

## Commentary

# INTERNET OF MEDICAL THINGS (IOMT) AND INTEGRATED HOME ASSISTANCE

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### ABSTRACT

This article furnishes an overview of the actual IoT technology used in integrated home assistance. It delineates how the IoMT devices are improving the implementation of integrated home assistance services, and how the IoT technology can influence the global healthcare assistance in upcoming years aiding healthcare systems by supplying secure and effective cures in a complementary or alternative way, even during periods of crisis or health epidemics, like that of "COVID-19." Healthcare assistance based on IoT and the use of deep machine learning can in fact help healthcare workers by giving them new and improved diagnostic capabilities. The combination of machines and clinical experience improves the reliability of the services of integrated home assistance. Artificial intelligence and deep learning can also optimize disease management, provide large amounts of data, and generate analytics from IoMT devices. Transforming the delivery of integrated home assistance healthcare services in this way, thanks to IoT, is essential for improving self-management for people with chronic illnesses and providing specialized care for people located far away or at home.

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## 1. Commentary

The Internet of Things (IoT)<sup>1</sup> is a neologism that identifies a network of things connected to the Internet that include connected devices and physical resources enabled for the "IoT". This is a phenomenon that is structurally affecting many aspects of our present and future life and that will increasingly optimize the organizational methods and the use of resources, beginning with "time", a more than precious resource, which must be used with even greater attention in an increasingly complex world.

Thanks to the IoT, the flow of information is shifting from person-to-person, to person-to-thing, and finally to thing-to-thing.

The IoT devices are becoming readily more connected, while the networks between humans, objects, and the network itself and steadily increasing.<sup>2</sup> The IoT promises many benefits for streamlining and improving healthcare delivery to proactively predict health problems and diagnose, treat and monitor patients both in and out of the hospital.

For this reason, today there is talk of the Internet of Medical Things (IoMT).

Throughout the world, government leaders and decision-makers are implementing politics to furnish healthcare assistance services utilizing IoT technologies, among others, in response to the "COVID-19" pandemic.<sup>3</sup> The IoMT is, in fact, an infrastructure that allows for the implementation of "intelligent healthcare services."<sup>4</sup>

When health data is collected, communicated, and stored by IoT sensors, data analysis and intelligent healthcare can be carried out, which can improve risk factor identification, disease diagnosis, treatment, remote monitoring and allow people to self-manage at home. An Integrated Home Assistance<sup>5</sup> system based on IoMT allows all healthcare systems to move from a traditional model of service delivery, which is often reactive, intermittent and uncoordinated, towards a more proactive, continuous and coordinated approach. Such an approach is beneficial because it offers the opportunity to provide high quality care that is both less invasive and attractive to patients and healthcare professionals.

This shift in the healthcare system landscape is also very attractive to policy makers because it can greatly increase the efficiency (and thus reduce resource use) of the healthcare system while providing it with flexibility to change its care models in relation to integrated home assistance.

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The various services and applications of the IoMT in integrated home assistance could be implemented in many ways for the management of single and cluster conditions, including the ability to monitor health progress remotely by health professionals, improve self-management of chronic conditions, assist in early detection of abnormalities, rapid identification of symptoms and clinical diagnoses, delivery of early intervention and improvement of adherence to prescriptions. These IoMT devices can make better use of healthcare resources and provide quality, low-cost medical care.<sup>6</sup>

Some of the most promising medical applications provided by the IoT are through artificial intelligence (AI).<sup>7</sup> Scientific applications of artificial intelligence have multiplied, including image analysis, text recognition with natural language processing, drug activity design, and gene mutation expression prediction.<sup>8</sup> The AI has the ability to read available Electronic Medical Records data, including medical history, physics, laboratory analyses, imaging and prescription drugs, and contextualize this data to generate decisions and/or options for treatment and/or diagnosis.<sup>9</sup> However, it is also important that healthcare systems are aware of the inequalities that could arise from the widespread implementation of the IoT for integrated home care, including people who may not be able to afford or access reliable technological hardware or web services due to geographic location or financial disadvantage. Similarly, if patients and healthcare professionals do not perceive the technology as 'easy to use', experience poor connections, or do not feel that the initiative was designed with their consultation, this could create frustration and reluctance to use such services.<sup>10</sup>

There are still important gaps for future research to address regarding: IoT technology itself, the healthcare system and users, beneficiaries of integrated home assistance, and who can use IoMT devices. Future specific research on IoT technology must address how IoMT devices can be designed with standardized protocols and interoperability with international and interstate healthcare systems. Further research is also needed on the efficiency of blockchain storage versus cloud-based centralized storage solutions in the context of IoMT-supported healthcare delivery.

The implementation of the IoMT in integrated home assistance will increasingly rely on a clear and robust code of conduct for data management, privacy, confidentiality and IT security regarding the supply and use of IoMT devices.<sup>11</sup> From a healthcare system perspective, clinical guidelines on digital health prescriptions and a robust remuneration policy are needed for integrated home assistance services provided through the IoMT.<sup>12</sup>

Finally, more research is needed to determine the acceptability and digital literacy of consumers and doctors in the context of using IoT to improve the overall delivery and experience of integrated home assistance. This also requires a greater digital maturity in the National Health Service to implement and evaluate technologies and solutions for integrated home assistance that will benefit from the IoT.

Opting for digital solutions to support the evolution and transformation of integrated home assistance services is essential: a fully connected and inter-operable healthcare environment will enable continuous acquisition and real-time analysis of patient data, offering an unprecedented capacity to monitor patients, manage disease and potentially provide early diagnosis. The clinical benefit of this is clear, but additional patient benefit and value will be gained from the ability to provide specialist care and care not close to home and/or at home.<sup>13</sup>

The interested parties need to actively negotiate existing challenges to accomplish the integration of data from IoMT devices into electronic health records. Considering IoMT devices as active parts of a connected digital integrated healthcare and home assistance infrastructure, aligning different business, personal, professional and healthcare system interests can help achieve this goal.<sup>14</sup>

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