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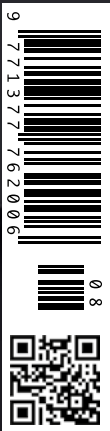
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# Improving Patient Compliance with Future mHealth

Summary: Combine the characteristic of our engagement with social media with existing technology and how could we improve patient compliance in the not so distant future?



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Patient treatment compliance is a significant barrier and a challenge for healthcare professionals the world over. While several studies have been conducted leading to techniques being developed to improve compliance and treatment outcomes, not enough seems to have been done to bring new technologies into play.

While we have seen an explosive growth in harnessing new technologies through the invention of diagnostic equipment, laboratory and radiology investigation techniques and molecular technologies for the pharmaceutical industry, attempts to overcome some of the most mundane barriers to patient compliance have been slow or tentative at best.

## Frustration with (Non)Compliance

From the patient point of view, barriers to treatment compliance include inadequate knowledge of illness and prescribed medication, poor discipline in taking medication and a fear of drugs. Review of medication information taking too much time and difficulty in obtaining knowledge of home medication constitute just two of the difficulties for physicians. When it comes to the healthcare system at large, treatment compliance can be undermined by a shortage of GP appointments and poor hospital communication (British Medical Journal 2017).

## Monitoring Technology

Now let us look at what technologies are viable for monitoring and influencing better patient compliance and health outcomes.

Technologies already mature and in use such as NFC, RFID, QR Code, embedded electronic chip, microprocessors, the IoT, are excellent candidates for more expansive applications in patient treatment protocol. We are already using several of these new technologies in monitoring, educating and serving as electronic “butlers” as part of the treatment in areas of medication

and post-discharge self-care of patients. Examples are monitored heart rate reporting, monitored blood pressure reporting, and monitored blood sugar reporting using smart phone apps that can upload data stream to a secure cloud storage location. The said storage location is given access via secure login to the physician’s office or the hospital that the patient is receiving care from.

I’d like to imagine a world where bolder and more effective treatment compliance would become mainstream. I think this is possible by harnessing an amalgam of contemporary technologies and newer technologies that leverage individual biomarkers and combine those with software driven hardware.

## Tech for Future Compliance

Recent developments in the way biomarkers are identified and used in developing treatment protocols have been exceedingly encouraging and exciting. Moving the process from the research bench to the patient bedside is already underway in some cases and a helping hand from molecular sciences, and powerful imaging technologies, is a boon to patients and medical professionals alike. That the biomarker discovery is an evolving ongoing process only bolsters the prospects for other hardware and software technologies to join the party.

A microprocessor is like a miniature computer central processing unit.

Microprocessors are key to marrying biomarkers with implantable chips that can happily live inside our bodies while silently monitoring and relaying what the biomarkers are telling them about our bodies. Since biomarkers are very specific in what they pick up in our bodies. A clever software-driven hardware chip that can “talk” to the biomarkers would significantly improve the monitoring and reporting loop both to the patient and the provider.

Artificial Intelligence also has a role to play. Let’s consider a combination of Natural Language Processing

(NLP) and Machine Learning (ML) for a stern virtual nurse that will not let you off easy on your physiotherapy. With ML, the software is aware of how many of the exercise routines you have completed and the degree of effectiveness of the routine. Over time, ML can look for and detect your areas of weaknesses or laziness and devise prompts that would help you or encourage you with improvement charts that would be displayed on the smart phone app that you would record your exercise start-stop events. If you ignore these helpful attempts by your virtual nurse, he/she would report your delinquencies to your provider. A carrot-stick approach that would have been setup at the time of your treatment planning would immediately come into effect. Nowhere to run. Nowhere to hide. Add Alexa from Amazon to your tribulations and now you have a duo of chips badgering you until you comply.

Compliance of physiotherapy is external and can be effectively monitored, assisted and reported. What about medication administration? There are some clever devices and operational approaches to medication dispensation and monitored reporting in the market. However, a clever patient who strongly objects to the side effects of his/her prescribed medication can find ways to cheat any system. A patient who simply forgets to take medications also loses out on the treatment outcomes and causes worry for the family and the provider. Added complications come up when the patient lives alone and does not have the luxury of an aide or a neighbor who can administer the medication if the patient is suffering from other complications such as dementia.

A combination of biomarkers and implanted chips can help such patients. Not unlike external infusion pumps, chips can be used to trigger medications that are attached to the patient in the form of dermal patches or pouches. These can be taped to the abdomen or lower back or any other discreet external location on the patient's body. When the biomarker picks up a value that is indicative of a drop in the medication's dosage, it signals the chip and the chip can trigger a mechanism attached to the said patch or pouch that would allow the right dosage to be released for a set duration.

## The Power of Data

Data when it is collected and indexed into useful categories can be invaluable to the patient and the provider. All the technologies discussed here, gather mountains of data. Edge computing can help sift through the heaps and collate and upload only the relevant pieces saving storage space and valuable time for the provider. Such data can also be aggregated to provide further analysis for understanding what challenges are not met and what

techniques and technologies engender best outcomes. A closed feedback loop would enable leaps and bounds of progress for providers in devising ever-expanding use of technology into their treatment planning.

Patients and their families would spend less energy on compliance, leaving the heavy lifting to the "butlers" in their bodies and look toward a healthy future. Providers would fare better in their profession deriving a much-desired satisfaction of seeing their patients recovering well. Job satisfaction will soar and employee turnover rate will fall.

## Unlimited Possibilities

Let's imagine we can bypass the, often cumbersome, present-day legal roadblocks without compromising ethical standards. What solutions could we come up with for effective patient compliance? If we were to imagine technologies and assistive devices coming together to become part of the human anatomy, the prospects of designing a near-perfect methodology that would combine activities of daily living (ADL) with a subliminal behavior modification through technologies that would seamlessly "guide" the patient along the treatment protocol with the patient not even realising it. Consider our obsessive engagement with the social media platforms with little or no financial or professional gains and yet, through this, we have been modifying our ADL, with considerable detriment to many dimensions of our lives.

If we were to harness a similar approach but for beneficial outcomes, technology would prove a better servant than a surreptitious master. ■

## KEY POINTS



- Lack of information and communication with healthcare professionals is a leading cause of patient treatment non-compliance
- Effective treatment compliance could become mainstream by incorporating technologies to monitor health outcomes
- Microprocessors, biomarkers, AI and implanted chips are all mHealth tools that could be used to increase treatment compliance
- The data collected from mHealth can be invaluable to the patient and the provider
- mHealth solutions for patient compliance would require using technology to adjust activities of daily living (ADL) to benefit patient health



## REFERENCES

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