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How architectural design is breaking down healthcare silos

Jacobs Institute idea to Reality (i2R) Centre addresses major health crisis

A medical innovation centre shows how a one-stop-shop approach to CVD medical device creation is accelerating impactful results for all stakeholders.

There is a global health crisis in cardiovascular disease that will require out-of-the-box thinking, collaborations, and partnerships in innovation in order to change course. Hospitals, universities, industry, and more will have to partner to take a fresh approach.

The Jacobs Institute in Buffalo, New York, is hoping to make such strides with the opening of its i2R, or Idea to Reality Centre, to impact medical device innovation and hopes others will collaborate and take a similar path in order to impact patient lives.

The Heart of the Crisis

Stroke and cardiovascular disease are the leading causes of disability and death in the world. According to the World Health Organization, an estimated 17.7 million people died from cardiovascular disease in 2015, representing 31% of all global deaths (WHO 2017).

Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke. In addition to personal devastation, the economic impact on society, communities and individual families is staggering.

The World Heart Federation notes that by 2030, the total global cost of cardiovascular disease is set to rise from approximately \$863 billion USD in 2010 to a staggering \$1,044 billion USD (World Heart Federation 2018).

Innovation saves lives

The medical device industry has quite literally transformed modern medicine, saving or improving the quality of life for those suffering from heart attacks or strokes, known as vascular disease.

In vascular disease, thanks to catheter-based procedures using medical devices, minimally invasive treatments of the brain and the heart are today important alternatives to traditional invasive treatments. However, the field is still in its infancy, and the need for better devices is critical.

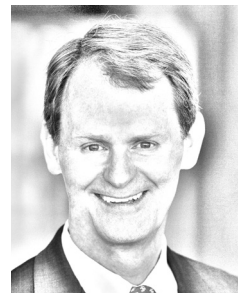
New breakthrough devices illustrate the potential for significant advances in the treatment of vascular disease. Until recently, the treatment of heart attack and stroke was limited to the use of drugs designed to dissolve the clots inside arteries causing the dangerous blockages. The risk of haemorrhage, lack of success and short time limitations for treatments proved to be major concerns. Today, catheter-based treatment with stents has revolutionised the treatment of heart attack, and stroke appears to be following a similar trajectory. Several recent clinical stroke trials including MrCLEAN (Berkhemer, O.A., et al. 2015) have provided Level I evidence of the safety and efficacy of the mechanical removal of clots in stroke patients to restore blood flow to oxygen-starved brain. New devices used in these trials represent a groundbreaking advance in reducing the number of patients devastated by the 15 million strokes suffered worldwide annually, according to the World Stroke Organization (2012).

Rapid mechanical clot removal to reverse the effects of stroke in its early stages is just one example that clearly illustrates the need for a place where new and better ideas for devices can quickly become reality.

Right people, right place, right time

The Jacobs Institute (JI), located in Buffalo, New York, is dedicated to developing next-generation technologies to treat cardiovascular disease through collisions of physicians, engineers, entrepreneurs, and industry. It recently launched the i2R, or Idea to Reality Centre, which focuses on developing smart-engineered endovascular medical devices at a faster pace and in a more cost-effective way to improve quality of life and reduce costs for patients, providers, and health systems across the globe.

The i2R is located in a one-of-a-kind building in which the entire product development, vetting, and proof-of-concept process, can occur in one place. It is sandwiched between and partnered with Kaleida



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Health’s Gates Vascular Institute (GVI) clinicians and the State University of New York (SUNY) at Buffalo vascular research scientists—yet independent from both entities. The i2R has access to clinical and scientific expertise and feedback, prototyping and product testing lab space, and imaging facilities. The i2R will take innovation concepts from the initial idea all the way to proof of concept, demonstrating that they will work well in patients. The i2R is, literally, uniquely positioned to transform innovation and address a long-standing health care crisis.

As a not-for-profit 501C-3 innovation centre focused on vascular disease, our biggest killer andcripler, located in the heart of and partnered with a multidisciplinary clinical and research vascular centre, yet fully independent from both partners, i2R is a unique innovation concept. Failure to reach proof of concept results in no cost to the inventor, as innovation is funded by philanthropy and state-funded economic development grants. For successful projects JI will ask for royalties or minimal equity toward an eventual self-sustaining i2R but the inventor will retain all intellectual property and control of the vascular device or drug. And JI will be happy to help the inventor find a commercialisation partner.

i2R strength through partnerships

Having the right partners in-house is a first step, but

leveraging strategic external partners will also help to accelerate the kinds of medical device breakthroughs needed to treat this health crisis.

Clinicians, scientists, and entrepreneurs are brought together by the building construct that was designed to create purposeful and valuable collisions among minds, collaborations between people, and innovations from all sources. The JI’s invaluable partnerships with SUNY at Buffalo’s Clinical and Translational Research Centre and with Kaleida Health’s GVI have given the i2R enormous resources at a low cost and access to brilliant scientists and world-class clinical expertise. Imperatively, the i2R sits in the heart of a clinical facility, thereby ensuring physician feedback at every stage of the process. It is a differentiating factor that isn’t replicated with consulting firms or device testing facilities.

Creating future technology has a greater chance when tapping into current leaders in the space, those already manufacturing the devices. The JI has extensive relationships with vascular medical device industry leaders and ongoing programmes with them to train and immerse company inventors, entrepreneurs, and product development experts in the clinical environment located just below the JI. These partnerships will lead to opportunities for product co-development and create a favourable environment for industry to acquire proven technologies.

Further, establishing external partnerships serve

to bolster innovation capabilities. JI partners have expertise in device manufacturing, clinical research, and data analytics, thereby leveraging device development expertise, federal regulatory experience, and advanced computing for product testing. Each of these partners increases the reliability and validity of the i2R innovation process. The first i2R projects are collaborating with experts in aerospace engineering and west coast entrepreneurs with a proven track record in creating life-saving technology.

Finally, entrepreneurial relationships are also critical to commercialisation of ideas that translate into devices for patients. JI has ties to the west coast, Boston, and Minneapolis neurovascular

entrepreneurial communities. These relationships will drive a continual flow of potential commercialisation opportunities. As we work to expand this network around the nation and the globe, the pace of idea flow will grow dramatically.

There is an urgent need to combat the burgeoning cardiovascular disease health crisis with smart-engineered medical device technology. Physicians, researchers, entrepreneurs, medical device companies, and regulators will need to collaborate to find the best solutions. The i2R's aim is to foster collaboration of those best and brightest minds in order to rapidly create cutting-edge devices to tackle this serious public health issue. ■



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