October 13-15, 2017
Davis Conference Center
1470 Madison Avenue

Icahn School of Medicine at Mount Sinai

Mount Sinai Health Hackathon

Creating Novel Technology Solutions For Healthcare

Cancer

Clinical Perspective

Cancer is a prominent disease worldwide and has tremendous socioeconomic impact on patients and their families. It was projected that in 2016, an estimated 1,685,210 new cases of cancer would be diagnosed in the United States alone (cancer.gov).

Many individuals involved in the screening, diagnosis, treatment, and follow up of oncology patients. The diverse team involved including primary care physicians, oncologists, psychiatrists, psychologists, social workers, nutritionists, nurses, and physical therapists who are involved in the screening, treatment, recovery and monitoring of patients with cancer. In addition to clinical specialists, the patients need a support system including family and friends, online and in person support groups, hospital volunteers, and others to help them understand their diagnoses and make decisions about their care.

Equally important are the researchers across a wide range of fields including genomics, cell biology, informatics, pharmacology, and biomedical engineering who investigate disease biology, develop new treatments for cancer, improve diagnostic capabilities, and understand how targeted therapies can treat an individual person's disease. Indeed, cancer research is changing rapidly and is in large part being driven by technological advances in the fields such as imaging, nanomedicine, immunology, and genetics [1].

The development of new technologies alongside advances in personalized cancer therapy have allowed for exciting developments in the field of oncology. One example of a technological advance is development of a smartphone-based immunosensor for detection of the cancer biomarker CA-125; this may allow for an effective point-of-care tool for monitoring and detecting cancer [2]. In terms of cancer follow up, advances in technology may change the way patients interact with their physicians. There is evidence that digital technologies can be effectively and safely used for certain aspects of cancer follow up as opposed to the more traditional face to face visit [3]. Indeed, technology is emerging as an important and promising aspect in the diagnosis, treatment, and follow-up of patients with cancer.

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Solution Landscape

A range problems in the realm of cancer prevention, diagnosis, management, treatment and recovery can be addressed by technology solutions including apps, software and devices. Examples include but are not limited to:

- Apps/wearables for tracking lifestyle, diet and health for aiding prevention and recovery of cancer.
  - An app that targets smokers to help them quit (preventing cancer)
  - An app for managing diet and exercise of patients recovering from cancer treatment
  - An app that tracks physical activity of patients for monitoring overall health of patients through treatment

- Devices and apps to help in diagnosis or detection of cancer
  - Camera app for detecting skin cancer lesions
  - Point-of-care diagnostics for detecting serum cancer biomarkers

- Apps and software for patient-caregiver communication and management, and adherence of cancer treatment regimens
  - A software platform for managing patients in treatment and monitoring their treatment adherence, symptoms, side-effects, etc.
  - An app to help guide and educate patients throughout their treatment process
  - An app or software platform for aiding in clinical study data collection for new cancer therapeutics

- Apps for providing support, communication between peers of cancer patients
  - Social media tool to connect individuals and groups of individuals for discussing their journey in dealing with cancer

- Smart devices/software tools to enhance/improve current diagnosis or treatment protocols for cancer, such as chemotherapy, radiation therapy, surgical procedures
  - Machine learning tools to enable better analytics of patient data to improve diagnosis, optimize treatment protocols for individuals, etc.
  - A smart infusion pump to enable safer administration of chemotherapy
  - Wearable sensors to provide biofeedback to patients performing rehabilitation exercises after recovering from cancer treatment

References

1. Beerenwinkel, N., C.D. Greenman, and J. Lagergren, Computational Cancer Biology: An Evolutionary Perspective. PLoS Comput Biol, 2016. 12(2): p. e1004717.

2. Hosu, O., et al., Smartphone-based immunosensor for CA125 detection. Talanta, 2017. 166: p. 234-240.

3. Dickinson, R., et al., Using technology to deliver cancer follow-up: a systematic review. BMC Cancer, 2014. 14: p. 311.

4. Cancer Statistics. National Cancer Institute. March 22 2017. https://www.cancer.gov/about-cancer/understanding/statistics

5. Bert F, Gualano MR, Clemente S, Villa G, Siliquini R. [Technology and prevention in the era of mobile health: applications for cancer screening programs]. Ig Sanita Pubbl. 2017;73(1):13-27.

6. Fishbein JN, Nisotel LE, Macdonald JJ, et al. Mobile Application to Promote Adherence to Oral Chemotherapy and Symptom Management: A Protocol for Design and Development. JMIR Res Protoc. 2017;6(4):e62.

7. Young-afat DA, Van gils CH, Bruinvels DJ, et al. Patients' and Health Care Providers' Opinions on a Supportive Health App During Breast Cancer Treatment: A Qualitative Evaluation. JMIR Cancer. 2016;2(1):e8.

8. Davis SW, Oakley-girvan I. Achieving value in mobile health applications for cancer survivors. J Cancer Surviv. 2017;

9. Ribeiro N, Moreira L, Barros A, Almeida AM, Santos-silva F. Guidelines for a cancer prevention smartphone application: A mixed-methods study. Int J Med Inform. 2016;94:134-42.

10. Mirkovic J, Kaufman DR, Ruland CM. Supporting cancer patients in illness management: usability evaluation of a mobile app. JMIR Mhealth Uhealth. 2014;2(3):e33.

11. Appelboom G, Camacho E, Abraham ME, et al. Smart wearable body sensors for patient self-assessment and monitoring. Arch Public Health. 2014;72(1):28.