The Future of Health Care: Recent Legal Developments Impacting the Use of Artificial Intelligence

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From electronic health records to robot-assisted surgery, hospitals are embracing the benefits of technology in providing better care for patients. And as health care technology has developed, the government has expanded the network of laws and regulations governing its use. Much of the recent interest in the application and regulation of health care technology has been in the area of artificial intelligence.

In general, the term "artificial intelligence" refers to the use of computers systems to simulate human intelligence. Artificial intelligence encompasses two related computer-driven applications: machine learning and deep learning. The term "machine learning" refers to the use of algorithms to predict outcomes, simulating the way the human brain processes data. The goal of machine learning is to find connections in data without being explicitly programmed. Deep learning is a further subset of machine learning that employs computer "neural networks" to recognize patterns in large sets of data. Deep learning is often applied to health care in the use of computers to read and detect abnormalities in x-ray and CT images. The most recent government-approved uses of artificial intelligence in health care come from the application of deep learning.

In the clinical context, applications of artificial intelligence have been regulated by the federal Food and Drug Administration (FDA) as medical "devices." Medical devices are classified into Class I, II, and III based on the level of risk associated with the device.

- Class I and II medical devices are classified as low to moderate risk and are subject to less extensive FDA oversight.
- Class III is reserved for devices that "sustain or support life, are implanted, or present potential unreasonable risk of illness or injury."[1] Class III devices must go through an extensive premarket approval process, by which the FDA assesses the safety and effectiveness of the device before it can be marketed.

Class III also includes any novel device without a predicate on the market. As a result, most technologies employing artificial intelligence were automatically designated Class III, regardless of the level of risk associated with the device. To get novel, lower-risk technologies to market more quickly, Congress passed the Food and Drug Administration Modernization Act of 1997, which added the "De Novo" classification option—a less onerous alternative to the standard premarket approval process. To submit a De Novo classification request, the sponsor submits a request to the FDA that includes a description of the device, its probable benefits and anticipated risks, as well as any supporting clinical or nonclinical data.[2]

Even with the introduction of the De Novo option, rapid advances in digital health technology continued to highlight the tension between new technology and the increasingly outdated FDA regulatory framework for medical devices. Congress addressed this tension in December 2016, after significant lobbying from technology companies, by passing the 21st Century Cures Act.

21st Century Cures Act

The 21st Century Cures Act (Cures Act) aimed to accelerate the development of medical technology and bring innovation to patients faster and more efficiently. As part of these aims, the Cures Act specifically targets the development of artificial intelligence by:

- Clarifying the FDA's jurisdiction over digital health products by excluding a subset of medical software from the definition of medical "device."[3]
- Accelerating the development of innovative medical products by establishing the Breakthrough Devices Program.[4]

Device Exclusions

The federal Food, Drug, and Cosmetic Act (FDCA) establishes the FDA's jurisdiction over medical "devices." Section 3060 of the Cures Act amends the FDCA to expressly exclude certain software functions from the "device" definition. Most relevant to this discussion, the Cures Act excluded from the medical device definition what is generally referred to as "clinical decision support" (CDS) software. Software qualifying for exclusion as CDS under the Cures Act must meet the following four criteria:

> (1) intended to display, analyze, or print medical information about a patient or other medical infor-

mation (such as peer-reviewed clinical studies and clinical practice guidelines);

(2) intended to support or provide recommendations to a health care professional about prevention, diagnosis, or treatment of a disease or condition;

(3) intended to enable such health care professional to independently review the basis for such recommendations that such software presents so that it is not the intent that such health care professional rely primarily on any of such recommendations to make a clinical diagnosis or treatment decision regarding an individual patient; and

(4) *not* intended to acquire, process, or analyze a medical image or a signal from an in vitro diagnostic device or a pattern or signal from a signal acquisition system.[5]

CDS is not intended to replace clinician judgment; rather, CDS is a tool "to assist care team members in making timely, informed, and higher quality decisions."[6] The FDA published draft guidance in December 2017 to provide clarity on the types of CDS excluded by the Cures Act.[7] Examples of non-device CDS the FDA listed in the draft guidance include:

- Software that provides a health care professional with current practice treatment guidelines for common illnesses based on the patient's diagnosis;
- Software that suggests an intervention or test based on the physician's order; or
- Software that suggests alternatives to orders, drugs, or therapies consistent with practice guidelines and other generally accepted practices.[8]

Breakthrough Devices Program

Section 3051 of the Cures Act amends the FDCA to establish a program for "breakthrough devices," intended to assist with more timely access to breakthrough technologies by reducing the lag time associated with the assessment and review of eligible devices. To qualify for designation as a breakthrough device, the device must "provide for more effective treatment or diagnosis of life-threatening or irreversibly debilitating disease or conditions" and one of the following must be true of the device:

(1) it represents breakthrough technologies;

(2) no approved or cleared alternatives exist;

(3) it offers significant advantages over the existing alternatives; or

(4) the availability of the device is "in the best interest of patients."[9]

The FDA issued draft guidance in October 2017 implementing the Breakthrough Devices Program, which superseded the prior expedited review schemes: the Expedited Access Pathway and the Priority Review Program.[10] The guidance sets forth the principles of the Breakthrough Devices Program, including interactive and timely communication between the device sponsor and the FDA, efficient and flexible clinical study design, and priority review of breakthrough devices. FDA has approved at least one artificial intelligence software application under this program.[11]

FDA Guidance and Software Precertification Pilot Program

In the wake of the Cures Act, the FDA issued its Digital Health Innovation Action Plan, which outlined the agency's framework for the regulation and review of new digital health technologies.[12] The plan has three primary objectives:

1. Issuing guidance implementing the 21st Century Cures Act;
2. Launching the Software Precertification Pilot Program; and
3. Building the FDA's expertise in its digital health unit.

The FDA addressed the first objective by issuing a spate of draft guidance throughout 2017, including:

- Breakthrough Devices Program Draft Guidance (October 2017)[13]
- Changes to Existing Medical Software Policies Resulting from Section 3060 of the 21st Century Cures Act Draft Guidance (December 2017)[14]
- Clinical and Patient Decision Support Software Draft Guidance (December 2017)[15]

The second objective, the Software Precertification Pilot Program (Precertification Program), takes a novel approach to digital health technology oversight. Rather than addressing approval of individual products, FDA's Center for Devices and Radiological Health (CDRH) "pre-certifies" eligible digital health developers who "demonstrate a culture of quality and organizational excellence."[16] These pre-certified developers could then qualify to market their devices either without additional FDA review or through a streamlined premarket review process, depending on the level of risk associated with the product. The Precertification Program selected its participants in September 2017, which include Apple, Fitbit, Johnson & Johnson, and Samsung.[17] The FDA plans to establish the framework for precertification by the end of 2018.[18]

Recent FDA Approvals of Artificial Intelligence Devices

As the agency focuses more on innovation, a greater number of devices employing artificial intelligence are clearing the FDA approval process.

The first two examples below were low-to-moderate risk devices approved using the FDA's De Novo premarket review process. The third example is among the first artificial intelligence software applications approved through the new Breakthrough Devices Program.

De Novo Premarket Review

Stroke—In February 2018, the FDA permitted the marketing of a clinical decision support software designed to alert providers of a potential stroke in patients.[19] Under the current standard of care,

a patient's CT images are reviewed by a neuro-radiologist who then reports any potential stroke indicators to a neurovascular specialist. With the Viz.AI Contact application, the algorithm reviews the CT images, and, if a stroke indicator is detected, the application sends a text alert to the neurovascular specialist for further review. As the FDA notes in its press release, the application does not replace review by the neuro-radiologist; the human review and algorithm review occur simultaneously. Rather, by using artificial intelligence to analyze the CT images, the Viz.AI Contact application potentially speeds up the notification process. As part of the FDA's De Novo premarket review, the company demonstrated that the application could notify a specialist sooner in cases involving a suspected large vessel blockage.

Wrist fractures—In May 2018, the FDA approved the marketing of an artificial intelligence algorithm for detecting wrist fractures. OsteoDetect is a detection and diagnostic software that uses an artificial intelligence algorithm "to analyze two-dimensional X-ray images for signs of distal radius fracture, a common type of wrist fracture."[20] The software uses machine learning to identify areas of fracture in x-rays. As part of its application for De Novo premarket review of OsteoDetect, the company submitted a study comparing 1,000 x-ray images assessed using the algorithm against those same images assessed by board certified orthopedic hand surgeons. The study suggested that detection of wrist fractures was improved using OsteoDetect, as compared to the review of the images unaided by the software.

Breakthrough Devices Program

Diabetic retinopathy—In April 2018, the FDA authorized the marketing of the first medical device using artificial intelligence "to detect greater than a mild level of the eye disease diabetic retinopathy in adults."[21] Diabetic retinopathy, caused by high levels of blood sugar damaging the blood vessels of the retina, is the most common cause of vision loss among diabetics. The device, known as IDx-DR, is a software program that uses an artificial intelligence algorithm to analyze images of the eye. The images are uploaded to a cloud server and the IDx-DR software provides the doctor with one of two readings: "more than mild diabetic retinopathy detected," or "negative for more than mild diabetic retinopathy." IDx-DR was approved using the Breakthrough Devices Program and is the first device approved by the FDA that provides a screening decision without the need for interpretation by a specialist.

Conclusion

The past two years have seen significant development in the laws and regulations governing the use of artificial intelligence in health care. The 21st Century Cures Act and its regulatory progeny have paved the way for greater innovation by developing creative options to streamline FDA approval and get products to market sooner. As the regulatory framework becomes more flexible, the opportunities for artificial intelligence in health care will only expand. Hospitals and health systems can leverage these new technologies to improve both the quality and efficiency of care delivery. Everyone wins!

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1 U.S. Food and Drug Admin. (FDA), *Learn if a Medical Device Has Been Cleared by FDA for Marketing*, *available at* https://www.fda.gov/medicaldevices/resourcesforyou/consumers/ucm142523.htm (last visited Sept. 1, 2018); *see also* 21 U.S.C. § 360c(a)(1)(C).

2 FDA, *Evaluation of Automatic Class III Designation (De Novo)*, *available at* https://www.fda.gov/medicaldevices/deviceregulationandguidance/howtomarketyourdevice/premarketsubmissions/ucm462775.htm (last visited Sept. 1, 2018).

3 21st Century Cures Act, Pub. L. No. 114-255, tit. III, § 3060.

4 *Id.* at § 3051.

5 *Id.* at § 3060.

6 Ctrs. for Medicare & Medicaid Servs. (CMS), *Clinical Decision Support: More Than Just "Alerts" Tipsheet*, at 2, *available at* https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/ClinicalDecisionSupport_Tipsheet-.pdf.

7 FDA, *Clinical and Patient Decision Support Software: Draft Guidance for Industry and Food and Drug Administration Staff* (Dec. 8, 2017), *available at* https://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM587819.pdf.

8 *Id.* at 8-9.

9 21 U.S.C. § 360e-3(b).

10 FDA, *Breakthrough Devices Program: Draft Guidance for Industry and Food and Drug Administration Staff* (Oct. 25, 2017), *available at* https://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM581664.pdf.

11 See *infra* Recent FDA Approvals of Artificial Intelligence Devices.

12 FDA, *FDA In Brief: FDA brings additional efficiency and modernization to regulation of digital health, as part of the Digital Health Innovation Action Plan* (Apr. 26, 2018), *available at* https://www.fda.gov/NewsEvents/Newsroom/FDAInBrief/ucm605723.htm; FDA, *Digital Health Innovation Action Plan*, *available at* https://www.fda.gov/downloads/MedicalDevices/DigitalHealth/UCM568735.pdf.

13 *Supra* note 10.

14 FDA, *Changes to Existing Medical Software Policies Resulting from Section 3060 of the 21st Century Cures Act: Draft Guidance for Industry and Food and Drug Administration Staff* (Dec. 8, 2017), *available at* https://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM587820.pdf.

15 *Supra* note 7.

16 *Digital Health Innovation Action Plan, supra* note 12, at 5.

17 FDA, *FDA selects participants for new digital health software precertification pilot program* (Sept. 26, 2017), *available at* https://www.fda.gov/newsevents/newsroom/pressannouncements/ucm577480.htm.

18 FDA, *Precertification (Pre-Cert) Pilot Program: Frequently Asked Questions*, *available at* https://www.fda.gov/MedicalDevices/DigitalHealth/DigitalHealthPreCertProgram/ucm577330.htm (last visited Sept. 1, 2018).

19 FDA, *FDA permits marketing of clinical decision support software for alerting providers of a potential stroke in patients* (Feb. 13, 2018), *available at* https://www.fda.gov/newsevents/newsroom/pressannouncements/ucm596575.htm.

20 FDA, *FDA permits marketing of artificial intelligence algorithm for aiding providers in detecting wrist fractures* (May 24, 2018), *available at* https://www.fda.gov/newsevents/newsroom/pressannouncements/ucm608833.htm.

21 FDA, *FDA permits marketing of artificial intelligence-based device to detect certain diabetes-related eye problems* (Apr. 11, 2018), *available at* https://www.fda.gov/newsevents/newsroom/pressannouncements/ucm604357.htm.