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THIRTY-EIGHT YEARS AND COUNTING: THE FDA'S MISUSE OF THE 510(K) NOTIFICATION PROCESS AND CONSEQUENT UNDER-REGULATION OF IMPLANTABLE MEDICAL DEVICES

I. INTRODUCTION

A. Failing Hip Replacements

In 2010, DePuy Orthopaedics, a division of medical device manufacturer Johnson & Johnson, voluntarily recalled its ASR XL Acetabular hip replacement systems.¹ These hip replacements, known as metal-on-metal implants—because both the ball and socket components of the artificial hip joint were made from metal,² were shown to exhibit a higher than normal failure rate, leading to a greater need for surgical revision among hip replacement recipients.³ Because both components of the implant were metal, these components often grinded together creating metallic debris that was potentially toxic and damaging to an implant recipient's bones and tissue. This metallic debris had been linked to certain cancers.⁴ These particular hip implants had been in use in the United States (U.S.) since 2008 when the Food and Drug Administration (FDA) cleared them for marketing through a preliminary regulatory review method known as the 510(k) Premarket Notification (PMN) Process.⁵

In response to the recall, thousands of lawsuits have been filed against DePuy on behalf of plaintiffs alleging to have suffered serious injuries as a

1. See *DePuy ASR Recall Response Supporting Patients and Clinicians*, DEPUY ORTHOPAEDICS (Nov. 7, 2012), <http://www.playitliveitforlife.com/sites/default/files/DPYUS1%20Recall%20Notice.pdf>.

2. *Medical Devices, Metal-on-Metal Hip Implants*, FOOD & DRUG ADMIN., www.fda.gov/medicaldevices/productsandmedicalprocedures/implantsandprosthetics/metalonmetalhipimplants/default.htm (last updated Jan. 17, 2013).

3. Brent M. Ardaugh et al., *The 510(k) Ancestry of a Metal-on-Metal Hip Implant*, 368 NEW ENG. J. MED. 97, 98 (2013).

4. Barry Meier, *Maker Aware of 40% Failure in Hip Implant*, N.Y. TIMES (Jan. 22, 2013), http://www.nytimes.com/2013/01/23/business/jj-study-suggested-hip-device-could-fail-in-thousands-more.html?pagewanted=all&_r=0; Deborah Cohen, *How Safe are Metal-on-Metal Hip Implants?*, 344 BRIT. MED. J. 1, 2 (2012).

5. Ardaugh et al., *supra* note 3, at 98; *Premarket Notification (510k)*, FOOD & DRUG ADMIN., <http://www.fda.gov/medicaldevices/deviceregulationandguidance/howtomarketyourdevice/premarketnotifications/premarketnotification510k/default.htm> (last updated Aug. 19, 2014).

result of the hip implant's failure.⁶ One of the more troubling aspects of this particular device has surfaced in the wake of these pending actions, as reports have been discovered indicting that the device manufacturer was actually aware that the implants had a higher propensity for failure well before the recall was made.⁷ While many of these cases are still being litigated,⁸ the DePuy hip recall underscores an unconventional means through which medical devices may obtain the FDA's regulatory blessing and raises questions regarding the adequacy of the Agency's ability to protect the public against unsafe medical devices.

In the case of the DePuy hip replacement, the FDA's grant of marketing clearance was based on DePuy's showing that the ASR device was substantially equivalent to components contained in a number of earlier hip implants, including grandfathered devices that had been in use before the FDA began reviewing new medical devices to ensure their safety and effectiveness.⁹ The risks associated with some of the devices to which substantial equivalence was shown, however, precluded the continuation of their use long before DePuy's device was ever cleared.¹⁰ Considering the method through which the DePuy ASR hip implants legally became available for use, it is evident that such a process is not an effective means of regulating the safety of similar implantable devices intended for use and marketing in the U.S.

B. Comment Overview

Congress developed the 510(k) PMN Process as a means of balancing the need to ensure the safety of medical devices made available, with that of timely access to medical innovation.¹¹ Using 510(k), the safety and effectiveness of low- and moderate-risk devices can be evaluated through a relatively quick and painless process, so that new or improved devices can become accessible to patients sooner. Since implemented, however, this process has met its share of critics raising concerns regarding its

6. Troy Roberts, *The FDA's 510(k) Approval Process in Medical Device Litigation*, AM. BAR ASS'N (July 29, 2013), <http://apps.americanbar.org/litigation/committees/products/articles/summer2013-0713-fda510k-approval-process-medical-device-litigation.html>.

7. Meier, *supra* note 4.

8. Roberts, *supra* note 6.

9. Ardaugh et al., *supra* note 3, at 98.

10. See Ardaugh et al., *supra* note 3, at 98 (noting that clearance of the ASR XL device was based on devices that were themselves determined to be substantially equivalent to three pre-amendment metal-on-metal hip implant devices—the McKee-Farrar, Ring, and Sivash—all of which “were discontinued long ago (and well before clearance if the ASR XL) because their risk of revision was so much higher than that of other hip prostheses.”).

11. Diane M. Zuckerman et al., *Medical Device Recalls and the FDA Approval Process*, 171 ARCHIVES INTERNAL MED. 1006, 1006 (2011).

effectiveness.¹² While the 510(k) Process was created to evaluate the safety of devices posing no more than moderate risks, various medical devices had already been in use and marketed throughout the U.S. by the time device regulations were introduced.¹³ The presence of these so called pre-amendment devices in the American market necessitated an alternative use for the 510(k) process. This was intended to be a temporary means of bringing these existing devices under the FDA's regulatory purview.¹⁴ Over the course of 510(k)'s thirty-eight year history, however, the FDA has lost sight of the temporary nature of this secondary use. Instead, the Agency has made a habit out of inappropriately using the PMN Process to evaluate the safety of many devices, including some with the greatest potential to create dangers to their users—implantable medical devices. In doing so, the FDA is essentially putting the users of these devices at a greater risk of harm.

The FDA's continued reliance on this inappropriate use of the 510(k) Process is unacceptable and results chiefly from the Agency's inexcusable failure to properly classify and regulate the medical device types that were in existence prior to the passage of the Medical Device Amendments (MDA)—nearly four decades ago. Using the DePuy hip implant and its subsequent recall as a starting point of reference,¹⁵ Section II describes the current state of the premarket review of medical devices. Based on this regulatory framework, Section III discusses the major problems that have developed out of the current uses of the 510(k) Process. Section IV takes a closer look at the FDA's handling of both implantable devices and those devices marketed prior to the enactment of the MDA. It also examines the impact that these pre-amendment devices have had on the 510(k) Process and premarket review more broadly. Recognizing the safety concerns that have resulted from the FDA's treatment of pre-amendment devices, Section V investigates the justifications available for the Agency's continued use of 510(k) with respect to pre-amendment devices over the past four decades. Finding no reasonable justification, Section

12. *Id.* at 1009.

13. FOOD & DRUG ADMIN., THE 510(K) PROGRAM: EVALUATING SUBSTANTIAL EQUIVALENCE IN PREMARKET NOTIFICATIONS [510(K)] GUIDANCE FOR INDUSTRY AND FOOD AND DRUG ADMINISTRATION STAFF 2-3 n. 5 (2014).

14. *515 Program Initiative*, FOOD & DRUG ADMIN., <http://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDRH/CDRHTransparency/ucm240310.htm> (last updated June 3, 2014) [hereinafter *515 Program Initiative*].

15. The problems identified through the experience of the DePuy hip case are not unique to this particular orthopedic device. It is merely illustrative of an ongoing issue concerning numerous pre-amendment devices. A study examining medical devices recalled between 2005 and 2009 indicated that of the 115 recalls, like the DePuy hip implant, thirteen were pre-amendment devices cleared for marketing through the 510(k) clearance process. Zuckerman et al., *supra* note 11, at 1007, 1008. These recalled devices included several automated external defibrillators (AEDs) and intra-aortic balloons that had also been linked to serious injury and even death. *Id.* at 1008.

VI considers the most recent efforts made towards bringing 510(k)'s rampant misuse to an end, to reach the conclusion that as it is currently situated, the FDA lacks the ability to optimally police future advancements in medicine and medical technology.

II. BACKGROUND OF MEDICAL DEVICE PREMARKET REVIEW

Congress passed the Federal Food, Drug, and Cosmetic Act (FD&C Act) in 1938, which initiated the government's role in the regulation of medical products to ensure the safety and effectiveness of those products marketed in the U.S.¹⁶ The FD&C Act established a protocol that authorized the FDA to begin regulating new drugs by requiring them to undergo a premarket review process that included clinical trials evaluating safety and effectiveness.¹⁷ However, because medical devices of that time were relatively simple instruments whose defects could be easily detected, the authority the FD&C Act granted to the FDA stopped short of regulating medical devices.¹⁸

A. *The Medical Device Amendments*

In the decades that followed the FD&C Act's enactment, advancements in research and technology led to the introduction and use of more complex devices.¹⁹ Many of these advanced devices available on the market and ultimately caused very serious injuries and even death among the patients and consumers who used them. Included in these devices were intra-uterine contraceptives such as the Dalkon Shield, which had been linked to various instances of infertility, as well as miscarriages and maternal deaths.²⁰ Reports of cases like the Dalkon Shield brought the issue of medical device regulation in to the arena of public concern.²¹ The increased attention resulted in Congress passing amendments to the FD&C Act in 1976 known as the MDA, which provided a framework in which medical devices would be brought under the FDA's regulatory purview.²²

16. Jordan Bauman, *The "Déjà Vu Effect:" Evaluation of United States Medical Device Legislation, Regulation, and the Food and Drug Administration's Contentious 510(k) Program*, 67 FOOD & DRUG L.J. 337, 339-40 (2012).

17. See Zuckerman et al., *supra* note 11, at 1006.

18. See David R. Challoner & William W. Vodra, *Medical Devices and Health – Creating a New Regulatory Framework for Moderate Risk Devices*, 365 NEW ENG. J. MED. 977, 977 (2011).

19. *Id.*

20. See Zuckerman et al., *supra* note 11, at 1006; see also William H. Maisel, *Medical Device Regulation: An Introduction for the Practicing Physician*, 140 ANNALS INTERNAL MED. 296, 296 (2004).

21. Zuckerman et al., *supra* note 11, at 1006.

22. See *id.*

1. Medical Device Classification

The MDA established a system of classification that required the FDA to group medical devices into one of three regulatory classes.²³ A device's categorization into one of these classes is based on the level of controls needed to ensure the safety and effectiveness of that particular device.²⁴

Class I devices are considered low-risk medical devices.²⁵ Because of the minimal risks associated with their use, only general controls (which are applicable to all medical devices regardless of their classification) are required to provide a reasonable assurance of device safety and effectiveness.²⁶ Applicable general controls include the general requirements found in the provisions of the FD&C Act addressing adulterated, misbranded, banned, and restricted devices as well as device registration, reporting, and notification requirements.²⁷ Additionally, Class I devices may not be intended for the use of supporting or sustaining life or have an important role in preventing impairment to human life, and must not present the potential for unreasonable risk of injury or illness.²⁸ Class I includes devices such as tongue depressors, mechanical (manual) wheelchairs, and carbon dioxide absorbers.²⁹

Class II contains moderate-risk devices.³⁰ In addition to the general controls, special controls are required to provide a reasonable assurance of the safety and effectiveness of these devices.³¹ These additional controls include performance standards, post-market surveillance, patient registries, guidelines and labeling, and premarket data requirements.³² Devices grouped within Class II include powered wheelchairs, hypodermic needles, and peak-flow spirometer devices.³³

High-risk devices are classified within Class III and receive the most regulatory scrutiny.³⁴ Unlike Class I devices, these devices may be used to support or sustain life, may have an important role in preventing impairment to

23. See 21 U.S.C. § 360c(a) (2012).

24. See *id.*

25. See 21 U.S.C. § 360c(a)(1)(A)(ii)(II); Challoner & Vodra, *supra* note 18, at 978.

26. 21 U.S.C. § 360c(a)(1)(A); *General Controls for Medical Devices*, FOOD & DRUG ADMIN., <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/Overview/GeneralandSpecialControls/ucm055910.htm> (last updated June 26, 2014) [hereinafter *General Controls*].

27. See *General Controls*, *supra* note 26.

28. *Id.*

29. 21 C.F.R. §§ 868.5310, 880.6230, 890.3850 (2013).

30. Challoner & Vodra, *supra* note 18, at 977.

31. 21 U.S.C. § 360c(a)(1)(B) (2012).

32. *Regulatory Controls*, FOOD & DRUG ADMIN., www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/Overview/GeneralandSpecialControls/default.htm (last updated June 26, 2014).

33. 21 C.F.R. §§ 868.1870, 880.5570, 890.3860 (2013).

34. See 21 U.S.C. § 360c(a)(1)(C); Challoner & Vodra, *supra* note 18, at 978.

human life, or might present the potential for unreasonable risk of injury or illness.³⁵ And unlike Class II devices, the use of special controls would not be sufficient to provide a reasonable assurance of the device's safety and effectiveness.³⁶ As a result, the path to legal marketing for these devices requires compliance with the general controls and also the premarket approval process, the most intensive premarket review process established by Congress, described below.³⁷

2. Premarket Review Mechanisms

While some devices are exempt from premarket review because of the minimal risks associated with their use,³⁸ there are two main processes through which the FDA reviews medical devices and either approves or clears them for use in the U.S. These two processes are respectively known as the Premarket Approval (PMA) Process and the 510(k) PMN (or Premarket Clearance) Process, the latter deriving its name from the section of the MDA in which it can be found.³⁹

The MDA requires that Class III devices undergo PMA—a stringent premarket review process.⁴⁰ Under this process, a device manufacturer must submit full reports of all information known or reasonably known to the manufacturer or sponsor submitting the PMA Application on its behalf, regarding: investigations undertaken to assess the safety and effectiveness of the device; all the components and properties of the device; the methods, facilities and controls used in and for the manufacturing, processing, packaging, and installing the device; specimens of labeling proposed for the device; and any other information relevant to the application required by the FDA.⁴¹ Once a device manufacturer submits a PMA Application, the FDA must review and approve, or deny the application within 180 days.⁴² The FDA may deny a PMA Application if: the application fails to provide a showing of a reasonable assurance of safety or effectiveness; the methods, facilities, or controls used in and for manufacturing, processing, packaging, or installation of the device are substandard; or proposed labels contain false or misleading statements.⁴³

35. 21 U.S.C. § 360c(a)(1)(C).

36. *Id.*

37. *Id.*

38. Challoner & Vodra, *supra* note 18, at 978.

39. See INST. OF MED., MEDICAL DEVICES AND THE PUBLIC'S HEALTH: THE FDA 510(K) CLEARANCE PROCESS AT 35 YEARS 1 (2011).

40. 21 U.S.C. § 360e(a) (2012).

41. 21 U.S.C. § 360e(c)(1).

42. 21 U.S.C. § 360e(d)(1).

43. 21 U.S.C. § 360e(d)(2).

A key difference between the two processes is the approval versus clearance distinction. Acceptable devices subject to PMA are *approved* while those passing the 510(k) Process are merely *cleared* for marketing.⁴⁴ The MDA contemplates that only devices in Class I or Class II that are not exempt from premarket review will be subject to this abbreviated premarket review process.⁴⁵ The 510(k) Process allows for devices to be cleared for marketing with greater ease and in less time than the PMA Process.⁴⁶ The purpose of this abbreviated process is to support innovation in medical device technology by making certain that advances in medical technology are available faster.⁴⁷ FDA regulations require that manufacturers of devices subject to the 510(k) Process submit a premarket notification to the FDA at least ninety days before they plan to commercially distribute a device.⁴⁸

The FDA's regulations also outline the content of this required submission. Such a submission must include information detailing the name of the device, its classification, and information about the manufacture or the sponsor submitting notification on its behalf.⁴⁹ Additionally, submissions must contain "an explanation of how the device functions, the scientific concepts that form the basis of the device, and the significant physical and performance characteristics of the device," as well as statements of its intended use and substantial equivalence to devices currently marketed.⁵⁰ Manufacturers must also provide statements detailing the similarities and/or differences between their device and the predicate device or devices to which it claims substantial equivalence, and provide an explanation as to how any changes could create a significant impact on the safety or effectiveness of the new device.⁵¹

B. Post-Medical Device Amendments: Legislative Changes to Premarket Review

While the MDA provided a solid framework on which medical device regulation could be based, in some ways the regulatory scheme contemplated in the initial amendments was not entirely compatible with the realities facing both the FDA and medical devices. Thus, since its enactment, Congress has passed three major pieces of legislation aimed at modifying and strengthening the MDA, in order to increase the ease and effectiveness of premarket review

44. Challoner & Vodra, *supra* note 18, at 978.

45. 21 U.S.C. § 360(k) (2012).

46. OFFICE OF INSPECTOR GEN., DEPT. OF HEALTH & HUMAN SERVS., OEI-04-10-00480, FDA'S CLEARANCE OF MEDICAL DEVICES THROUGH THE 510(K) PROCESS 1 (2013) [hereinafter OIG 2013 REPORT].

47. Zuckerman et al., *supra* note 11, at 1009.

48. 21 C.F.R. § 807.81(a) (2014).

49. 21 C.F.R. § 807.92 (2014).

50. *Id.*

51. 21 C.F.R. § 807.87.

processes for medical devices. These legislative effects are: the Safe Medical Devices Act (SMDA), the Food and Drug Administration Modernization Act (FDAMA), and the Food and Drug Administration Safety and Innovation Act (FDASIA).⁵²

The first step Congress took to improve device review was the SMDA in 1990.⁵³ The SMDA broadened the applicability of the substantial equivalence standard,⁵⁴ expanded the definition of Class II devices allowing an increased number of previously unclassified devices to fit within the category,⁵⁵ and required the FDA to establish a schedule for the promulgation of regulations requiring PMA Applications for Class III devices that were not previously required to submit such applications.⁵⁶ The next major change to the MDA came in 1997, when Congress passed the FDAMA. The FDAMA altered the medical device review process by, among other things, exempting investigational devices as well as some Class I and Class II devices from certain review requirements.⁵⁷ It also introduced an alternative review process for low-risk devices, narrowed the scope of the FDA's review of 510(k) devices,⁵⁸ and mandated that devices be reviewed within timeframes established for both the 510(k) and PMA Processes.⁵⁹ Most recently, Congress passed the FDASIA in 2012, which further modified many of the changes brought about by previous legislative revisions and introduced a regulatory change to device classification that authorized the FDA to classify or re-classify certain devices by administrative orders, rather than promulgating regulations.⁶⁰

52. While Congress enacted several other pieces of legislation that significantly impacted medical devices and their regulation — namely, the Medical Device User Fee and Modernization Act of 2002, Food and Drug Administration Amendments Act of 2007, and the FDASIA — the SMDA, FDAMA and FDASIA have affected the most significant changes in the regulatory process originally contemplated in the MDA. Jeffrey K. Shapiro, *Substantial Equivalence Premarket Review: The Right Approach for Most Medical Devices*, 69 FOOD & DRUG L.J. 364, 367, 370, 386 (2014).

53. See INST. OF MED., *supra* note 39, at 249.

54. Safe Medical Device Act of 1990, Pub. L. No. 101-629, § 4(a), 104 Stat. 4511, 4515 (1990).

55. Safe Medical Device Act § 4(b).

56. *Id.*

57. Food and Drug Administration Modernization Act of 1997, Pub. L. No. 105-115, §§ 201, 206, 111 Stat. 2296, 2333-34, 2339 (1997).

58. Food and Drug Administration Modernization Act § 202.

59. Food and Drug Administration Modernization Act § 209.

60. Food and Drug Administration Safety and Innovation Act of 2012, Pub. L. No. 112-144, § 608, 126 Stat. 993, 1055-59 (2012).

III. MAJOR CONCERNS IMPACTING 510(K) CLEARANCE PROCESS AS IT EXISTS TODAY

A great deal of attention has focused on the inadequacies of the FDA's medical device premarket review methods.⁶¹ Because 510(k) or the PMN Process is used to review significantly more devices than the PMA Process, the 510(k) Process is subjected to sharp criticism. Much of the attention and criticism stems from concerns that the process fails to ensure that only safe devices are made available to patients.⁶² Thus, various investigations have been launched to identify the source of the breakdown in this regulatory process.⁶³ To that end, recognizing that problems exist within the PMN Process, the FDA commissioned the Institute of Medicine (IOM) to investigate whether 510(k) "protect[s] patients optimally and promote[s] innovation in support of public health" and to determine what changes would be necessary in the event that it does not.⁶⁴ The IOM's report and other 510(k) investigations have identified a number of crucial failures that undermine the clearance process' ability to protect the public from dangerous devices.⁶⁵ Generally, these failures can be categorized as relating to either the substantial equivalence standard itself or the standard's reliance on predicate devices.

A. *Substantially Equivalent, But Not Safe and Effective*

In what is arguably the most damning critique of the 510(k) Process, the sufficiency of the standard against which this process evaluates medical devices is often called into question. The standard set forth in the MDA that all devices, regardless of their classification, are measured against to evaluate their fitness for marketing, requires that device manufacturers only

61. For example, see INST. OF MED., *supra* note 39, at 4 (providing an FDA commissioned review of the 510(k) clearance process to determine whether "the process optimally protect[s] patients and promote[s] innovation in support of public health"); see also Jonas Zajac Hines et al., *Left to Their Own Devices: Breakdowns in United States Medical Device Premarket Review*, PLOS MED., July 2010, at 1, 1, available at <http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1000280> (reviewing "eight addressable weaknesses at the FDA level and above that impeded the agency's ability to review devices for efficacy"); see also Zuckerman et al., *supra* note 11, at 1006 (analyzing recalled devices initially cleared through 510(k)); see also Challoner & Vodra, *supra* note 18, at 979 (advocating for the replacement of the 510(k) process with a new regulatory framework); see also OIG 2013 REPORT, *supra* note 46, at 13, 15 (noting the FDA's continued reliance on 510(k) to clear pre-amendment devices).

62. See, e.g., INST. OF MED., *supra* note 39, at 4.

63. *Id.* at 34; Hines et al., *supra* note 61, at 4; CTR. FOR DEVICES & RADIOLOGICAL HEALTH, FOOD & DRUG ADMIN., 510(K) WORKING GROUP PRELIMINARY REPORT AND RECOMMENDATIONS 16 (2010) (all discussing the 510(k) notification process and failures with premarket medical device review).

64. See, e.g., INST. OF MED., *supra* note 39, at 4.

65. See INST. OF MED., *supra* note 39, at 191; Hines et al., *supra* note 61, at 1.

demonstrate a “reasonable assurance of safety and effectiveness.”⁶⁶ In the case of the 510(k) Process, this reasonable assurance is satisfied if a manufacturer shows that its device is substantially equivalent to any device previously cleared through the 510(k) Process.⁶⁷ Thus, the standard can be met so long as a device maker shows that the device it seeks to market is similar to a device currently marketed. The standard relies on the assumption that the new device is at least as safe and effective as the predicate device on which its clearance is based.⁶⁸ Therefore, this standard encourages manufacturers to focus on proving that their new devices are similar enough to an old device, rather than making an effort to show that the new device in and of itself, is actually safe or effective.⁶⁹

Additionally, in 1990, the SMDA allowed for device manufacturers to make a showing of substantial equivalence even when differences in the technological characteristics exist between the new device and predicate device to which it seeks to claim equivalence.⁷⁰ Under the SMDA, only new issues of safety or effectiveness will bar a finding of substantial equivalence.⁷¹ Implicitly, this allows device manufacturers to secure clearance for new devices by relying on predicate devices that are significantly different from the new devices claiming to be equivalent.⁷²

Further, the standard established by the MDA for reviewing medical devices is a lower standard than that which has been in place for reviewing new drugs.⁷³ While medical devices manufacturers need only demonstrate a “reasonable assurance of safety and effectiveness,”⁷⁴ premarket approval of new drugs requires that drug makers show “substantial evidence” of safety and effectiveness.⁷⁵ New drug applications generally consist of at least two clinical studies evaluating a new drug, while PMA Applications for medical devices generally have just one and clinical data is seldom included in 510(k) submissions.⁷⁶ The difference in approval standards results in a higher level of scrutiny afforded to the review of new drugs than new devices. In an age where the simplistic nature of medical devices presented minimal risks in use, perhaps this deferential standard may have been more appropriate. However, because devices have experienced dramatic advancements in both technology

66. 21 U.S.C. § 360(m) (2012).

67. 21 U.S.C. § 360c(f)(1) (2012).

68. INST. OF MED., *supra* note 39, at 88.

69. *See id.* at 88-89.

70. Hines et al., *supra* note 61, at 3.

71. *Id.*

72. *Id.* at 3-4.

73. *Id.* at 3.

74. 21 U.S.C. § 360c(a)(1)(A)(i) (2012).

75. 21 U.S.C. § 355(d)(5) (2012).

76. Hines et al., *supra* note 61, at 3.

and use—as seen through implantable devices such as the DePuy hip and the grave risks that have been associated with its use—the weakness of the device review standard is apparent.

B. Predicate Reliance on Pre-Amendment Devices

The clearance of a new device through the 510(k) Process can be based on a device manufacturer establishing that its device is substantially equivalent to *any* device already legally marketed.⁷⁷ Therefore, a new device can be shown as substantially equivalent to one predicate device that was itself shown as substantially equivalent to an earlier device.⁷⁸ As this cycle continues, the potential for major differences to arise between new devices and the predicates on which their clearance is based, increases.⁷⁹ Additionally, reliance on any predicate device also undermines the integrity of the 510(k) Process' assurance of safety and effectiveness because devices legally marketed prior to the enactment of the MDA often times serve as predicate devices. Since such pre-amendment devices were not evaluated for safety and effectiveness, there is a similar void of assurance in the safety of the new devices claiming substantial equivalence.⁸⁰

Similarly, even if after completing the 510(k) Process, the FDA determines that a device cannot show substantial equivalent to a predicate device, some devices may still be cleared for marketing through a review procedure created by the FDAMA.⁸¹ This provision creates a path to legal marketing for novel low-risk devices without having to undergo the PMA Process.⁸² Since such new devices are denied clearance through 510(k) because they are not shown as equivalent to any other marketed device, it is unclear what assurances of safety and effectiveness serve as the basis for clearing them for marketing.

These issues highlight reasons why the 510(k) Process leaves room for concern about how effectively the FDA controls the safety of the devices actually intended to be regulated through this process—those posing low and moderate risks.⁸³ However, because there were devices in existence and use prior to the enactment of the MDA, some devices belonging in Class III have been and continue to be reviewed and cleared for marketing through 510(k) based on a showing of their substantial equivalence to a pre-amendment device that was never properly classified.⁸⁴ These identified 510(k) issues—when

77. See 21 U.S.C. §360c(c), (f).

78. Hines et al., *supra* note 61, at 4.

79. *Id.*

80. See INST. OF MED., *supra* note 39, at 36.

81. Hines et al., *supra* note 61, at 4.

82. See 21 U.S.C. § 360c(f)(2).

83. 21 U.S.C. § 360c(a)(B).

84. INST. OF MED., *supra* note 39, at 100.

considered in light of the fact that the FDA has also been using this broken regulatory mechanism to control the availability of medical devices whose high risks actually require the highest level of premarket review afforded to medical devices—makes this long-standing FDA practice particularly alarming.

IV. PRE-AMENDMENT IMPLANTABLE MEDICAL DEVICES

When Congress passed the MDA in 1976, two issues threatened the smooth transition into this new medical device regulatory framework. First, the use and marketing of certain medical devices was already prevalent in the U.S. These devices—known as pre-amendment devices—had been freely bought, sold, and used in interstate commerce without any legal consequence well before the MDA was enacted.⁸⁵ Second, included among these exiting pre-amendment devices were implantable devices. FDA regulations now define implantable devices as medical devices that are “placed into a surgically or naturally formed cavity of the human body.”⁸⁶ Because the use of these devices requires what essentially amounts to the implantation of a foreign substance into the human body for a prolonged time period, they often carry the potential to present unique health risks among patients who receive them.

Given these risks, the FDA generally classifies these implantable devices alongside Class III devices intended to support or sustain life, and subjects them to the greatest deal of regulatory scrutiny afforded to medical devices—PMA.⁸⁷ The existence of these pre-amendment devices, particularly those implantable in nature, added an additional dimension to Congress’s efforts to regulate the medical devices that could become commercially available. They forced Congress to find an equitable balance between the existing pre-amendment devices and the new devices introduced after the MDA’s enactment, in order to prevent the arbitrary treatment of similar devices differing only in their date of introduction to the market.⁸⁸

As a general rule, the MDA classifies all pre-amendment devices into Class III.⁸⁹ This Class III assignment, however, was merely a classification in

85. *Id.* at 68.

86. 21 C.F.R. § 812.3(d) (2014).

87. 21 C.F.R. § 860.93 (2014).

88. *See* PETER BARTON HUTT ET AL., FOOD AND DRUG CASES AND MATERIALS 1215 (4th ed. 2014).

89. Section 513 of the Medical Device Amendments sets out the limited circumstances in which a pre-amendment device could be down-classified into Class I or II and provides that:

Any device intended for human use which was not introduced or delivered for introduction into interstate commerce for commercial distribution before May 28, 1976, is classified in class III unless— (A) the device— (i) is within a type of device (I) which was introduced or delivered for introduction into interstate commerce for commercial distribution before such date and which is to be classified pursuant to subsection (b) of

name. Unlike most other Class III devices, there was no determination of the level of controls necessary to ensure the safety and effectiveness of these pre-amendment devices prior to their statutory assignment into this category.⁹⁰ Thus, although these devices had been effectively classified, the risks associated with their use remained undefined and the categorization did little to address or promote device safety.

To the extent that a Class III device requires the most stringent level of review before receiving approval for marketing, the MDA's approach to these devices is not problematic; provided, of course, that this stringent review is actually utilized. However, these devices were already marketed and available and PMAs were not immediately required for the existing devices or new devices falling within their device types.⁹¹ Instead, in order to protect the availability of devices already marketed and in use, Congress effectively grandfathered the pre-amendment devices.⁹² Doing so allowed the continued use of these pre-amendment devices and through the 510(k) process, permitted clearance for marketing new devices claiming to be their substantial equivalent, despite the fact that these Class III devices required, but never received, stringent review.⁹³

To be fair, Congress did not give the FDA *carte blanche* to completely disregard the regulatory framework the MDA created with respect to pre-amendment devices. The MDA mandates that the FDA ultimately review all the pre-amendment Class III devices to determine whether the PMA Process is appropriate, or whether devices need to be reclassified and subjected to other premarket review methods.⁹⁴ The use of the 510(k) in this respect was merely a preventative measure Congress implemented to avoid the disparate treatment of similar devices introduced before and after MDA enactment.⁹⁵ The 510(k) Process was only intended to be used until the FDA issued a final regulation or order requiring that a PMA Application be submitted for a particular pre-

this section, or (II) which was not so introduced or delivered before such date and has been classified in class I or II, and (ii) is substantially equivalent to another device within such type, or (B) the Secretary in response to a petition submitted under paragraph (3) has classified such device in class I or II.

21 U.S.C. § 360c(f)(1) (2012).

90. See INST. OF MED., *supra* note 39, at 219.

91. As discussed below, PMAs would only be required for pre-amendment devices if upon review, the FDA determined these devices properly belonged in Class III. 21 U.S.C. § 360e(b) (2012). However, the FDA's review of these devices would only occur if it is determined that a pre-amendment device was never classified, or if the FDA determines—on its own, or by a manufacturer's petition—that a particular device warrants reclassification. 21 U.S.C. § 360c(f)(2), (3).

92. See INST. OF MED., *supra* note 39, at 100.

93. *Id.*

94. 21 U.S.C. § 360e(b).

95. See BARTON HUTT ET AL., *supra* note 88, at 1215.

amendment device.⁹⁶ Thus, device manufacturers could continue marketing these and similar new devices provided they demonstrate that the new devices are substantially equivalent to an unclassified pre-amendment device in accordance with the 510(k) Process.⁹⁷

That notwithstanding, Congress contemplated that once the FDA had reviewed all the Class III pre-amendment devices and determined which among them should be reclassified as Class I or Class II devices and which should remain classified as Class III devices, such Class III devices would be subject to the standard PMA Process:

In the case of a class III device which—(A) was introduced or delivered for introduction into interstate commerce for commercial distribution before May 28, 1976; or (B) is (i) of a type so introduced or delivered and (ii) is substantially equivalent to another device within that type, the Secretary shall by administrative order . . . require that such device have an approval under this section of an application for premarket approval.⁹⁸

It is, therefore, apparent that the use of the 510(k) Process with respect to pre-amendment Class III devices was intended to be a temporary, transitional tool used only to help equitably facilitate the implementation of the new regulatory system.⁹⁹

In 1976, when the MDA was enacted, there were more than 170 Class III pre-amendment device types awaiting review and temporarily subjected to the 510(k) Process.¹⁰⁰ As of this writing, nearly thirty-eight years later, at least fourteen pre-amendment devices are still waiting to be reviewed and properly classified.¹⁰¹ Notable among the types of pre-amendment devices not yet reclassified is a femoral hip prosthesis.¹⁰² This is the device type that served as the basis for the 510(k) submission that ultimately led to marketing clearance for the DePuy ASR hip replacement that was recalled in 2010.¹⁰³ In a

96. General and Plastic Surgery Devices; Reclassification of the Topical Oxygen Chamber for Extremities, 71 Fed. Reg. 17,390, 17,391 (April 6, 2006) (to be codified at 21 C.F.R. pt. 878).

97. *See id.*

98. 21 U.S.C. § 360e(b)(1).

99. *Id.*; *see also* General and Plastic Surgery Devices: Reclassification of the Topical Oxygen Chamber for Extremities, 71 Fed. Reg. at 17,391.

100. *515 Program Initiative*, *supra* note 14.

101. *Id.* While the exact number of unclassified/reviewed devices to date was not specifically reported, the FDA reports that there were twenty-six device types in 2009. *Id.* Counting from a FDA spreadsheet, fourteen still require action in February 2014. *515 Project Status*, FOOD & DRUG ADMIN., <http://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDRH/CDRHTransparency/ucm240318.htm> (last updated Feb 24, 2014) [hereinafter *515 Project Status 2014*]. *See also infra* note 156.

102. 21 C.F.R. § 888.333 (2014).

103. *See Class 2 Device Recall Depuy ASR XL Acetabular Cup System*, FOOD & DRUG ADMIN., <http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfRES/res.cfm?id=96136> (last

timeframe spanning nearly forty years, the U.S. government, through the FDA, has not been able to completely and effectively review and classify roughly 170 types of medical devices in order to accurately assess the level of review necessary to ensure that only safe devices are approved for use in this country. This troubling reality raises serious questions regarding the ability and efficiency of one of the most crucial government Agencies entrusted with the responsibility of protecting and promoting public health.¹⁰⁴

V. FDA'S FAILURE TO REVIEW AND CLASSIFY

Because medical devices were widely marketed before the MDA became effective, the FDA was forced to temporarily use a premarket review process, 510(k)—designed to facilitate a showing of a reasonable assurance of safety and effectiveness among devices presenting no more than moderate risks—to evaluate pre-amendment devices whose perceived risks exceeded the moderate risk threshold the 510(k) Process was intended to evaluate. One would assume that the FDA would have acted with haste to address these unclassified devices in order to keep this improper use of the 510(k) Process to an absolute minimum. This, however, has not been the case.

Instead, the FDA has taken every bit of its time to review and classify the pre-amendment devices, taking full advantage of the relative ease of 510(k) regulatory requirements and in the process, allowing 510(k) to become the primary mechanism used to evaluate Class III pre-amendment devices.¹⁰⁵ No pre-amendment Class III devices were required to undergo the PMA Process until 1984, when the first regulation mandating PMA for a pre-amendment device was published, a full eight years after the MDA was enacted.¹⁰⁶ While various influences both within and beyond the FDA's control may have impacted the speed of review, a number of factors contributing to the FDA's failure to complete its review of the pre-amendment Class III devices suggest that the problem is rooted in larger, underlying Agency-wide issues.

A. *Burdensome Procedural Classification Process*

Perhaps one reason for the FDA's apparent foot-dragging with regard to its review and classification of these pre-amendment devices was the burdensome

updated Jan. 16, 2014) (summarizing the DePuy ASR XL 510(k) application and recall); *see also* Ardaugh et al, *supra* note 3, at 98.

104. *See* BARTON HUTT ET AL., *supra* note 88, at 5.

105. *See* INST. OF MED., *supra* note 39, at 81; *see also* Amanda Swanson, *510(k) Clearance: Opportunities to Incentivize Medical Device Safety Through Comparative Effectiveness Research*, 10 IND. HEALTH L. REV. 117, 126-127 (2013).

106. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO/PEMID-88-14, MEDICAL DEVICES: FDA'S 510(K) OPERATIONS COULD BE IMPROVED 38 (1988) [hereinafter FDA'S 510(K) OPERATIONS COULD BE IMPROVED].

administrative and procedural process that was required before a device type could be classified.

Prior to a device's classification, regulations promulgated following enactment of the MDA required that the Commissioner of the FDA refer the device to a classification panel consisting of experts in the medical area in which the device is to be used.¹⁰⁷ The panel is to review the device and make a recommendation to the Commissioner as to its appropriateness for classification into one of the three regulatory classes.¹⁰⁸ However, before a panel can submit a recommendation to the Commissioner, it must provide "to the maximum extent practicable, an opportunity for interested persons to submit data and views on the classification of the device."¹⁰⁹

Once a panel recommends a classification, the Commissioner must then review and publish the recommendation along with the proposed regulations classifying the device so that interested parties may again have the opportunity to voice their concerns.¹¹⁰ Finally, the Commissioner is to review the comments and issue a final regulation that classifies the device.¹¹¹

The purpose of these procedural elements in part, is to determine the safety of the device being reviewed. While the panels are comprised of experts, the step affording interested persons the opportunity to submit data could very well provide additional information that could result in a more accurate assessment of the device's safety. The same holds true for the Commissioner's review and publication of the recommendations. The Commissioner's review serves as an additional check to ensure that the panel's perception of safety is consistent with that of the FDA, and similarly, publication and opportunity for public comments ensure that the FDA's safety perception is consistent with that of the general public. However, these additional steps calling for public notice and comment also increase the amount of time required to fully review a device and make a recommendation as to what level of classification is required, which in turn extends the amount of time and risk of harm caused by the prolonged misapplication of the 510(k) Process.

B. Industry Pushback

Medical device manufacturers and the industry more broadly, may have also played a significant role in the FDA's device classification delay. The 510(k) process is the vehicle most commonly used to regulate the availability of medical devices in American markets.¹¹² This is largely due to the fact that

107. 21 C.F.R. § 860.84(b) (2014).

108. 21 C.F.R. § 860.84(c).

109. 21 C.F.R. § 860.84(c)(5).

110. 21 C.F.R. § 860.84(f).

111. 21 C.F.R. § 860.84(g).

112. INST. OF MED., *supra* note 39, at xi.

the 510(k) Process is far less burdensome and time consuming than the PMA Process. Naturally, device manufacturers would be drawn to the use of an easier process whenever possible. The 510(k) Process is not only the swifter and less strenuous means to achieve marketing clearance, but its use also represents substantial financial savings.

For Fiscal Year 2015, the standard user fee assessed by the FDA for a 510(k) application is \$5,018, while the standard fee assessed for a PMA is \$250,895.¹¹³ Further, the Advance Medical Technology Association (AdvaMed) reports that the actual average cost associated with submitting and supporting a PMA is five million dollars and that there are instances where the need for clinical trials have pushed these costs well in excess of fifty million dollars.¹¹⁴ Faced with the possibility that upon review the FDA will call for PMAs for pre-amendment devices and their substantial equivalents, device manufactures have been incentivized to oppose and delay the Agency's review and classification of these devices.

To this end, in recent years, while the device lobby has echoed the empty rhetoric calling for the expeditious classification of the remaining pre-amendment devices,¹¹⁵ just one year before the DePuy hip recall, AdvaMed noted that "pre-amendment devices have not presented unreasonable threats to the public health in the approximately 30 years they have been entering the market, and generally are well understood."¹¹⁶ Further, even as 510(k) has been the subject of growing criticism, AdvaMed has been a staunch and vocal supporter of the use of the process and has spoken out against efforts to impose limitations on its use, or to expand the definition of Class III devices and the domain of the PMA Process.¹¹⁷ Thus, while the industry conveys a verbal commitment to pre-amendment device classification, device manufacturers and their lobby have taken actions that in actuality have been far less than supportive of this effort.

C. *Limited Agency Resources*

Undoubtedly, the resources at the FDA's disposal have played a role in the speed with which the pre-amendment devices have been reviewed and reclassified. Issues relating to funding as well as staffing within the Agency

113. Notice, 79 Fed. Reg. 44178, 44180 (July 30, 2014).

114. COMMENTS OF ADVANCED MEDICAL TECHNOLOGY ASSOCIATION, DOCKET NO. FDA-2013-N-1259, at 3 (April 24, 2014), *available at* <http://advamed.org/res.download/698>.

115. *See* COMMENTS OF ADVANCED MEDICAL TECHNOLOGY ASSOCIATION, DOCKET NO. FDA-2011-N-0556, at 3 (Sept. 30, 2011), *available at* <http://advamed.org/res.download/184>.

116. Letter from Stephen J. Ubl, President & CEO, Advanced Medical Tech. Ass'n, to Margaret Hamburg, Comm'r, Food & Drug Admin., at 3 (May 22, 2009), *available at* <http://advamed.org/res.download/186>.

117. COMMENTS OF ADVANCED MEDICAL TECHNOLOGY ASSOCIATION, *supra* note 114, at 1-2.

have been well documented over the past several decades.¹¹⁸ Throughout the 1980s, the FDA saw an overall decrease in its staff, losing nearly 600 employees, which accounted for nearly ten percent of its staff.¹¹⁹ As noted, the FDA did not issue the first final regulation classifying a pre-amendment device until 1984.¹²⁰ Thus, it is understandable that such a significant reduction in its staffing resources, during the same time frame that it began undertaking such a critically important project, would likely lead to delays.

Completing review of all the pre-amendment devices classified as Class III devices by the MDA has been a highly involved process. It requires not only that the FDA refer each of the 170 device types to a classification panel as noted above, but also, that PMA Applications be submitted for all pre-amendment devices and their substantially equivalent progeny that are ultimately determined to be properly classified in Class III.¹²¹ A 1988 Government Accountability Office (GAO) report indicated that nearly 2,000 devices had been cleared through 510(k) notifications claiming substantial equivalence to pre-amendment Class III devices.¹²² If the FDA determined that PMA applications were required for each of the pre-amendment predicates supporting those 2,000 510(k) notifications, reviewing just those 2,000 devices would have taken the FDA eleven years.¹²³

More recently, budgetary constraints have restricted the number of Agency employees dedicated to the FDA's division responsible for reviewing medical devices. Between Fiscal Years 2008 and 2010, the number of full time equivalent staff within the Center for Devices and Radiological Health (CDRH) was limited to approximately 1,200.¹²⁴ While this is a marked increase from the levels observed in the 1980s and 1990s,¹²⁵ these employees

118. See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-88-14, FDA RESOURCES: COMPREHENSIVE ASSESSMENT OF STAFFING, FACILITIES, AND EQUIPMENT NEEDED 12 (1989) [hereinafter FDA RESOURCES].

119. *Id.* at 12. An actual increase in staffing levels was observed in at least three years during the 1980's; however, the net difference in FDA staffing levels over the course of the decade indicate that there was a significant staffing decline. *Id.* The impact that this decline had on any specific FDA center or project was not reported.

120. FDA'S 510(K) OPERATIONS COULD BE IMPROVED, *supra* note 106, at 38.

121. See *id.*

122. *Id.*

123. *Id.*

124. See FOOD & DRUG ADMIN., FY 2010 CONGRESSIONAL BUDGET REQUEST 265 (2009) (showing that in Fiscal Year 2008 the FTE for the CRDH was 1130, while the omnibus and estimated figures for 2009 and 2010 were 1204 and 1275 respectively).

125. See FDA RESOURCES, *supra* note 118, at 12 (where actual FDA staffing for 1988 totaled 7,103 FTE); cf. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-581, FDA FACES CHALLENGES MEETING ITS GROWING MEDICAL PRODUCT RESPONSIBILITIES AND SHOULD DEVELOP COMPLETE ESTIMATES OF ITS RESOURCE NEEDS (2009) [hereinafter FDA FACES CHALLENGES] (reporting that actual FDA staffing for 2008 totaled 9,811 FTE).

are expected to handle all the tasks for which the CDRH is responsible. In addition to reviewing and reclassifying pre-amendment devices, the CDRH's responsibilities include: limiting and controlling human exposure to medical, occupational, and consumer products emitting radiation; monitoring and enforcing good manufacturing practice regulations and standards for devices and radiation-emitting products; tracking compliance with surveillance programs and adverse events related to such devices and products; and providing technical assistance to product and device manufacturers.¹²⁶ Because of the 510(k) Process's relative ease of review, the majority of medical devices subject to premarket review seek clearance through that method. Consequently, since the FDA is expected to complete 510(k) and PMA review within statutorily mandated timeframes, much of the CDRH's resources must be allocated to 510(k) review.

Additionally, reports indicate that while the FDA and by extension, the CDRH, have seen increases in staffing and funding in recent years, these increases have not been proportional to the rise in the CDRH's workload.¹²⁷ Thus, with such a multitude of tasks to complete and such limited resources to dedicate toward their completion, Class III pre-amendment devices have become a staple among the device types reviewed through 510(k).

D. Progress Made Toward Completion

While the issues identified thus far rationalize, to some extent, the delay in the completion of review of pre-amendment devices, these concerns are not new. Reports of issues relating to the procedural complexity and Agency resources required to complete pre-amendment device review have been documented for decades.¹²⁸ Even though the practice is still in use nearly forty years after Congress—out of necessity—temporarily authorized the use of the 510(k) Process to evaluate some of the most high-risk medical devices, it is important to note that progress, in fact substantial progress, has been made towards the end of classifying the remaining pre-amendment devices and bringing an end to this 510(k) misuse.¹²⁹ Much of this progress, however, has only come as a result of legislative action forcing changes in the FDA's practices. Though these efforts have primarily been aimed at increasing the efficiency of the existing 510(k) and PMA review processes, they have had at

126. ROSEANN B. TERMINI, *LIFE SCIENCE LAW: FEDERAL REGULATION OF DRUGS, BIOLOGICS, MEDICAL DEVICES, FOODS AND DIETARY SUPPLEMENTS* 63 (2010).

127. See generally *FDA FACES CHALLENGES*, *supra* note 125.

128. See *INST. OF MED.*, *supra* note 39, at 81; see also *FDA'S 510(K) OPERATIONS COULD BE IMPROVED*, *supra* note 106, at 38; see also *FDA RESOURCES*, *supra* note 118, at 12-19.

129. As of February 2014, just fourteen devices remain unclassified. See *515 Project Status 2014*, *supra* note 101. See also *infra* note 156.

least some incidental or residual impact on the review of pre-amendment devices.

The SMDA of 1990 attempted to ease the burden that pre-amendment devices placed on the FDA.¹³⁰ In order to do this, the SMDA advanced a more expansive definition of Class II devices than had previously been included in the MDA. This new definition now included some devices that would have previously been included in Class III. The SMDA defines a Class II device as:

A device which cannot be classified as a class I device because the general controls by themselves are insufficient to provide reasonable assurance of the safety and effectiveness of the device, and for which there is sufficient information to establish special controls to provide such assurance, including the promulgation of performance standards, postmarket surveillance, patient registries, development and dissemination of guidelines (including guidelines for the submission of clinical data in premarket notification submissions in accordance with section 360(k) of this title), recommendations, and other appropriate actions as the Secretary deems necessary to provide such assurance. For a device that is purported or represented to be for a use in supporting or sustaining human life, the Secretary shall examine and identify the special controls, if any, that are necessary to provide adequate assurance of safety and effectiveness and describe how such controls provide such assurance.¹³¹

Additionally, the SMDA authorized the FDA to order pre-amendment device manufacturers to submit reports containing additional information regarding device safety and effectiveness and re-evaluate these unclassified devices based on this information.¹³² By expanding the definition of Class II devices and easing the process for re-evaluating unclassified devices, Congress allowed a number of less dangerous pre-amendment devices that would have otherwise remained in Class III to be moved into Class II. This reduced the need for the FDA to waste time and resources calling for and reviewing PMA applications for both pre-amendment devices and their post-amendment substantial equivalents, in situations where such review was not actually necessary to evaluate the safety of a device.

The SMDA also ordered the FDA to, “as promptly as is reasonably achievable,” establish a schedule for the issuance of regulations requiring PMA Applications for all Class III pre-amendment devices that would not be reclassified as Class I or Class II devices.¹³³ This schedule was released in 1994 and divided the remaining devices into three categories based on each

130. See INST. OF MED., *supra* note 39, at 228.

131. 21 U.S.C. § 360c(a)(1)(B) (2012), amended by Safe Medical Devices Act of 1990, Pub. L. No. 101-629, § 5, 104 Stat. 4511, 4517-18 (1990).

132. 21 U.S.C. § 360e(i) (2012).

133. Safe Medical Devices Act § 4(b)(1).

device's level of use and potential for being *down-classified*.¹³⁴ Establishing such a schedule should have forced the FDA to become more accountable and expedite the completion of the pre-amendment review process. Admittedly, to some extent it did, as there were 116 Class III pre-amendment devices subject to 510(k) at the time. However, more than a decade later, many dangerous devices remain accessible through 510(k).¹³⁵

The Medical Device User Fee and Modernization Act (MDUFMA) enacted in 2002 authorized the FDA to “assess and collect fees” for various premarket review activities.¹³⁶ Extended in 2007, through the Food and Drug Administration Amendments Act (FDAAA)¹³⁷ and again in 2012 by the FDASIA,¹³⁸ these medical device user fees have shifted some of the financial burden of medical device review to the device manufacturers seeking to market their new device and have helped reduce the strain on the Agency's resources.¹³⁹

However, even with all this coverage and attention, these efforts seeking to inspire the expedient completion of the FDA's review of pre-amendment devices have fallen short of actually reaching this goal.¹⁴⁰ This suggests that while the design of the regulatory process and the resources at the FDA's disposal may have increased the speed of pre-amendment device review, there may be additional factors that have contributed and continue to contribute to the Agency's failure to complete its review.

E. Priority of Pre-Amendment Classification

The delay in the FDA's pre-amendment device classification may have also, at least in part, been caused by the low level of priority given to these devices throughout the MDA-era.

134. 62 Fed. Reg. 32,356 (June 13, 1997).

135. See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-190, MEDICAL DEVICES: FDA SHOULD TAKE STEPS TO ENSURE THAT HIGH-RISK DEVICE TYPES ARE APPROVED THROUGH THE MOST STRINGENT PREMARKET REVIEW PROCESS 20-21 (2009) (noting that between 2003 and 2007, 228 Class III devices were cleared through 510(k) submissions based on substantial equivalence to 24 different pre-amendment devices, 16 of which were in the priority group identified by the FDA in 1994).

136. Medical Device User Fee and Modernization Act of 2002, Pub. L. No. 107-250, § 102, 116 Stat. 1588, 1591-93 (2002).

137. Food and Drug Administration Amendments Act of 2007, Pub. L. No. 110-85, § 212, 121 Stat. 823, 844-50 (2007).

138. Food and Drug Administration Safety and Innovation Act of 2012, Pub. L. No. 112-144, § 203, 126 Stat. 993, 1002-05 (2012).

139. Daniel B. Kramer & Aaron S. Kesselheim, *User Fees and Beyond—The FDA Safety and Innovation Act of 2012*, 367 NEW ENG. J. MED. 1277, 1277 (2012).

140. See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-370T, MEDICAL DEVICES: SHORTCOMINGS IN FDA'S PREMARKET REVIEW, POSTMARKET SURVEILLANCE AND INSPECTIONS OF DEVICE MANUFACTURING ESTABLISHMENTS 6 (2009).

As noted, the CDRH is the branch of the FDA responsible for both ensuring the safety and effectiveness of medical devices and limiting exposure to radiological products.¹⁴¹ Given these broad responsibilities, the duties stemming from them certainly extend beyond simply implementing premarket review mechanisms for medical devices. However, premarket review represents the first, and perhaps most crucial, step in ensuring the safety of medical devices marketed in the U.S.¹⁴² Even just within premarket review, the intricacies of the various kinds of medical devices themselves, and the state of the market for such devices when Congress enacted legislation initiating their regulation, have complicated the task assigned to the FDA and carried out by the CDRH. Given the importance of this first step, it follows that it necessitates tremendous FDA focus and attention.

However, if premarket review is merely the first step in ensuring device safety, proper review of medical devices prior to their marketing can be summarized in two main sub-steps. First, devices must be appropriately classified into one of three statutorily defined risk-based classifications.¹⁴³ And second, once classified, devices must undergo a risk-appropriate review assessment (generally 510(k) or PMA), to determine their fitness for public use.¹⁴⁴ Because Class III devices pose the greatest potential for risk, Congress requires that PMA—the most stringent and time consuming review process—be used to ensure their safety.¹⁴⁵

The crux of these premarketing sub-steps is that before the safety of a particular device can be adequately evaluated, the FDA must first determine which means are actually appropriate for evaluating its safety. Thus, it can be inferred from the basic construction of premarket review that the paramount phase of the process is proper classification of a device. It seems to follow within this premarket review scheme that the safety of a device improperly classified into a lower class (Class I or II) cannot be accurately evaluated if the process used to evaluate it cannot sufficiently assess the safety of devices falling within the category in which the device ought to have been properly classified (Class II or III). However, the importance of classification notwithstanding, it appears as though a greater deal of attention is given to other Agency functions. The amount of time required to review devices using 510(k) or PMA, implementing post-market surveillance measures within the CDRH, and addressing various non-medical device related Agency functions more broadly throughout the FDA seem to take the forefront with respect to

141. *See supra* Part V.C.

142. *Id.*

143. *See* 21 U.S.C. § 360(c)(1) (2012).

144. *See* 21 U.S.C. §360(k) (2012); *see also* 21 U.S.C. §360e(a) (2012).

145. *See* Swanson, *supra* note 105, at 123.

the Agency's focus—all while unclassified pre-amendment devices continue to be cleared through the 510(k) process.

In response to pressure to increase availability of and access to advances in medical technology, the MDUFMA and Congress's authorization and subsequent reauthorizations of medical device user fees, sought to expedite premarket review of medical devices.¹⁴⁶ As a result, greater emphasis has been placed on ensuring timely device review. Consequently, the FDA has and continues to identify specific performance goals directly aimed at improving premarket review times.¹⁴⁷ Conversely, however, no similar goals are recorded for completion of review and classification of Class III pre-amendments.¹⁴⁸ While there is certainly an interest in promoting the prompt review of new medical devices, an equally, if not, more compelling interest rests in ensuring that such timely review is appropriate, considering the risks presented by a device.

Though understandably limited, the FDA's allocation of its available resources among the various projects and initiatives for which it is responsible also suggests that the Agency has not given the classification of Class III pre-amendment devices the priority they deserve and require.

VI. FDASIA AND COMPLETING PRE-AMENDMENT DEVICE REVIEW

The latest attempt made by Congress to cure premarket review came with the enactment of the FDASIA of 2012. This has arguably been the most impactful development with respect to unclassified pre-amendment devices since the MDA was initially signed into law. In just the first year-and-a-half post-enactment, the FDASIA has paved the way for the completion of review and reclassification of nearly as many pre-amendment devices as had been reviewed and reclassified in at least the three years immediately preceding it.¹⁴⁹

146. Annette M. Zinn et al., *Median Approval Times for Class III Medical Devices Have Been Well Above Statutory Deadlines Set for FDA and CMS*, 31 HEALTH AFF. 2304, 2310 (2012); Bauman, *supra* note 16, at 351-52.

147. The FDA has issued performance goals and reports on their completion annually since the first authorization of user fees (MDUFA I) was enacted. These reports take into account review times, but do not consider progress made with respect to pre-amendment device review completion. See *MDUFMA Performance Reports*, FOOD & DRUG ADMIN., <http://www.fda.gov/AboutFDA/ReportsManualsForms/Reports/UserFeeReports/PerformanceReports/UCM2007450.htm> (last updated Feb. 14, 2014); see also *MDUFMA Annual Reports to Congress*, FOOD & DRUG ADMIN., <http://www.fda.gov/ForIndustry/UserFees/MedicalDeviceUserFeeandModernizationAct/ucm155275.htm> (last updated June 27, 2014).

148. See *MDUFMA Performance Reports*, *supra* note 147.

149. The FDA reports that in 2009, twenty-six Class III pre-amendment devices still required review. *515 Program Initiative*, *supra* note 14. While it is unclear what, if any, actions were taken in years 2009 and 2010, between 2011 and 2012—prior to FDASIA's enactment—final rules

Specifically, the FDASIA modified the pre-amendment classification process by amending the administrative procedure originally contemplated in the MDA, to eliminate the regulation promulgation requirement.¹⁵⁰ Instead, FDASIA authorizes the Director of the CDRH and the FDA Commissioner, to call for PMA Applications for pre-amendment devices that are determined to belong in Class III, by administrative order—after considering comments from stakeholders regarding the recommendations made by a device’s appropriate classification panel.¹⁵¹ By striking the statutory language requiring the FDA to issue regulations calling for PMA Applications, the FDASIA essentially simplified the process that the Agency needs to use in order to subject pre-amendment devices properly classified into Class III to the appropriate standard of premarket review so that they could be treated the same as any other Class III device. As originally enacted, the MDA required that the review and reclassification of pre-amendment devices be completed through rulemaking. Consequently, the slow moving notice and comment process implicated by this requirement to promulgate regulations became a major factor contributing to the delay. However, the use of administrative orders offers the FDA greater flexibility in determining whether a pre-amendment device should undergo PMA or be reclassified as having only low- or moderate-risk, because such orders can be issued without fulfilling the procedural requirements necessary for rulemaking.¹⁵²

Despite the FDASIA amendments, the MDA does retain a number of rulemaking-like procedural requirements that must be fulfilled before a pre-amendment device can be reclassified or subjected to PMA—namely, publication of the proposed order in the Federal Register, a meeting of the appropriate device classification panel, and consideration of comments from stakeholders regarding the recommendation made by a device’s appropriate classification panel.¹⁵³ Thus, the impact that this change from *rulemaking* to *administrative order* actually has is likely tempered. However, as demonstrated

providing classification were issued for seven of these devices, which include topical oxygen, female condom, pacemaker repair or replacement material, ventricular bypass device, implantable pacemaker pulse generator, pacemaker programmers, and cardiovascular permanent pacemaker electrode. See *515 Project Status 2014*, *supra* note 101. From January 2013 through February 2014, final orders classifying devices have been issued for five Class III pre-amendments, which include the temporary mandibular condyle reconstruction plate, intra-aortic balloon and control system, external counter-pulsating devices, transilluminator for breast evaluation, and the sorbent hemoperfusion system. *Id.* See also *infra* note 156.

150. 21 U.S.C. § 360e(b) (2012), *amended by* Food and Drug Administration Safety and Innovation Act of 2012, Pub. L. No. 112-144, § 608(b), 126 Stat. 993, 1056-59 (2012).

151. *Id.*

152. See MICHAEL ASIMOW & RONALD M. LEVIN, *STATE AND FEDERAL ADMINISTRATIVE LAW* 316 (3d ed. 2009).

153. 21 U.S.C. § 360e(b).

by the five device types reviewed and/or reclassified in the less than two years since the FDASIA became effective, the relaxed procedural requirements have contributed to greater efficiency and progress toward the completion of the review and reclassification of the remaining Class III pre-amendment devices.¹⁵⁴

Empowered by recent changes in the law, the FDA has targeted the end of 2014 for the completion of the remaining pre-amendment devices.¹⁵⁵ Unlike the legislative efforts before it, the FDASIA addresses many of the issues that have plagued the FDA's review of pre-amendment devices over the past four decades. The extension of the medical device user fees provides for greater Agency funding. The switch from rulemaking to administrative orders deals with the overly burdensome procedural process. Further, providing the Director of the CDRH the authority to actually issue these administrative orders localizes control over the process, and allows those most knowledgeable to be directly involved in the FDA's final classification decision-making. In addition to helping ease some of the administrative and procedural burdens associated with pre-amendment device classification, this could aid in prioritizing the classification of these devices within the Agency and bring an end to the continued misuse of the 510(k) process. However, the extent to which pre-amendment device priority will actually rise is yet to be seen, as there has been no Agency oversight or accountability. While identifying a target date for completion is certainly a crucial step, little, if anything, binds the FDA to meeting this goal or holds the Agency accountable if it does not.¹⁵⁶

154. See *515 Project Status 2014*, *supra* note 101.

155. *FDA Aims to Complete Device Reclassifications by End of 2014*, INSIDE HEALTH POL'Y (March 23, 2013) <http://insidehealthpolicy.com/fda-aims-complete-device-reclassifications-end-2014>.

156. Though it should not come as a surprise, it should be noted that the FDA did in fact fail to meet this 2014 completion goal. See *515 Project Status*, Food & Drug Admin., <http://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDRH/CDRHTransparency/ucm240318.htm> (last updated Feb 2, 2015) [hereinafter *515 Project Status 2015*]. Prior to this article's publication, between February 2014 and March 2015, the Agency completed review of three additional device types (the endosseous dental implant (blade-form), implanted blood access, and automated external defibrillators); bringing the total number of finalized device classifications completed since the FDASIA's enactment to eight and leaving eleven pre-amendment device types still to be classified. *Id.* In a 2014 proposed rule, the FDA sought to amend regulations providing the classification procedures that enumerate the specific considerations classification panels must take into account when determining what class of regulatory control should be recommended for a pre-amendment device. Medical Device Classification Procedures, 79 Fed. Reg. 16,252, 16,257 (proposed Mar. 25, 2015); see also 21 C.F.R. § 860.84(c) (2014). The proposed rule would have "remove[ed] the requirement to answer the classification questionnaire and provide information using the supplemental data sheet." *Id.* Doing so, the Agency believed, would help result in the more efficient use of Agency resources with respect to pre-amendment device classifications. *Id.* However, the Medical Device Classification Procedures Final Rule made no mention of these proposed pre-amendment

VII. CONCLUSION

In recent years, the FDA's 510(k) medical device PMN Process has come under fire due to substantial deficiencies in the regulatory process. These deficiencies have raised serious concerns about the Agency's ability to ensure the safety of the medical devices that it clears or approves for marketing and distribution throughout the U.S. Numerous reports and device recalls have been issued, all highlighting these deficiencies and indicating that there are major problems with the medical device premarket review process as it currently exists. However, of all the criticism that has been directed toward the 510(k) Process of late, the most notable and troublesome has been the rampant use of this process to evaluate pre-amendment and specifically, *implantable* pre-amendment devices that often pose unique and more substantial risks. This unwarranted and prolonged practice has exacerbated 510(k)'s problems because the process was never intended to serve as a permanent means of reviewing such potentially dangerous devices. Thirty-eight years after Congress enacted legislation initially authorizing the FDA to regulate medical devices, the proper review and classification of these pre-amendment devices has yet to be completed and they continue to be evaluated through substandard means. Consequently, unsafe devices may still be in use and receive clearance for marketing based on the assumption that they are as safe as the older devices to which they are found to be substantially equivalent, even though the older devices were never properly evaluated. While the FDA has reviewed many of these pre-amendment devices and determined and assigned the appropriate level of regulatory control needed to ensure their safety, many patients have suffered injuries resulting from the use of such devices.¹⁵⁷

Various factors and circumstances may have contributed to this failure. However, nothing can excuse the amount of time that has lapsed, the number of devices that have been cleared, and the number of people who have been put in danger as a result of 510(k)'s misuse. While recent legislation finally offers

procedure changes. Medical Device Classification Procedures; Reclassification Petition: Content and Form; Technical Amendment, 79 Fed. Reg. 77387 (Dec. 24, 2014). The FDA has since issued proposed orders offering the Agency's proposed classifications for nine of the remaining eleven pre-amendment device types and is currently reviewing and considering comments received for six of them. See *515 Project Status 2015*, *supra* note 156. Thus, while the Agency is undoubtedly making an effort to bring the circumstances necessitating 510(k)'s continued misuse to an end, even with the FDASIA's pre-amendment review procedural overhaul, viewed in light of these more recent developments, it seems that the FDA's non-binding 2014 completion target may have simply been an over-ambitious estimation given the resources available to the Agency, or just more of the same empty rhetoric that has plagued these pre-amendment devices for the last forty years. What is clear, however, is that while thirty-eight years may not have been enough time to complete review of these pre-amendment devices, the thirty-ninth has not proved to be any more promising; and so, we shall continue counting.

157. See Zuckerman et al., *supra* note 11, at 1007.

a redeeming opportunity to salvage what has otherwise been nothing short of a disastrous attempt at regulating medical devices made available in the U.S., a larger issue remains unsolved.

The shortcoming befalling the implementation of the MDA are not necessarily unique to medical devices. Prior to its enactment, Congress, struggling to develop a method for addressing the devices that had already been on the market, looked for guidance from the handling of similar challenges that arose in the wake of the adoption of the Food Additive Amendments of 1958, the Color Additive Amendments of 1960, and the Drug Amendments of 1962.¹⁵⁸ As shown by these earlier amendments, medical technology continues to march forward. Advancements continue to be made. At some point, technological advancements may again outpace the current regulatory framework and challenge traditional definitions, categorizations, and classifications of drugs, devices, and other medical products, just as was the case when Congress recognized there was a need for more comprehensive medical device regulation.¹⁵⁹ When that time comes, lessons learned from the medical device experience should direct the regulatory approach pursued, so that legitimate assurances of safety can be expected.

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158. INST. OF MED., PUBLIC HEALTH EFFECTIVENESS OF THE FDA 510(K) CLEARANCE PROCESS: BALANCING PATIENT SAFETY AND INNOVATION: WORKSHOP REPORT 3 (2010).

159. *Id.* at 4.

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