

Devices that sit on the skin are minimally invasive platforms of electronics in the style of a band-aid strip and contain an array of photodetectors and light-emitting diodes, to monitor patient data. Smartphones can be used as monitors, and upload data to the cloud.

Vulnerable patients

A particular emphasis is on working with vulnerable patients at both ends of the spectrum: in neonatal paediatric health and elderly patients.

Neonates, he said, are a major challenge because of the sensitivity of the skin, and small limbs and muscles, and that has led development of their most sophisticated and sensitive platforms.

The band-aid style devices, for 24/7 care of neonates, applied to relevant parts of the anatomy are battery-free and use wireless power and data transfer, dispensing of the 'primitive and constraining technology' of cables to allow critical skin-to-skin contact to continue between mother and child.

With high mortality during childbirth in LMICs (Low and Middle Income Countries) these devices, piloted in Chicago hospitals, have been successfully applied in resource-limited countries such as Zambia, Ghana, and Kenya, with wireless devices measuring the cardiac health of the mother, foetus, and of the neonate during and immediately after birth.

Patient-friendly materials

Prof. Rogers, who has a research focus on nano and molecular scale fabrication, characteristics of soft materials, bio-inspired and bio-integrated technologies, said cardiac monitoring devices and innovative tools are an important area of interest to the group, which collaborates with interventional cardiologists.

He remains acutely aware of the importance of softer materials in maintaining patient compliance. The skin-based devices use silicon and related compound semiconductors to support the electronics, structured in open mesh architectures embedded in soft silicone elastomers. This combines the rigid materials with soft flexible materials in a hybrid formation, paving the way for cost-effective manufacturing and devices that are more compatible for the skin.

'If a device creates any irritation or discomfort at the skin interfaces, most patients will not use it. You can develop a fantastic device with spectacular measurement capabilities but it is meaningless if patients are unable or unwilling to use it'.

With engineering activities based at a main campus at Evanston, plus labs in the major medical complexes of Chicago, the unit has ongoing trials of devices for cardiology, neurology, neonatology, paediatrics, nephrology, and dermatology. Patients with heart failure, cardiomyopathy, coronary artery disease, and stroke survivors are benefitting from this type of monitoring.

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Heroes, politics and media: the unshakable medical practice in the pandemic

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COVID-19 has turned the medical world upside down and sideways. Quite rightly, all hands are on deck in the medical and scientific world to fight the pandemic. With the alarm bell ringing, some important and unexpected consequences for medicine and medical science have gone largely unnoticed. In this article, we touch on some of these, as they are worthy of more attention.

The pandemic has reprioritized healthcare as a top, perhaps the top, public concern of our time. The global scope and sobering death toll of the pandemic have put physicians, other healthcare providers, and the healthcare system into a spotlight usually reserved for politics and show business. As a result, pandemic-related scientific research has become a point of focus not just for medical and public health academia but for mainstream journalists and mass media. This attention appears to have influenced the way in which human and monetary resources have been allocated among specific fields of anti-COVID-19 research, compared to the way in which they would have been allocated had the public and political leaders not been involved.

On the front lines, medical specialists have had to rediscover their early training talents and revert to being primary care and/or critical care physicians in order to cover the onslaught of incoming COVID-19 patients. Exempli gratia, super-specialized cardiology specialists have had to rediscover their innate bonds with internal medicine and recapture old skill sets by necessity to face the emergent need.¹

Moreover, with no evidence-based treatment protocols, healthcare providers were forced to rely solely on their fundamental knowledge, general experience, and clinical instincts. Throughout the world off-label or 'compassionate' treatment methods necessarily became the norm, rather than the exception. Accustomed to relying on expertise and data, physicians found themselves under-equipped.

In this environment of uncertainty—and given that they were risking their own lives in the fight—the people behind the personal protective equipment were bathed in a warm cloud of unprecedented trust and gratitude by the community; they became heroes. The hopeful among us sees this as the beginning of a renewed bond between scientists,

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Figure 1 London Board of Health searching the city for cholera during the 1832 epidemic; Lithograph, 1832; Wellcome Collection UK; <https://wellcomecollection.org/works/d7994mnn>; UK; License: CC4.0.

clinicians, and the public and the beginning of a reversal in the previous decline in the public trust in the medical and scientific communities.

Meanwhile, the ongoing rush of pandemic-related bio-medical research has already provided the initial outcomes of both randomized and observational studies and are starting to form a roadmap to evidence-based practice. A standard of care for COVID-19 patients has begun to form, with the boundaries of this novel disease starting to be delineated. Our capacity to handle both in- and out-of-hospital consequences of the pandemic has improved (and public expectations have again started to rise). As always, along with the incremental gains in knowledge, more uncertainties have appeared.

In normal times, although medical uncertainties may bring nervousness in everyday practice, they present a potential for growth and exploration² and thus are not entirely bad. However, this time, these uncertainties were not reviewed in expert circles in the context of medical debates but rather projected as unfiltered headlines to the public without restrictions or discussion of nuances typical of scholarly scientific debate. Individuals who are not equipped to understand the science or the statistics are influencing or even dominating the debate, with consequences that move through the political system into policy decisions and, in day-to-day practice giving patients a false sense of knowledge that can cause them to make poor decisions about their treatment. The medical community has an ethical duty to resist the pressure from the unknowledgeable and hold fast to scientific rigour and due diligence, especially in the case of public beliefs on vaccination.³

We physicians take the patient by the hand, inform him/her about the available data about outcomes and risks in light of particular circumstances, and help him/her to make the best therapeutic choices in light of these circumstances. Notably, 'shared decision-making' is an active interplay between the physician and the patient. However, the shared decision-making model is problematic in the treatment of COVID-19 patients because (i) physicians lack the normal evidence base and (ii) in many cases the patients have formed strong beliefs about the disease based on 'information' from sources who have no real knowledge.

Medical knowledge in the field of the COVID-19 is constantly evolving and thus is not framed in a safe harbour of guidelines or even a wide consensus. In consequence, some physicians may not be comfortable with the implementation of new therapies -even vaccines- either because strong evidence is lacking and they are not entirely convinced of their overall safety and effectiveness or because this uncertainty simply makes them feel vulnerable to potential malpractice claims. Have the current educational priorities of evidence-based and guideline-directed medicine, in the context of a litigious environment paralyzed physicians when faced with a disease like COVID-19 for which there are no 'safe harbours'? Are physicians unable to digest best-available but shaky evidence and make decisions for their patients or are they just unwilling to do so?

The vaccine situation presents a particularly acute case for this question. First, the normal consultation environment will be missing. The patient will not be feeling ill and thus will not have the usual



Figure 2 Venus Healing Aeneas; Merry Joseph Blondel; about 1820; Restricted gift of Pamela and Roger Hull through the Old Masters Society <https://api.artic.edu/api/v1/artworks/226550/manifest.json>; License: CC0.



Figure 3 Hope; by Hiram Powers; Smithsonian American Art Museum; <http://n2t.net/ark:/65665/vk73b21beaf-efa5-47f5-8c5c-13a0e3801698>; License: CC0.

psychological dependency that supports his trust in the physician. Moreover, there will be no direct human interaction, which also supports that trust. Thus, there is no scope for the art of medicine as defined by Voltaire: 'amusing the patient while nature cures the disease'. Second, the widespread and unwarranted fear of childhood vaccines among the public has morphed into a fear of vaccines in general.

Beyond novel knowledge and discoveries, including rapid development and approval of novel approaches to vaccines, established practices also have been put in question. Indeed, during the first months of this pandemic, a thrombolysis-first approach for ST-elevation myocardial infarction (STEMI) was (though unfounded, as proved later) proposed as a means of overcoming logistic issues and limitation of in-hospital contamination.⁴ As expected, acute care cardiologists found themselves in an admittedly disconcerting albeit transient situation. The expeditious evaluation and accumulation of acute STEMI care data under COVID-19, reaffirmed that established guidelines and time-targets for primary percutaneous coronary intervention (PCI) should continue to be followed and guidance was issued accordingly.⁵

As our practice of medicine is confronted by its first pandemic, the call of the medical community is neither to create nor to exaggerate divisions but rather to recall our sacred Hippocratic oath, to adopt an empathetic approach and treat the sick to the very best of our ability. Beyond handling the fears and uncertainties of our patients,^{2,6} our responsibility is to be resolute in our scientific integrity and maintain our

systematic approach in gathering and reading the lines of scientific evidence (and ignore the distractions of politics and mass media). The setting is unfamiliar, but priorities are set, resources are available, scientific evidence has started to accumulate, a new and firm bond of trust between scientists and the community is palpable. 'Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less,' Marie Curie.

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Digital, risk-based screening for atrial fibrillation in the European community—the AFFECT-EU project funded by the European Union

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Owing to the demographic changes, we are facing an epidemic of atrial fibrillation (AF) in the aging population with a prevalence of approximately 2.5–3%¹ (twice as high in men and 5% prevalence in individuals ≥ 65 years) and a projected doubling of this number by 2050.² Atrial fibrillation is often asymptomatic with its first manifestation being debilitating stroke in more than 10 of patients.³ Atrial fibrillation produces significant healthcare costs for the European society and precludes

healthy aging. The European Society of Cardiology (ESC) guidelines recommend screening for AF to prevent complications and optimize treatment, including the use of highly effective oral anticoagulation (OAC) in patients at risk of stroke.⁴ However, questions on whom to screen, how to screen, and the optimal setting for screening with highest efficiency remain unanswered. In this context, the EU-funded AFFECT-EU project (www.affect-eu.eu, *Figure 1*) aims at developing a



Figure 1 Consortium members and geographic origin. All consortium partners are named in the supplement.

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