from diverse areas of innovation; and introduced participants to topical conferences, hackathons, and job opportunities. Despite going through years of education, many of the participants had never been taught the process of innovation and often did not know where to start, even when they had a great idea for a solution to an unmet

need. The physicians had not previously encountered the VMW program material in their higher education coursework. Besides technical knowledge, many physicians did not realize that they had the ability to integrate innovation and entrepreneurship into their careers. The medical school curriculum sets physicians up to start their own private practices or pursue a career in academia, but rarely does it show future doctors they have the skills to become innovators. Many interviewees talked about how they dreamed up better ways of solving problems from a young age but did not think that clinicians could go down the path of becoming a founder or CEO prior to VMW. In addition to educational resources, the VMW participants also cited that they lacked resources from their employer, including protected time and funding. A dermatologist noted that the time spent applying for grants encroached on her allotted time to work on her idea.

We found many similarities between the experiences of the dermatologists during and after the VMW program, despite their different ages, genders, locations, and current roles. The Magic Wand Initiative team has acknowledged

benefits of the program and will work to emphasize these helpful aspects as we expand our reach. Even without the VMW program, the network aspect can be implemented in other ways (i.e., social media). While the network can be provided easily and for free, buy-in from large institutions is needed to truly promote innovation that has the potential to change patient outcomes. Solutions are not required to be completely novel, as physicians have the clinical expertise to apply current solutions in innovative ways.

Many of the barriers spoken about can be overcome through educational interventions like the VMW program. Leaders in healthcare organizations can reduce physician workload or allow protected time for innovation. In terms of lack of knowledge and resources, medical education institutions should take note of the benefits of innovative work and offer learning opportunities for students. Medical schools have vastly expanded their curriculum in recent decades to offer a more holistic view of medicine, and innovation can be the newest addition. Several schools have already started innovation programs, like Vanderbilt School of Medicine's Medical Innovators Development Program, Vagelos College of Physicians & Surgeons' Innovative Medicine Program, Harvard Medical School's HealthTech Fellowship and Course, and George Washington School of Medicine's Clinical Practice Innovation and Entrepreneurship Track [5–8]. These programs all encourage clinically trained professionals to think deeply about the healthcare problems surrounding them and to apply innovation principles to ideate solutions to these problems. Even national professional organizations, such as the American Medical Association and the American Academy of Family Physicians have begun creating networks for practitioners interested in innovation [9, 10]. One recent study confirmed our findings that young clinicians are interested in biomedical innovation but require additional training to pursue entrepreneurial endeavors [11]. Physician burnout is a pressing issue in our country, especially after the COVID-19 pandemic, and expressing creativity through clinician innovation may be a needed respite. One physician asserts that, "the role of academic medical centers is not only to take care of patients but also to advance healthcare by bringing these innovations to the bedside" and that "entrepreneurship may be one of the most exciting opportunities in the twenty-first century" [12]. The momentum to integrate innovation and entrepreneurship curriculum into medical training has begun, and the outlook for better patient outcomes, happier physicians and an improved healthcare system is promising.

Limitations

First, all participants were dermatologists. While we anticipate that similar barriers to innovation exist in other specialties and among other clinical personnel, more research should be conducted in different fields with a variety of clinical roles. Second, only clinicians who volunteered were interviewed for this project. These participants may have experiences and opinions that differ from physicians who did not respond to our interview requests. Finally, due to our small sample size, we may have missed additional barriers or benefits. Although we reached thematic saturation, our sampling could have been broader.

Conclusion

VMW program encourages innovation by creating a network of like-minded individuals, teaching the innovation process, and shifting the way physicians think of themselves and their work. The biggest barriers to clinician-led innovation are lack of time, knowledge, and resources. Medical educators should reevaluate their curriculum to include teaching innovation, and department chairs may consider allowing their physicians protected time to innovate. More research is needed to examine the longitudinal effects of innovation instruction and benefits to other specialties.

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Author contributions R.A.D. conducted interviews, wrote the main manuscript text, and prepared tables and figures. All authors reviewed and edited the manuscript.

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Declarations

Conflict of interest The Magic Wand Initiative is supported by donations from Advancing Innovation in Dermatology, LEO Pharmaceuticals, and Sally Gottesman. Other disclosures: The trademark for Magic Wand is owned by the Massachusetts General Hospital which is the current employer of RAD, YSL and LG. The authors declare no other competing interests.

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