High tech low tech: What the heck?

Delineation of definitions and implications for practice

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INTRODUCTION

The Assistive Technology Act of 2004 defines an assistive technology (AT) device as "any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities." [1] Assistive technology devices are further defined in several ways, almost always including the concepts of high tech and low tech.

Defining high tech and low-tech devices is confusing. High-tech and low-tech definitions vary depending on where you look for an answer. Clouding these two categories not only introduces potential conflict from a solution standpoint, but it also creates a barrier when navigating reimbursement. The Global Report on Assistive technology highlights barriers to AT around the world to include issues such as lack of awareness, high costs, procurement and delivery challenges, lack of funding and investment and sociodemographic factors among others. [2] These barriers would benefit from more clarity around defining high tech and low tech.

Aside from the clinical challenges with properly defining low and high tech, additional challenges exist from the client's perspective. A client may perceive receiving a low-tech solution as negative and will only consider something high-tech as an acceptable outcome to intervention. Similarly, a client receiving a high-tech solution may feel overwhelmed with having to learn a perceived complex process for the task they are hoping to accomplish. The Human Activity Assistive Technology (HAAT) Model as described by Cook, et al. as a long-standing example of a model that demonstrates how AT is an integral piece of a larger social, human, and environmental picture.[3] An update was proposed to the model in 2013 that would more "…fully capture the inherent omnipresence of the context that permeates the other three core concepts or the centrality of the person". [1, p.238]

This paper demonstrates ways that uniformity in definition can lead to increased functional outcomes and overall client satisfaction. High-tech devices as described by Cook, et al. are "more complex, frequently electrically powered, or electronic, having multiple functions, are more difficult to acquire, and are more expensive". [3, p.4] Low-tech devices are typically "easy to operate and construct, are manually driven, easy to acquire, and low cost" [3, p.4]. Georgia Tech defines them in the following way with distinct differences: They state that "Low tech AT are devices or equipment that don't require much training, may be less expensive and do not have complex or mechanical features. High Tech AT refers to the most complex devices or equipment, that have digital or electronic components, may be computerized, will likely require training and effort to learn how to use and cost the most." [5]

This paper highlights the fact that improved clarity around the distinction between high tech versus low tech is crucial for purposes of user access and reimbursement. This paper proposes that the definition of high tech or low tech must include the perspective of the user and that two different clients may consider the same piece of equipment high tech or low tech depending on client factors such as motor, sensory or cognitive function.

APPROACH

This section outlines ways in which the delineation of high tech and low tech are operationalized and implemented through 2 case examples.

Case example 1

The first case example highlights the experience of an older woman with a progressive condition that affected her motor skills, cognition, and vision. Her goal was to remain as independent as possible at home with her husband, her primary caregiver. She struggled with several activities of daily living, requiring varying levels of physical and cognitive support to execute depending on her pain levels and progressive nature of her condition. Specifically, due to lack of visual acuity, she had difficulty applying her makeup, which is a task her husband also found challenging to complete due to inexperience. While she was able to apply the makeup using her sense of touch, this client struggled with locating and identifying various makeup tools and materials. A low-tech solution was

implemented to address this barrier. A color contrast background was installed, and reorganization strategies of the tools and materials were used. With this contrast and organization, she was able to identify tools and materials based on size and shape. While this intervention was successful for this client, high-tech approaches could have been implemented as well. For example, the use of recognition apps would be able to identify objects for her. There are several reasons why this easily accessible option "high-tech" solution would not work for her based on client factors. First, due to her visual and fine motor skills, it would have taken several sessions to set up a device accurately and functionally for independence. Additionally, based on her cognitive skills, learning a new device and/or app would have been very challenging, likely affecting her motivation to independently complete the task. Finally, as this client's condition was progressive, this low-tech solution of installing a color contrast background allows her to be independent for longer than a high-tech recognition app, in which her decline in abilities would prevent independent use very quickly. Given the client factors in this situation, low-tech solutions can be implemented immediately and be adapted to changing needs with ease as opposed to a high-tech solution, that may have taken so long to set-up and train and that her condition may have changed by the time of implementation.

Had this individual been someone who had even moderate digital affinity, they may have considered the app solution a lower tech solution than the color contrast and reorganization solution. They may have considered the color contrast and reorganization complex to remember and keep in the correct places.

Case example 2

The second case study specifically demonstrates the complex journey of decision making as it pertains to the just right fit for clients when approaching high-tech vs. low tech solutions. This client presented to OT with multiple limb amputations from a blast injury that was sustained during combat operations in Afghanistan. During the initial evaluation, the client stated that one of the goals he wanted to work on was to play video games despite the complex polytraumatic injuries he incurred. The client's upper extremity injuries included a transhumeral amputation on the right upper extremity and multiple digit amputations on the left hand. The initial approach to gaming solutions included simple positioning techniques with the controller that included custom splinting for his hand as well as strategically positioned mounts to facilitate button/switch access. The team also made intentional decisions to select games with simple controls and inputs. The goal of this setup was to help the client achieve success with this activity despite the quality of game play. The client was successful with the low-tech approach, however, his satisfaction with being able to play video games was not ideal. The client stated that he wanted to explore ways to be able to play any game that was on the market regardless of the difficulty. Moving away from the low-tech solutions, the team decided to look at other ways for the client to engage in gaming that included more complex games which would require more complex solutions. These solutions included a study of traditionally required movements to engage in operating a controller. The team decided to incorporate the Xbox adaptive controller as the hub for a multi switch approach considering his available movements. He was able to use the index finger and thumb from his left hand to operate a traditional analog stick and four buttons. The team was able to position another analog stick (using a goal post configuration) with two additional switches that were accessible using his right residual limb. There were two other optional switches that the client was able to use if needed that were activated using his two legs. This setup was a much more high-tech approach, however, gave the client greater independence considering his desire to play without being limited to simple games. The decision to change course from low-tech to a high-tech solution was specifically made based on the client factors and potential environmental modifications available during treatment sessions.

This case demonstrates the challenge with the current definitions for high-tech and low-tech solutions. Though the team decided to take a high-tech approach, the criteria did not necessarily align with the traditional definition. The initial low-tech approach included a higher cognitive load on the client and was a bit more difficult for the therapist to facilitate given the custom splint fabrication for the controller. In comparison, the high-tech approach required less of a cognitive load, was easier to acquire, and easier to operate.

IMPLICATIONS FOR PRACTICE

These two cases highlight the importance of the two definitions as they relate to cases that might have used technology in ways that could be considered high tech or low tech.

Abandonment and resources

The Global Report on Assistive Technology [2] states that "if assistive technology provision is not based on user involvement and adequate procedures, the risk of abandonment increases, bringing with it the waste of public resources and also needs not being optimally met." Further clarifying the difference between high tech and low tech and that the perspective of the user is central to the definition and will strengthen the users adoption of the device. Additionally, as described in Case 1, there are times when the electrically powered device may be the less costly and easier one depending upon the user's digital affinity [4], or ability to easily learn new tech.

Language use

Using subjective language, such as "complex", "difficult to acquire" or "effort to learn", to describe high-tech assistive technology opens the definition to interpretation, which can be harmful to the client plan of care and reimbursement. For example, is high-tech complex to the client or to the practitioner? Complexity can change based on context. Similarly, "difficulty to acquire" is dependent on many socioeconomic factors. "Effort to learn" is also based on client factors (cognition), and external factors such as training and support available.

The same is true for the definitions of low-tech assistive technology. "Easy to operate" is dependent on client cognition, vision and motor skills. Using "low cost" as a guideline to define low-tech creates a lot of assumptions about clients and is dependent on many socioeconomic factors.

CONCLUSIONS

This paper proposes further consideration of low-tech and high-tech definitions of assistive technology. The assignment of a low-tech or high-tech label should be dependent on the client's current affinity to technology, as well as the other options of solutions available for the barrier. We presented examples of how consideration of low-tech or high-tech devices significantly impacted the user and their functional outcomes. The definition of low-tech or high-tech assistive technology, and therefore the cost, should not impact the provision or implementation of services and devices. Best practice must be based on client needs and preferences.

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