Game Changer: Is Palliative Care Ready for Games?

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Introduction

Dissemination of evidence-based psycho-oncology, supportive care, and palliative care services (hereto called palliative care) requires creative, technology-based solutions to ensure equitable, broad access. Currently, the reach of palliative care services is stymied by clinician time, unequal access between urban/rural settings, and varying degrees of uptake from patients and health systems.[1] As a result, patients' supportive care needs are largely left undertreated.[2]

Technology provides a unique and low-cost solution to wider dissemination of palliative care services for patients with cancer. Currently, 85% of US adults own a smartphone, and 93% use the Internet,[3] with the pandemic leading to expansive increases in telehealth services and comfort with technology. However, many palliative care telehealth interventions focus on telephone- or video-based delivery, which can remain clinician-intensive and limited in scope of dissemination. Although clinician evaluation/treatment is the critical aspect of palliative care services, not all supportive care interventions require this level of attention (eg, disease self-management, pain, symptom education, activity engagement, and communication training).

Researchers and clinicians should consider the use of serious games—games with explicit clinical and educational purposes—to meet palliative care needs of patients with cancer and serious illness. Serious games are uniquely appealing for use in palliative care because (1) patients' time is precious during chronic disease management, and any intervention must carefully maximize usefulness and enjoyment; (2) patients have high levels of complex needs that must be addressed in interactive and efficient methods; (3) patients with cancer are increasingly more comfortable using technology while sharing and exploring health information in a digital space; and (4) clinicians often do not have the time to promote patients' self-management goals, and technological integrations are an effective supplement to motivating behavior change to improve clinical outcomes.[4,5] In this commentary, we further explain our rationale for advancing serious game interventions in palliative care settings, along with advice to researchers and clinicians who are considering embarking on this path.

Author affiliations and support information (if applicable) appear at the end of this article.

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What Are Serious Games for Health?

Serious games are interventions that provide users with a meaningful purpose alongside a pleasurable experience. Generally, serious games must meet specific criteria: having a goal, providing rules of how to achieve that goal, providing feedback, and allowing voluntary participation.[6] Serious games can focus on skills development or problem solving, but should build immersive, enjoyable experiences where achieving goals in the game reinforce the learning objectives. Serious games for health have health-related goals that focus on behavior change or knowledge acquisition using basic behavior change principles of reinforcement. Serious game technologies motivate users to interact with and learn from the game by using algorithm-based, visually interactive media designs.

Serious games for health have precipitously increased over the past decade. Researchers have used games to provide novel stand-alone interventions, complement an existing mobile or web-based intervention, or provide a novel delivery mode for a validated intervention.[7] Even longstanding interventions in palliative care have used game-like formats to engage patients and caregivers in advanced care planning and serious illness conversations.[7,8] Relevant, existing games include Hello,[9] Go Wish,[10] and the MyPal initiative in Europe.[11] Contrary to many misperceptions, all genders and ages engage with games, especially those available through social media and smartphones.[12-14]

Potential Benefits of Serious Games

Uniquely, games can present complex concepts using engaging, illustrative representations, especially when compared with paper versions of similar content. At various times, games provide distraction, knowledge, entertainment, and even social connection.[15] Serious games provide extensively wider access to evidence-based content—a relevant consideration in light of increasing rates of googling solutions to symptoms during the cancer experience.[16] These interventions use a spectrum of game features spanning from immersive, narrative-based games to the gamification of specific features within existing interventions.

Interventions designed as games are increasingly showing a positive impact on patient's health and well-being. Some of the most effective (and exciting) serious games target patient self-management and

coping with chronic disease or relevant health behaviors for cancer prevention.[17-25] For example, although much work is limited to pilot studies, several serious games designed for patients with cancer demonstrate a positive impact on health behaviors pertinent to cancer prevention and patient-reported outcomes including drug adherence, symptom burden, and quality of life.[26,27]

Games are well-received because they are approachable, do not require in-person appointments, can be accessed via smartphones or web-based platforms, provide meaningful and desired distractions, and are not dependent on clinician input. They can be especially beneficial for patients who are hospitalized, receiving elongated infusion treatments, and subject to long waiting periods between appointments when patients may be looking for distraction and information. Patients often struggle to engage in self-management and coping interventions because many rely on avoidant coping strategies.[28,29] Games present meaningful content in alternative modalities and may serve as a solution for individuals particularly prone to avoidance of self-management.

In their approachability, games can transform the complexity of serious illness management into palatable action steps by providing patients with a structure representative of their experience while being geared toward achieving their health-related goals. If available on open platforms (eg, iOS App Store/Google Play Store), anyone with appropriate devices can download the intervention, making serious games infinitely more accessible than in-person clinical services.

Potential Limitations of Serious Games

Researchers should also consider potential barriers of using games as intervention platforms. Development and maintenance costs remain the primary barrier. Game development incurs large upfront costs, and most features require additional costs. While most of our discussion emphasizes digital games, it is important to note that analog games (eg, board games and card games),[8] which can be less costly, also fit the serious game definition—although their dissemination potential is less promising. Understanding which features are most integral to the game's learning objectives can help researchers focus on which game elements to include in initial versions for testing and validation. In addition, cost-effective options are increasingly available through low-cost, modifiable platforms (eg Amazon Mechanical Turk MTurk).

A major driver of cost depends on who is developing the game. Typically, researchers may need to decide between institutionally affiliated groups and outside vendors, which can often vary dramatically in cost.[30] Although researchers want to create the best game possible, it is also important to ensure that the company is willing to work as a team, understands the research needs, and uses a HIPAA compliant platform. Developing technology can often take longer than estimated; technology-based bugs require modifications and can cause delays in development schedules, resulting in extra costs for both tech and research staff.

Serious game technologies, once tested, may not achieve the desired outcome. To reduce the likelihood of negative outcomes, researchers should engage in iterative designs that ensure bug resolution and securing access to the data from the games that reflect users' usage of the app a priori. Developing a versatile, multimodal serious game intervention and collecting qualitative and quantitative data regarding its use and impact can help to inform modifications to the technology and its clinical integration to better serve patients' needs in future iterations.

The Science of Games

The promise of serious games to advance palliative care's goals depends on the scientific rigor by which we design and evaluate these interventions. The scientific landscape is moving toward more intensive designs in which game reporting becomes uniform and transparent,[31] and evaluations are focused on efficacy and mechanism testing.[32] Researchers interested in serious game interventions should use frameworks specific to technology-based interventions (eg, the Behavioral Intervention Technology Model) or serious games.[33,34] Frameworks like these can not only help to structure evidence-based game development but also help to identify the active ingredients within a game.

Case Studies

Strong together self-advocacy serious game. Our team of researchers and clinicians developed a conceptual framework of patient self-advocacy in women with advanced cancer. Enticed by the simplicity and depth of serious games, we transformed our qualitative and quantitative findings into a self-advocacy serious game. First, we solicited feedback from women undergoing chemotherapy on our hand-drawn wireframes. Then, we developed a prototype that was successfully pilot tested. Users are introduced to characters who are also women with advanced cancer and are instructed to keep the characters healthy and strong through difficult situations. As users follow these characters, they select behaviors to decide how the characters should respond to common, difficult situations (eg, managing treatment side effects, talking with oncologists, etc). See Figure 1 for more details. Currently, we are evaluating the interventions' efficacy in a large-scale, multisite randomized clinical trial funded by the National Cancer Institute (1R37CA262025-01).

Smartphone Technology to Alleviate Malignant Pain with Pain-Focused Cognitive Behavioral Therapy. With a desire to integrate pain-focused behavioral treatment to a previously developed pain and opioid tracking app for advanced cancer (R21NR01774),[19] we secured foundation funding to tailor pain-cognitive behavioral therapy (CBT) content for app delivery. In collaboration with clinician experts,

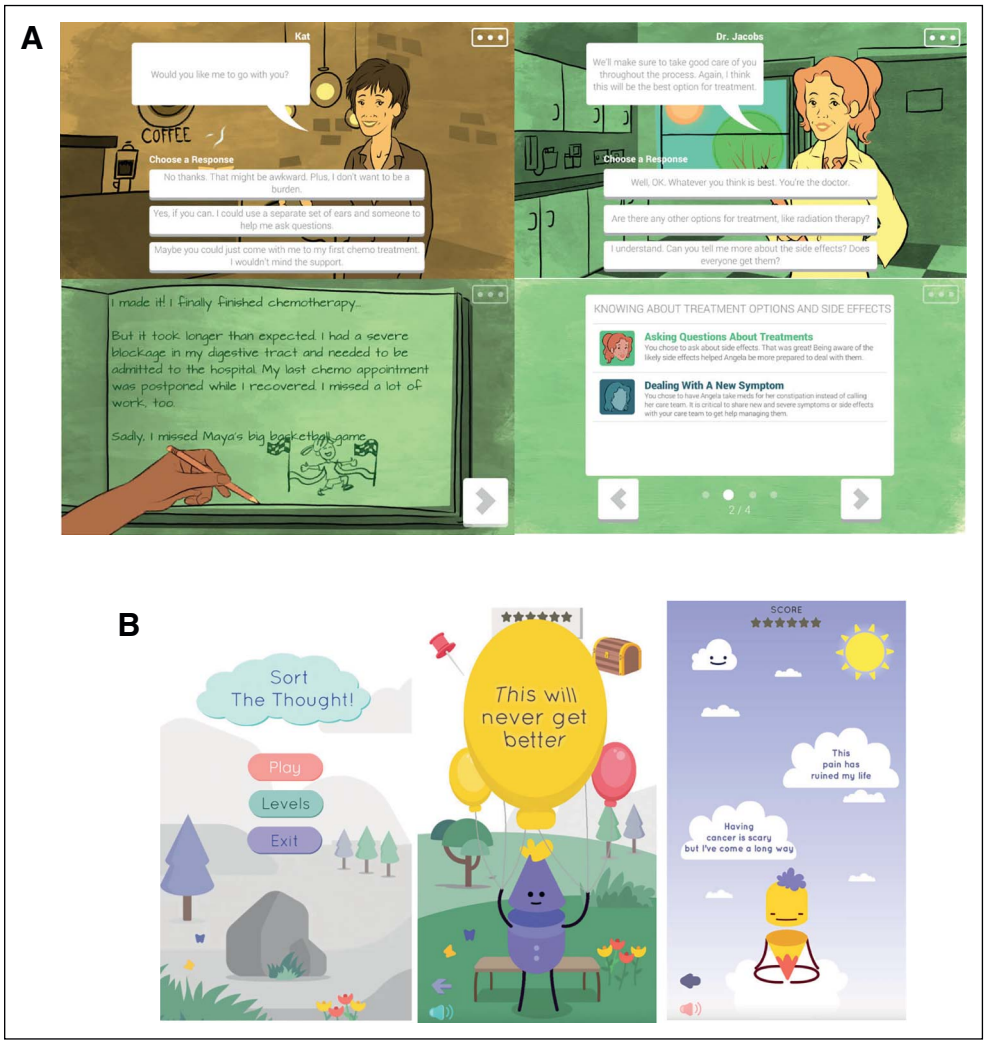

FIG 1. (A) Screenshots from Strong Together Self-Advocacy Serious Game: When selecting behaviors that represent self-advocacy, patients are then exposed to the positive outcomes associated with self-advocacy and the contrary for behaviors not reflective of self-advocacy. Various feedback mechanisms are used to reinforce these learning outcomes including debriefing at the end of each session, changes in color and music within the game, and expressing feedback about how these actions resulted in the outcomes. (B) Screenshots from the STAMP + CBT adaptive thoughts game, levels 1 and 2. In both levels of the game, the patient is guided to read an example pain thought, identify its category, and drag the thought to the correct save (adaptive) or dispose (maladaptive) bin—where they are either positively (score points and character dances) or negatively reinforced (error sound with visuals) to promote learning. CBT, cognitive behavioral therapy; STAMP, Smartphone Technology to Alleviate Malignant Pain with Pain-Focused.

patient stakeholders, software engineers, and game design specialists, we created embedded cognitive games and gamified features into this pain-focused app. The app pushes brief, gamified content to the patient each day while delivering daily symptom reports with tailored, algorithm-based feedback for pain and psychological symptoms. Specifically, the current serious game focuses on aiding the user in learning to differentiate between maladaptive and adaptive thoughts relevant to cancer pain. See Figure 1. Funded by the National Palliative Care Research Center and the NCI (R21CA263838), the Smartphone Technology to Alleviate Malignant Pain with Pain-Focused + CBT (STAMP + CBT) app is currently being pilot tested with patients with advanced cancer to evaluate its feasibility and acceptability.

Recommendations

1. *Deciding on a partner for game development.* Serious games require experts in coding, graphic design, technology-based algorithms, and user design experience. Understanding the capabilities of different gaming/design companies and the cost drivers of game features needed to achieve the learning outcomes of interest is a pivotal step in deciding to create a serious

game. Researchers are responsible for both conveying to patients which patient health information (PHI) is collected and selecting HIPAA-compliant game platforms that ensure PHI protections.[34]

2. *Breaking game development into multiple stages*. By breaking the project into stepwise projects each with demonstrable outcomes (feasibility of the technology, acceptability of its use, and the impact on patient-reported outcomes), researchers can more easily address issues related to funding, timelines, design and content concerns, and patient preferences. This also allows for iterative changes on the basis of incoming data and incremental funding. To start, identify the main learning and behavioral objectives, create core ways to achieve these goals on the basis of the type of game being built (eg, a narrative-based game versus a multiplayer quiz-like game), then identify game segments, and build additional content and features over time. Advanced features, such as integrating user data from the game into the medical record, can help modify clinical care; although such features should be discussed in earlier stages, they should not be implemented until funding and institutional readiness are achieved.
3. *Recognizing differential access and use of serious games*. Serious games should be designed with demographic considerations in mind. Age, education, and internet access affect patients' use of mHealth technologies.[35] Simplifying images and using larger text is often necessary for users of older age, and characters that are representative of the target users (gender congruent or gender neutral) can also improve uptake.
4. *Use patient stakeholders strategically*. Although the game development process is ripe for user design techniques that bring in target users, recognizing how and when to collaborate with patient stakeholders is key. Research suggests that using stakeholders for targeted feedback may lead to better game outcomes than if stakeholders are used as codesigners.[36]
5. *Embedding empirical tests and comparisons within games*. Integrating serious games with ecologic momentary assessments, app-led assessments that allow patients to complete self-reported states or symptoms in their natural environment, can strengthen such interventions. Technology algorithms can be embedded to deliver games or other interventions (eg, education, advice, reminders, and games) in response to low or elevated symptom reports (eg, elevated pain, increased stress, and worsening nausea; Fig 1).[37]

In conclusion, serious games are a promising, evidence-based, accessible modality for providing palliative care interventions to patients with advanced cancer and caregivers. With upfront considerations of the scientific and practical considerations, researchers and clinicians can build on the growing scientific evidence supporting games for health.

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