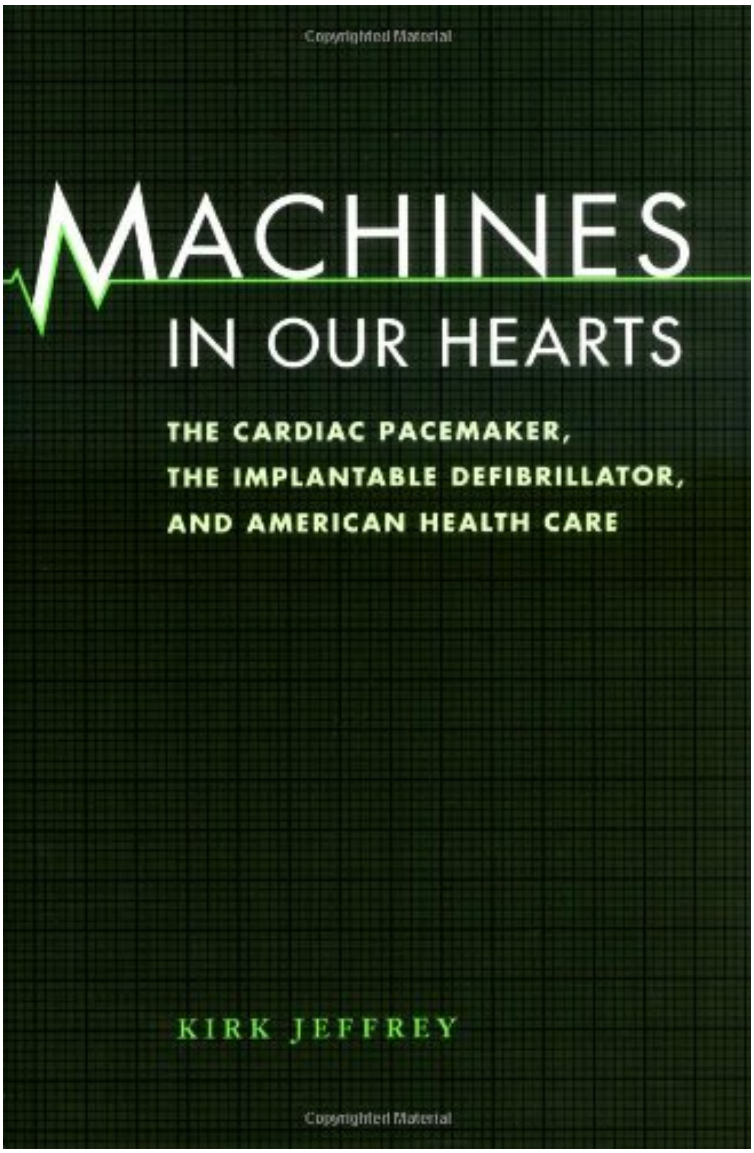
Machines in Our Hearts: The Cardiac Pacemaker, the Implantable Defibrillator, and American Health Care

Kirk Jeffrey



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Kirk Jeffrey : Machines in Our Hearts: The Cardiac Pacemaker, the Implantable Defibrillator, and American Health Care before purchasing it in order to gage whether or not it would be worth my time, and all praised Machines in Our Hearts: The Cardiac Pacemaker, the Implantable Defibrillator, and American Health Care:

0 of 0 people found the following review helpful. A great bit of medical, political cultural historyBy Katy ButlerThis is a thorough, well-written history not only of the pacemaker and internalized defibrillator, but of the cultural implications of the devices. Most of the emphasis is on the pacemaker -- the first fully implantable and miniaturized form of life support. Jeffrey examines how the pacemaker began as a rarely-used lifesaving device and morphed, with the coming of Medicare, into a massively deployed standard of care for elderly people whose heart rhythm systems were wearing out with age.This is a book for people interested in detailed medical and technological history rather than a general interest book. For specialized readers, I recommend it highly. It contains great story of technology unfolding, including the men behind the inventions, like Medtronics founder and inventor Earl Bakken,who used a metronome circuit design from Popular Electronics to cobble together the first portable (but not implantable) pacemaker in 1958. Jeffrey's account is fascinating, but not rah-rah -- he looks at the complex social, political and cultural context in which the devices arose. It was a great background source for a book I'm currently writing, and for an article I wrote for the New York Times magazine in June 2010 called "What Broke My Father's Heart," a family medical memoir examining the moral choices created by devices like the pacemaker near the end of life.0 of 0 people found the following review helpful. Excellent history of pacemakers and defibrillatorsBy Bradley J. RothMachines In Our Hearts is an excellent history of the pacemaker and defibrillator. These devices are one of the best examples of the application of technology to medicine. Jeffrey tells the exciting story of their development. I highly recommend it.

Today hundreds of thousands of Americans carry pacemakers and implantable cardioverter-defibrillators (ICDs) within their bodies. These battery-powered machinessmall computers, in factdeliver electricity to the heart to correct dangerous disorders of the heartbeat. But few doctors, patients, or scholars know the history of these devices or how "heart-rhythm management" evolved into a multi-billion-dollar manufacturing and service industry. Machines in Our Hearts tells the story of these two implantable medical devices. Kirk Jeffrey, a historian of science and technology, traces the development of knowledge about the human heartbeat and follows surgeons, cardiologists, and engineers as they invent and test a variety of electronic devices. Numerous small manufacturing firms jumped into pacemaker production but eventually fell by the wayside, leaving only three American companies in the business today. Jeffrey profiles pioneering heart surgeons, inventors from the realms of engineering and medical research, and business leaders who built heart-rhythm management into an industry with thousands of employees and annual revenues in the hundreds of millions. As Jeffrey shows, the pacemaker (first implanted in 1958) and the ICD (1980) embody a paradox of high-tech health care: these technologies are effective and reliable but add billions to the nation's medical bill because of the huge growth in the number of patients who depend on implanted devices to manage their heartbeats.

"The story is a complex one, and Professor Kirk Jeffrey follows its twists and turns with utter clarity, technical sophistication, and high intelligence... elegantly researched and highly thoughful... argued and written on different levels with wonderous detail and massive research." (Hamilton Cravens Journal of American History)"This is an important book that provides valuable insight into the origins and growth of one of the world's most successful biomedical industries... It includes a wealth of information and will be an indispensable reference for the development and diffusion of pacemakers. Jeffrey knows his subject and has passion for it." (W. Bruce Fye Journal of the American Medical Association)"This interesting book on the history and development of pacemakers and defibrillators is recommended for electrophysiologists and cardiologists as well as for patients who have these devices." (John F. MoranMD Doody's Book Service)"The historian's role in analyzing the many social and cultural factors that impinge on medical treatment, and its cost, is crucial to all of us, and this book provides much stimulation for further thought." (Audrey B. Davis American Historical)"If you are looking for a well-written and well-produced history of a post-war medical tecnology and its social, political and economic context, Machines in Our Hearts will be a good choice." (Carsten Timmermann British Journal of the History of Science)"Tells a story of profound significance, one of medical practice and industrial research." (Journal of the History of Medicine and Allied Sciences)"The cardiac pacemaker and the implantable cardioverter-defibrillator are among the most important medical innovations of the twentieth century. Machines in Our Hearts tells the fascinating story of this remarkable achievement. This is an original piece of work, building on a significant amount of new information from Jeffrey's interviews with key protagonists as well as careful analysis of primary and secondary source material." (Joel D. Howell, M.D., University of Michigan)From the PublisherThis is an important book that provides valuable insight into the origins and growth of one of the world's most successful biomedical industries. Kirk Jeffrey is a history professor at Carleton College in Minnesota (where much of the US pacemaker industry is based). He spent a decade reviewing the literature, conducting oral history interviews, and writing this detailed study of the invention and growth of the pacemaker industry. Jeffrey's research has paid off: he displays a firm grasp of the medical, scientific, technical, and institutional aspects of his subject. Although he focuses on the United States, he acknowledges the many important contributions of European doctors, electronics experts, and corporations. Jeffrey supplements his history of pacemakers with a chapter on the development of the implantable cardioverter-defibrillator, a technological innovation that has revolutionized the treatment of tachyarrhythmias. The history of the pacemaker industry is a tale of fertile collaboration and fierce

competition. Jeffrey describes and interprets the complex relationships between the inventors and innovators, the entrepreneurs and manufacturers, the academic electrophysiologists, and the practitioner cardiologists and surgeons who ultimately prescribe and implant pacemakers into patients with too few heartbeats. A series of scientific discoveries and technological innovations that owed much to government-sponsored defense and space research triggered this interplay of illness, innovation, and industry. Cardiology, more than any other medical specialty, has been fueled by advances in technology. Heart specialists and hospitals embraced new technologies and techniques because these innovations helped patients and were profitable. Launched in the late 1950s by a few innovators (such as US electronics experts Earl Bakken and Wilson Greatbatch and surgeons C. Walton Lillehei and William Chardack), the pacemaker business grew rapidly into a huge international enterprise. This book highlights a significant difference between the professional world of medical practice and the commercial world of medical technology. Traditionally, surgeons freely shared their procedural innovations with other doctors. They published descriptions of their new techniques and demonstrated them to colleagues, trainees, and visiting physicians. This was true of most of the physician-pioneers of pacing. The research programs of most pacemaker companies, however, have been shrouded in secrecy, and there have been several legal battles over patent infringement. Jeffrey explains just how vital serial innovations have been to pacemaker companies and how vigorously they have protected their products. The initial estimates of the potential pacemaker market greatly underestimated the number of persons with symptomatic bradyarrhythmias. With the advent of continuous electrocardiographic (Holter) monitoring, it became apparent that many persons with episodic alterations of consciousness or "spells" had transient bradycardia or heart block. The challenge was to tap into this market. Pacemaker companies chose a distribution plan that insured rapid diffusion of their products and encouraged brand loyalty. Manufacturers began to train surgeons and other practitioners to implant their devices in their local hospitalsrather than limiting the devices to referral centers and heart rhythm experts. They also provided comprehensive professional support that even included procedural assistance in the operating room and free devices designed to evaluate and track the function of pacemakers. As with many new technologies, especially those rushed to market, some early pacing systems had design or production defects. These problems, combined with the relatively short battery life, meant that patients with pacemakers had to undergo regular pulse generator changes and additional unpredictable procedures necessitated by electronic or electrode (lead) problems. Pacemaker companies worked hard to develop more reliable and sophisticated pacemaker systems. The Medical Device Amendments of 1976 reflected the US federal government's concern that manufacturers were sometimes marketing products such as pacemakers that were defective, unreliable, or ineffective. Increasing competition and the pressure to grow market share caused some firms to take risks, such as incorporating innovations that needed more testing. Today, the government regulates certain aspects of clinical trials and product release. Emphasis is placed on the safety of individual patients. Jeffrey also describes the professionalization of clinical electrophysiology, now a large and influential subspecialty of cardiology. The pacemaker field, once populated mainly by cardiothoracic surgeons, has been taken over by cardiologists, especially clinical electrophysiologists who focus their practice on patients with cardiac arrhythmias. The advent of transvenous pacemaker leads that did not require a thoracotomy catalyzed this shift: cardiologists could insert these electrodes into a vein and implant the generator beneath the skin. Today, clinical electrophysiology has a defined career path with a board examination in addition to a specialty society, a distinct vocabulary, and journals and meetings that focus on cardiac arrhythmias. The book includes a wealth of information, and it will be an indispensable reference for the development and diffusion of pacemakers. Occasionally, the detail detracts from the author's narrative. Some technical data could have been placed in endnotes, which reflect the author's diligence in acquiring data from published and unpublished sources and from oral history interviews. His valuable seven-page bibliographical essay is a useful guide to pertinent secondary sources. Jeffrey knows his subject and has passion for it. He closes with a discussion of the economic implications for society of these "machines in our hearts." These sophisticated devices are expensive, but they enhance and prolong lives. "They really work" is his final statement. --W. Bruce Fye, Journal of the American Medical AssociationAbout the AuthorKirk Jeffrey is a professor of history at Carleton College, where he teaches American history and the history of technology. He is coauthor (with mathematician Loren Haskins) of Understanding Quantitative History.