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Opinion

A Technological Approach to Healthcare: A Stroke Survivor's App Store that Provides Personalized Relevance Rankings for the Apps

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Every year over 795000 people are hit by a stroke in the Unites States [1]. Stroke is a leading cause of long-term severe disability [1-3]. Medical research helped increase the chances of people surviving a stroke. While this is obviously welcome news, it implies that the number of people left with important disabilities is increasing. It is well known that age is the primary risk factor for stroke [3] and thus also the number of people hit by a stroke will continue to increase in the near future because of our ageing society.

What can we do to improve the quality of life of survivors? What is the most effective way to have an impact on these people lives without increasing the cost for society?

I believe the answer is in the use of technology, especially low-cost technology (software such as apps and games). An app could be a solution to many problems. For example apps could help survivors to keep their mind and body trained, to avoid getting lost, to connect them with other survivors, with their friends and family, to find what they need in town or on holiday.

Some complex everyday activities (like cooking and gardening) could even become a form of rehabilitation if survivors could practice them safely while being monitored, for example, through an appropriately developed app.

A large number of apps and games are already available to help with all sorts of problems (e.g. language and communication, monitoring blood pressure, organizing drug and doctor appointments), and useful for training (e.g. memory, attention, visual acuity). These apps are spread around app stores and the web, sometimes aggregated in some websites (e.g. the Stroke Foundation, Strokesmart, the Stroke Association) but often these collections aren't supervised by qualified health professionals, cover a very limited range of apps, are not regularly updated and well designed (missing search options or scoring systems). Thus many existing useful tools are currently underused by survivors.

It is possible to establish a system to exploit these resources more effectively. An initial limited investment would cover the creation of a small team with technological and clinical expertise that would categorize all available apps depending on the problems that they could be useful for (e.g. remembering doctor appointments, improving memory), rate them for quality, usability (according to criteria tailored to the needs of stroke survivors), and usefulness for a particular purpose. This categorized list could then be made publicly accessible on the web.

The rating is a very important point since it guides the patients to select the more appropriate apps for their own needs. An initial automatic assessment of the patient's difficulties, both motor (e.g. tremor, slowness, hand weakness) and cognitive, would help to personalize the rating and ranking in the list for each app. As an example, an app featuring small buttons will appear to have a low usability score and very low rank especially in the list for users with tremor; an app for training memory, if of good quality, could have a high usefulness score and very high rank, especially in the list for survivors experiencing memory deficits.

The overall rating and ranking in the list is dynamically calculated for each user, based both on the initial assessment of the users' skill level and on the characteristics of the app as initially evaluated by the clinical team (generally based on usability and quality), providing a low-cost platform for individualized therapy and assisting technology.

The rating (that reflects the usefulness of each app for each patient) can be dynamically updated as more users access the system sharing anonymous data regarding the effectiveness of each app for their needs. This adaptability of the rating system allows different apps to be compared: the relative improvement of the patients using a specific app is automatically compared to the improvement provided by similar apps. Apps that provide larger improvements across a wide range of patients are rated higher. Thus the quality score, initially subjectively given by the clinical team, would become increasingly more objective and indicative of the actual effectiveness of apps.

Once a complete list of apps is available, associated with a scoring system to understand how suitable and useful they are for patients, it is easy to understand what is missing, what is still needed for making the life of these people safer, easier and happier.

At this point the system is mature enough to attract the interest of app developers that can have an easy way to identify holes in the market and exploit an accessible route to market for their products. With a well-defined rating system, it is easier for the developers to create products that are more suitable for patients. For example, if a higher score is attributed to apps that allow voice recognition alongside touch interfaces, developers are motivated to create apps with both options to appear in a higher position in the list.

A small fee may be required to be included in the list, for covering the costs of rating new apps. With this business model the platform can

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be launched with a small investment and maintained at very low costs in the medium term, and it will be maximally useful to patients and possibly to researchers and doctors. Indeed a very large amount of data from patients can be stored and automatically analyzed to investigate the progression of the disease and the effectiveness of the therapy.

If the rating criteria were based on patient deficits, then the relevance of this system would be broader, not limited to stroke patients only, but encompassing a much larger category of patients with overlapping cognitive or motor difficulties.

The national health services should logically sponsor this platform. Occupational therapists, healthcare assistants and doctors could easily raise awareness about the platform across their patients.

I am proposing an alternative solution to modernize the whole assisting system maximizing the resources that are currently available. Similar solutions are urgently needed to decrease the gap between economic resources of health services and needs of the community.

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