JAIN MALKIN

4

FOURTH EDITION

MEDICAL AND DENTAL SPACE PLANNING

A COMPREHENSIVE GUIDE TO DESIGN, EQUIPMENT, AND CLINICAL PROCEDURES

WILEY

MEDICAL AND DENTAL
SPACE PLANNING

MEDICAL AND DENTAL

SPACE PLANNING

A Comprehensive Guide to Design, Equipment, and Clinical Procedures

FOURTH EDITION

Jain Malkin

For general information about our other products and services, please contact our Customer Care Department within the United States at (800) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley publishes in a variety of print and electronic formats and by print-on-demand. Some material included with standard print versions of this book may not be included in e-books or in print-on-demand. If this book refers to media such as a CD or DVD that is not included in the version you purchased, you may download this material at http://booksupport.wiley.com. For more information about Wiley products, visit www.wiley.com.

In memoriam to Stuart,
for the many years of enduring patience
and encouragement as I researched
and wrote numerous books,
each time saying it would be the last

And in memory of my Mother,
whose energy and drive, love for the written word,
and intellectual curiosity have shaped my life

Finally, my affection to Gary, whose sense of humor
and commitment kept me going through
this huge endeavor (*that will absolutely be my last book!*)

Contents

Appendix II, containing medical and dental space planning questionnaires,
can be found on the book's companion website at: www.wiley.com/go/
medicaldentalspaceplanning

Preface

In 1970, I decided to specialize in healthcare design. I spent many weeks at the library researching literature on medical and dental space planning, color and its effect on patients, and the psychological aspects of illness—how do patients and visitors react to hospitals? Why do people fear a visit to the doctor or dentist? What role does lighting play in patient rooms?

Much to my surprise, very little had been written on these topics. I found nothing in architecture or design publications but did come across an occasional article in obscure publications sometimes dating from the 1940s. There were a few articles in the *American Journal of Occupational Therapy* on the effect of the environment on the patient, and there were numerous articles on color preferences of various ethnic groups or cultural taboos with respect to color. A handful of articles on limited aspects of office space planning were scattered in medical or dental practice management magazines and Department of Health, Education, and Welfare publications. Here was a field with few resources and vast potential.

Most medical and dental offices in 1970 were either colorless and clinical or drab and dreary. There was no middle ground. Clinical offices had high levels of illumination, easy-to-clean shiny surfaces, and many medical or dental instruments in view. At the other end of the spectrum were offices designed to be less threatening with brown or beige shag carpet, residential pendant lights, nubby, earth-tone upholstery fabric to conceal soil, and poorly styled wood furniture that appeared to have been rescued from a Salvation Army truck. Dusty plants in macrame hangers often accessorized these unhygienic environments.

I concluded that I would have to do my own empirical research to gather enough data on which to base my design work. I spent the better part of a year visiting hospitals, interviewing staff and patients, and observing how patients were handled. I wanted to see the facility through the patients' eyes. I also visited many physicians and dentists and asked about their practices—what kinds of instruments they used, what size treatment room would be optimal, what kinds of changes would make their offices more efficient, and what critical adjacencies existed between rooms or treatment areas.

I documented my visits with photographs of confusing signage, waiting rooms furnished with Goodwill castoffs, dismal lighting, corridors jammed with medical equipment, and procedure rooms that resembled Dr. Jekyll's laboratory. At the end of my research, I had accumulated over 2,000 photos and reams of notes that I analyzed. From this, I formulated my design philosophy. My dual college majors, Psychology and Environmental Design, provided a theoretical background with which to interpret my findings. The culmination of my 40 years of experience designing hundreds of medical and dental offices has resulted in this book.

A person with no prior experience in healthcare design can study this book and become familiar not only with current economic and practice management issues, but also with medical and dental procedures, equipment associated with each medical or dental specialty, room sizes, traffic flow, construction methods, codes, interior finishes, and more. I have attempted to summarize my research and experience so that others will not have to follow such a laborious course of study in order to become proficient in a field that requires such highly specialized knowledge.

Today, probably more than a thousand architects and designers across the country list healthcare as one of their specialties. In its infancy when I started out, the field

has now reached maturity. No longer concerned with discovering the basic rules and principles, healthcare design specialists can devote themselves to innovation and refining what has been learned.

The first edition of this book was published in 1982 and featured exclusively my own work. However, the second (1990), third (2002), and the new fourth edition (2014) in order to give a broader perspective, include examples of work by other practitioners who are credited under each photo. I thank each of these architects, designers, and photographers for sharing their work.

The fourth edition updates the book on digital technology—electronic medical records, digital imaging, diagnostic instruments, and networked communications—and how these impact the design of medical and dental offices. The rise of mHealth (mobile monitoring and diagnostic devices) enables patients to be monitored in their homes and this has resulted in a frenzy of partnerships between software providers, device manufacturers, and companies that provide secure portals and networks for transmitting the data. Increasingly, people will be wearing unobtrusive sensors and small monitoring devices, some of which may be managed through applications on their cell phones to measure blood sugar levels, blood pressure, heart arrhythmias, and even to warn them two weeks ahead of an impending heart attack.

The milieu in which physicians and dentists practice—the impact of the Affordable Care Act (ACA), Patient-Centered Medical Homes, the baby boomer generation, the large number of uninsured Americans—is presented as a backdrop for understanding the pressures on the healthcare system, and also, implications for facility design. The influence of the ACA on clinic design, especially in primary care, can be seen in team collaboration spaces and larger examination rooms that enable multidisciplinary coordination of care. In primary care, especially internal medicine, the rise of "talking rooms" reflects recognition that patients often need not disrobe and may, in fact, feel less threatened and more comfortable in a setting devoid of medical instrumentation.

A very thorough discussion of the design of endoscopy centers is presented in this edition of the book. This includes a literature review of the risks associated with this rapidly expanding service line related to improper or inadequate cleaning of fiber-optic scopes. As I became aware of the risks, I felt compelled to learn more because people who undergo these procedures are generally unaware of the questions to ask and they (like I, before stumbling upon this research), have no idea how really difficult it is to properly clean a scope. Nor are most of us aware of the serious consequences of inadequately cleaned scopes. Because this is difficult work requiring good technique, the design of the workroom and proper lighting really help or handicap technicians in doing the job well. A functional guide to the design of the scope workroom is something that does not seem to exist. As a result of many interviews and site visits, I am glad to be able to provide this information.

A new chapter on Community Health Centers has been added, and the chapter on Primary Care has been expanded to include corporate health and wellness centers, the concept of direct care, urgent care, and integrative medicine. The patient-centered medical home is explored in-depth. Bariatric surgery has been added to the chapter on Medical Specialties. The chapter on Ambulatory Surgery Centers (ASCs) gives clarity to the interplay of licensing, Certificates of Need, accreditation, and Medicare certification. Whether an experienced practitioner or new to planning ASCs, the wealth of information contained in this chapter will enhance your understanding of economic and regulatory issues, code compliance, patient flow, infection control, and more.

Nowhere have changes in technology been more apparent than in dentistry and diagnostic imaging. These and most other chapters have been totally rewritten. Nearly 100 new or revised space plans, revised space programs for all specialties, and new photos of facilities and equipment have been added to all chapters. New developments in medical and dental treatment are presented along with state-of-the-art equipment. Fabrics and interior finishes representative of recent technological advances are introduced, and an in-depth discussion of LEED has been added to Chapter 13, Construction Methods and Building Systems. The updated lighting chapter acquaints readers

with new types of lamps and fixtures with a large section on LED lighting and innovative solutions to enhance both aesthetics and function.

A change since the last edition of this book is the rigor of regulatory agency review of office-based surgery practices, far more stringent mandatory regulation (certification, licensing, and accreditation) of ambulatory surgical centers, and interest by group practices and large managed-care organizations in seeking voluntary accreditation from one or more national organizations as well as Medicare certification. Ambulatory care enterprises such as breast care centers, urgent care, women's centers, or radiation therapy that may physically be located in a medical office building but are covered under the hospital's license, are subject to a Joint Commission survey and accreditation. This book will help clarify the roles of these various agencies and organizations, explain which aspects of the regulations apply to the built environment, and answer many questions that often arise when trying to understand compliance. I have also tried to clarify OSHA issues that affect design, which required wading through several inches of "interpretive letters" to find those kernels that impacted safety of personnel and were within the province of design professionals as opposed to policies and procedures followed by staff to protect themselves.

On a final note, although the book attempts to familiarize readers with basic code information, codes vary geographically and it is the responsibility of the architect or designer to check local and state codes, as well as the evolution of the Americans with Disabilities Act (ADA) legislation.

Acknowledgments

Introduction: Changing Perspectives

HEALTHCARE FINANCE

Dramatic changes have occurred in the delivery of healthcare since the first edition of this book (1982), when undiscounted fee-for-service reigned. The seminal event that kicked off a series of radical changes in the traditional fee structure began in 1984, with the federal government's prospective pricing program whereby Medicare and Medicaid reimbursements were made on a fixed, flat-fee basis, rather than as a percentage of an individual physician's fee. Based upon a list of 500 diagnosis-related groups (DRGs) of procedures, the physician/provider received a flat fee, regardless of actual cost. Each DRG has a "weight" established for it primarily based on Medicare billing and cost data. Each weight reflects the relative cost, across all hospitals, of treating cases classified in that DRG. Since Medicare and Medicaid comprise a significant percent of the national healthcare budget, hospitals and physicians have been forced to take a hard look at ways to reduce costs. Following the lead of the federal government, some states also have initiated prospective pricing programs, and insurance companies have followed suit, issuing guidelines and directives, and making physicians feel that third-party payers, rather than they, are managing their patients' care.

During the 1990s, the demands of investors increasingly influenced the delivery of healthcare services as a growing number of hospitals, home healthcare services, skilled nursing facilities, and HMOs (health maintenance organizations) became for-profit entities, publicly traded on Wall Street. Investor ownership profoundly influenced the "product" of healthcare by intensifying competition, creating a focus on cost containment, reducing the autonomy of physicians, and, ultimately, reducing healthcare services to a commodity. But by 1997, healthcare stocks were performing poorly because cost containment and competition had reduced profit margins and Medicare and Medicaid had made serious budget cuts. Then came the scandals leading to the collapse of two of the most celebrated companies—Columbia/HCA and Oxford Health Plans.

Just when healthcare finance seemed as if it couldn't get any worse, it did. The Balanced Budget Act of 1997 required that Medicare expenditures be cut by $115 billion over a period of five years, placing enormous pressure on hospitals to reduce costs. During the first decade of the 21st century, there was much jockeying between insurance companies and providers to reduce costs with continual speculation about whether health reform would ever come about and, to the amazement of many—it did. The Affordable Care Act (ACA), sometimes referred to as "Obamacare," was passed during Barack Obama's administration.[1] This changed healthcare from a privilege to a human right available to all Americans. Hotly debated—yes. Only time will tell, as with Social Security and the Medicare program, if this will achieve the overarching goal of bringing better health to more people by strategically balancing access, quality, and cost.

On the insurance front, a big change in recent years has been the growth of HMO enrollment to an eight-year high of 79.5 million Americans in 2011.[2] A more detailed discussion of HMO and PPO market penetration and statistics about numbers of visits and so forth, can be found in the *Managed Care Digest* source listed in the footnote.

---

[1] Social Security Legislative Bulletin Number 111-40; March 24, 2010. "The President Signs H.R. 3590, The Patient Protection and Affordable Care Act." http://www.ssa.gov./Legislation/legis_bulletin_032310.html (accessed Oct. 14, 2013).
[2] Managed Care Digest Series® *HMO-PPO Digest*, 2012–2013; published by Sanofi, Bridgewater, NJ. www.managedcaredigest.com/digitaldigests/2012_2013 HMOOPPORxDigest/files/assets/basic-html/page8.html (accessed Oct.14, 2013).

The Patient Protection and Affordable Care Act of 2010

It would be hard to find a healthcare topic that has had more written about it in the past three years than the ACA and Accountable Care Organizations (ACOs) as well. As the final touches are put on this manuscript in October 2013, there has been an hourly flurry of articles, blogs, newsletters, and the like as a response to the inauguration of the state insurance exchanges. While there are dozens, if not hundreds, of websites that seek to define the ACA and the role of ACOs, this simple description sums it up nicely: "Accountable care is a broad concept of people-centric care, where the various providers take responsibility in a collaborative or formally integrated arrangement for a specific population's health—from prevention to acute care to chronic care management."[3] The actual legislation is lengthy and complex with reforms that include rules for insurance companies, tax impacts, funding, spending, new benefits, and rights and protections for patients.

This groundbreaking piece of legislation is very much a work in progress as various provisions of it have come into play at different times with the major event—the roll-out of state healthcare insurance exchanges—on October 1, 2013. Prior to this, states had been engaged in pilot programs, tweaking existing laws, and working with large healthcare systems to reshape care delivery. In 2014, 32 million uninsured Americans will have access to care, but having access to and receiving care is not the same thing. Half of these individuals will be covered by Medicaid expansion and the other half through state insurance exchanges. With shortages of primary care physicians, how will this huge influx of patients be accommodated? This remains to be seen, but there will be funding for the expansion of Federally Qualified Health Centers (FQHC), more commonly known as community health centers or safety-net clinics—entities that are already structured to offer comprehensive healthcare services in a patient-centered medical home context. As discussed in Chapter 4, community health centers are an efficient and practical model for the delivery of health and wellness.

Clearly, it is only through a major restructuring of primary care that the influx of patients can be accommodated and this has, at its foundation, a robust clinical decisions database and continual measurement of patient outcomes. This also means fundamental changes in clinic design and space planning (discussed in Chapter 3), the use of mobile health monitoring (discussed in Chapter 1) to enable people to stay at home and not have to personally visit a provider to check vitals or manage specific chronic conditions, and proactive team-based coordination of care. When providers are paid a fixed fee per capita to manage a patient's care, being able to bill for a virtual visit or responding to an email becomes a nonissue. There are so many more efficient ways of providing care and achieving better outcomes than the current system pre-2014. Innovation is occurring everywhere. Healthcare systems across the nation have been preparing for the ACA by challenging themselves to think of ways to be more effective. An example, from Chapter 7, is the Shared Medical Appointment (SMA). Harvard Vanguard Medical Associates, the largest SMA provider in the nation, established a 90-minute enhanced appointment in which a group of patients with a similar chronic condition receive care and support each other. The success of this program can be measured in patient satisfaction scores and improved outcomes. A specialized group exam room used for this purpose can be viewed in Chapter 7, Group Practice.

REGULATORY ISSUES AFFECTING PHYSICIANS

New HIPAA Rules Take Effect

The Health Insurance Portability and Accountability Act of 1996 will continue to result in changes to regulations and costs for both physicians and dentists.[4] HIPAA

---

[3] Susan Davis, James Proctor, and Mark Jamikowski. White paper: "The Evolution of Accountable Care: Accelerating the Transformation of U.S. Healthcare," January 3, 2011. www.kpmginstitutes.com/healthcare-life-sciences-institute/insights/2011/the-evolution-of-accountable-care.aspx (accessed Oct. 14, 2013).

[4] Joseph Conn. "New HIPAA Rules Take Effect," posted March 25, 2013. http://modernhealthcare.com/article/20130325/NEWS/303259955.

is a mandate from the federal government to automate health-related financial and clinical data to protect patient privacy. The year 2013 brought amendments to HIPAA (with a compliance deadline of September 23, 2013) that expand privacy and security to business associates that might include vendors of remote-hosted EHRs to office-based physicians or companies providing hospitals with clinical and financial data analytics.[5] Agreements signed prior to the enactment of these amendments have a one-year grace period for compliance. Another new aspect of this is that a patient who pays out-of-pocket for medical treatment now has the right to ask the provider not to share a record of that treatment with the patient's health insurance provider. This can be difficult to manage but software vendors are developing a method of blocking a specific treatment or office visit so that it cannot be transmitted. As in past years, HIPAA compliance will result in significant cost for software, compliant hardware, employee training, personnel security policies, considerable documentation, and monitoring of compliance. The use of a single HIPAA-defined administrative standard for electronic transactions, such as claims processing and verification of eligibility, has been one of the goals for a number of years.

FORCES SHAPING HEALTHCARE

It is worthwhile to revisit a couple of concepts from the Introduction to the third edition of this book (published in 2002) to see how the forecasts by knowledgeable individuals have fared.

Telemedicine

According to Kirby Vosburgh, Associate Director of CIMIT (Center for the Integration of Medicine and Innovative Technology in Boston), healthcare will be moving into the home, changing "house calls to mouse calls."[6] Internet-enabled medicine will allow patients and providers to communicate in cyberspace, listening to a patient's heart or lungs, and monitoring blood pressure via computer. Telemedicine is especially useful for clinical consultations with physicians who are located in rural areas. This is expected to reduce the number of office visits and to help manage chronic illnesses, such as hypertension, and the number of acute complications that result from poor management of these conditions. Payment for "televisits" is expected within five years, and 50 percent of physicians will treat patients online, according to a survey by the American Medical Association.

Commentary: Excellent predictions but only now slowly starting to become a reality. One can never underestimate the glacial speed at which change occurs in the healthcare system.

Medical Informatics

The use of information systems in running a medical practice and managing patient care makes a vast store of clinical data instantly available to physicians. An aggregate database of millions of clinical encounters can be accessed with powerful software programs that will even run on a palm-top PC. Currently, patients with identical conditions may receive radically different treatments from different providers, whereas the use of a prognosis "calculator" enables physicians to quantify the advantages and disadvantages of various clinical strategies, to review research findings, and to calculate drug dosages while the patient is in the exam room. Another aspect of medical informatics is the computer-based provider order entry (CPOE), which is expected to greatly reduce errors due to illegibility.

Commentary: Physicians have been slow to adopt the clinical decisions support database, perhaps preferring to rely upon their intuition, personal experience, and

---

[5] Ibid.

[6] Lecture by Kirby Vosburgh, Ph.D. "The Electronic Outpatient/Home Environment—from House Calls to Mouse Calls," at "Beyond 2000: An International Conference on Architecture for Health," Vancouver, British Columbia, October, 2000.

evidence-based medicine. This will no doubt be ramped up by the passage of the ACA that makes accountability and measurement of clinical outcomes essential. Many physicians with mature practices still have not adopted EHRs due to expense and having to scan years of hand-written patient records. Younger physicians are much more comfortable accessing databases and have the expectation of using EHRs. A thoughtful discussion of the issues associated with adoption of clinical decision support (CDS) and EHRs makes the case that it is not enough just to have digitized patient information without a foundation of evidence-based intelligence to enable meaningful care.[7] The velocity of clinical information is more than any physician can manage. Just avoiding negative drug interactions can reduce visits to the ED and this information can be accessed with a click of a button if the EHR has CDS.

Adoption of EHR

The adoption of EHR is important if real health reform is to occur in the United States because it is hard to deliver effective care that is timely, safe, and without error, and to coordinate care for individual patients, without reliance on a clinical database and the ability to electronically share data with other providers. And it is impossible to document and measure patient outcomes without an electronic system. The goal of the federal 2009 *Health Information Technology for Economic and Clinical Health (HITECH) Act* is to encourage and advance the use of informatics by providing Medicare and Medicaid financial incentives to physicians and hospitals that adopt and demonstrate meaningful use of EHR.[8]

A government study indicates that in 2011, only 54 percent of physicians had adopted EHR and 85 percent of those reported being either somewhat or very satisfied with their systems.[9] There is higher adoption by physicians under the age of 50. The breakout of the statistics is interesting.

Standalone, self-contained systems are favored by 59 percent over Web-based systems. The larger the physician group, the higher the rate of adoption with only 29 percent of solo physicians having EHR which ramps up to 62 percent for practices of 3 to 10 physicians. The following list shows the breakdown by ownership and specialty:

Breakdown by ownership:

Physician-owned	49%
HMO	100%
Community Health Center	73%
Academic Medical Center	69%

Breakdown by specialty:

Primary care	58%
Surgical	48%
Medical	54%

The New Consumer

Author's note: This topic is from the third edition of the book and is still accurate. Attempts to update the information from these same sources was not possible because SMG is no longer in business and Yankelovich has become a huge futures consulting company under the name The Futures Company, offering many tantalizing reports online only to subscribers. Price Waterhouse Coopers has become PwC and an updated report on this topic could not be found.

---

[7] White paper: "Elsevier Clinical Decision Support: Impacting the Cost and Quality of Healthcare," (no date provided but 2011 is an educated guess).

[8] Healthcare IT Index. "Health Information Technology for Economic and Clinical Health Act." www.healthcarenews.com/directory/health-information-technology-economic-and-clinical-health-act (accessed October 14, 2013).

[9] Eric Jamoon, Ph.D., and others. NCHS Data Brief No. 98, July 2012 (report revised January 11, 2013). "Physician Adoption of Electronic Health Record Systems: United States, 2011." www.cdc.gov/nchs/data/databriefs/db98.htm.

Much has been written about the new consumer: a more well-educated comparison shopper, empowered by the Internet, with the analytical ability to review research and form an opinion about treatment options.

Universal Beliefs

According to a study by Yankelovich Research, the new consumer has three universal beliefs:[10]

- Doctors can be wrong.

- People know their own bodies best; self-reliance is wise.

- Quality is important, and consumers want the best for less; value is being redefined.

Patients are realizing, largely due to their personal experiences with managed care—but also influenced by the media—that cost containment pressures and the complexities of the healthcare system leave them vulnerable to being ignored, being denied treatment, or being exposed to medical error unless they aggressively take responsibility for educating themselves and "managing" their own healthcare. These *empowered consumers* are a new factor, identified in a Price Waterhouse Coopers forecast of the healthcare industry (with projections to the year 2010) as the most important force behind change.[11] It, and other similar forecasts characterize Baby Boomers as "adversarial, fickle, and impatient" and point out that providers are "not prepared to serve the highly differentiated expectations of these strong-willed and knowledgeable individuals."[12]

Baby Boomers Empowered by the Internet

The explosion of Internet sites giving patients access to self-care information, journal articles, and chat rooms associated with specific diseases 24 hours a day, 7 days a week, will continue to grow. Consumers with the motivation

and education to do this type of research and the ability to understand what they are reading have been arriving at their doctors' offices prepared to discuss potential diagnoses and treatment options. Some physicians may not welcome this sort of "partnership" with patients, but if the research published in the past few years is any indication, this trend will accelerate, not diminish. From the physician's perspective, valuable examination time can be squandered by having to sort through a stack of studies that may or may not be relevant to the patient's condition. Nevertheless, the new consumer's desire to "take charge" and to play a proactive role seems to be a force that physicians will have to contend with.

Responding to the Pace of Change

The oldest Baby Boomers reached age 65 in 2011. As that population continues to age, it is expected to challenge and change society's view of aging as it has changed other societal structures. The increase in the numbers of persons who have attended college will impact the healthcare system as income inequality declines slightly. (Research has shown that health status increases proportionately with educational level.) The report "Boomers and Technology: An Extended Conversation" sponsored by Microsoft and AARP, discussed in Chapter 1, will be of interest.

Even with the ACA, it is likely that tiered access to healthcare will exist. The top tier, composed of empowered patients with discretionary income, education, and the ability to use technology like the Internet will have numerous options for health insurance; the next tier, those who have access to basic health insurance through the state insurance exchanges' choice of health plans (this includes those who are temporarily employed and early retirees who have less or no discretionary income); and the third tier, comprised of the uninsured and those on Medicaid, who have little access to technology and relatively little ability to participate in decisions about their health or treatment options but now have access to healthcare through Medicaid expansion and state insurance exchanges.

---

[10] A report delivered at Healthcare Forum Summit, 1998.

[11] "SMG Market Letter," (Chicago, IL: SMG Marketing Group Inc., 2000), 14(1): 1.

[12] Ibid: 1.

Disconnect between Values and Economic Reality

The sense of mission and the core values that attract many to a career in healthcare has been jeopardized by the notion that economic performance is more important than properly caring for patients. The "business of medicine" has created a corrosive environment for doctors, nurses, and patients.

According to noted ethicist Emily Friedman, every healthcare decision is both a business decision and a values decision. This has been a tug-of-war between these two polar forces. Physicians are being faced with seismic changes in a system that has served them well for a hundred years: the shift to electronic medical records, telemedicine, and medical informatics in all its forms; digital imaging; and the erosion of authority by virtue of vast medical data banks now available to consumers, not in a medical library, but in their own homes. These are tremendous cultural changes for midcareer physicians that, in the past few years, have caused many to leave private practice to join healthcare systems as salaried physicians or to join a large group practice that is able to wield more power in negotiating contracts. Recent medical school graduates, on the other hand, will be far more comfortable in this new environment.

ABOUT THIS BOOK

A Reader's Guide

For an understanding of medical practices, it is essential to read Chapter 3 first, as it is the foundation for all the specialty practices that follow in Chapter 5. Chapters on physical therapy, diagnostic imaging and clinical lab, and ambulatory surgical centers are relatively self-contained. Chapter 10, Practice of Dentistry, can be read independently of the medical chapters, although there are cross-references to other chapters on lighting, construction methods, furniture, and interior finishes.

Programming tables are provided for each medical and dental specialty to enable a design professional, physician, or dentist to calculate the approximate size of an office depending upon the number of providers and the specific specialty. For medical offices, in this edition of the book, a standard exam room has been increased from 8 × 12 feet to 10 × 12 feet, reflecting the new norm explained in Chapter 3.

Demystifying Medical Procedures

Presenting oneself as a medical space planner implies an understanding of what each medical specialist does. Yet it is hard to ask many of these questions (or even know what to ask) without appearing to lack the proper experience. Threaded throughout this book are explanations of dozens of procedures and discussions of how specific pieces of equipment are used. This knowledge leads to much more functional design and planning innovation.

A Word of Advice to Providers

Physicians and dentists should not lease office space prior to having a space planner prepare a program (list of rooms, sizes, and critical adjacencies) and a summary of total square footage required. This would be analogous to shopping for a suit of clothes without knowing what size one wears. In fact, if considering two or three alternative spaces, the fee invested in a program and schematic space plan will pay huge rewards in demonstrating which space most appropriately lends itself to your practice's needs. In fact, a smaller space with specific dimensions or a specific configuration may accommodate you better than a larger one. Signing a 10-year lease on an inefficient, awkward space can hamper your practice and be costly in more ways than one.

The Heterogeneous Nature of the Clinical Office

This book addresses a wide variety of clinical offices, from solo practitioners of primary care with one or two

employees in the front office to large group practices with dozens of physicians, medical assistants, and support staff. The latter category includes multispecialty group practices, specialists who may be accessed by referral only, and hospital-based clinics. But despite the heterogeneous nature of the clinical office as a place of work, almost all its settings have, until recently, shared in common one property: consistency of design in the face of enormous changes in the agenda of healthcare. In this edition of *Medical and Dental Space Planning*, however, at last, change can be seen as a result of the ACA. Strategies for seeing more patients and spending more, not less, time with each of them is driven by having to manage their care in a way that provides value to keep them out of emergency rooms and get them on a path to wellness or to at least be able to effectively manage their chronic conditions. This means clinical team collaboration, connection to community services, and consistent and continual follow-up with patients as part of a patient-centered medical home. This is a new agenda for physicians, many of whom are wondering how to do this with further impending cuts in reimbursement. This is a time for architects and planners to explore new models of care such as *The Ambulatory Practice of the Future*, discussed in Chapter 3. It is also an opportunity to implement evidence-based design research from The Center for Health Design (healthdesign.org).

Hopefully the information and resources introduced in this book will stimulate innovation and encourage providers to consider new possibilities, in addition to explaining the basic principles of medical space planning.

Meeting the Challenges Ahead

As physicians regroup to meet the challenges ahead, competent medical space planners will be needed, and they will be expected to be familiar with new technology, the types of medical procedures being performed, and the latest techniques and equipment. To that end, this book will be an invaluable guide.

The Office of the Actuary of the Centers for Medicare and Medicaid Services (CMS) projects that many of the 11 million newly insured individuals are likely to be younger and healthier and expected to devote a larger share of their healthcare spending to prescription drugs and physician and clinical services rather than hospitals.[13] This means an increased need for physician offices and clinics and more business for those who know how to plan these facilities.

---

[13] "US Health Spending Projected to Grow an Average of 5.8 Percent Annually through 2022," October 10, 2013. www.Science Codex.com/us_health_spending_projected_to_grow_an_average_of 5.8_percent_annually_through_2022-120837.

CHAPTER 1
New Directions

Primary care is undergoing a radical transformation from physician-centered practices to team-based patient-centered care. Amid the upheaval, this is spawning real innovation as healthcare organizations across the nation challenge themselves to reduce waste and provide more effective care and—most important—to document and measure health outcomes with robust IT systems. States have some leeway in determining how they wish to handle newly insured Medicaid beneficiaries and even if they wish to participate at all in the state health insurance exchange program. If they do not, Medicaid enrollees will be eligible to join through an exchange created by the federal government. One thing is certain: This is a massive undertaking and the regulations are voluminous, the "shared savings" with Medicare and Medicaid—the incentive payments for meeting the targets—are complex beyond measure, and this bold experiment is going to provide a lot of work for analysts and financial consultants. But isn't it great that people with preexisting conditions will now be able to buy insurance and the many Americans who are uninsured will now be able to buy a basic level of coverage?

When the dust settles from all the chaos, there should be huge benefits in the areas of patient safety, proactive coordination of care for those with chronic conditions, and reduced hospitalization and visits to the ED due to the focus on prevention. In theory, if patients have access to primary care, most of their conditions can be dealt with in a low-cost setting and in a timely manner, before they ramp up to requiring more expensive procedures. This will save money and reduce the escalation of healthcare expenditures. A thoughtful exploration of healthcare reform delving into specific (and often amusing) examples of the ineffectiveness of our current system will be of interest to anyone wondering about how we got to this point and how we can get better healthcare for half the cost.[1] The writing style makes it a page-turner as its author, Joe Flower, untangles the many forces that have resulted in our current system, but he ends with optimism.

ACO QUALITY METRICS

Accountable care organizations (ACOs) will be assessed by 65 quality metrics spanning five equally weighted domains: patient and caregiver experience, care coordination, patient safety, preventive health, and care for frail elderly and at-risk populations.[2]

A SAMPLING OF INNOVATION

Innovation occurs in small and large settings as can be seen in the examples below, starting with Oregon's five-year Medicaid experiment to test whether coordinated care can deliver better health at lower cost. Next, a project at the Mayo Innovation Center looks at outpatient obstetrical care and better ways to provide continuity between scheduled visits. Last, a two-physician family practice takes bold steps to redesign care with a new office that

---

[1] Joe Flower. *Healthcare Beyond Reform: Doing It Right for Half the Cost* (New York: CRC Press, 2012).

[2] Rob Lazerow. "First Impressions: The Medicare ACO Program," The Advisory Board Company, April 1, 2011. www.advisory.com/research/Health-Care-Advisory-Board/Blogs/Toward-Accountable-Payment/2011/04/First-Impressions:The-Medicare-ACO-Program.

is iconoclastic in its concept and aesthetically stunning as well.

Oregon's Medicaid Transformation

The cover story in *Modern Healthcare* shouts "Kitzhaber's Gamble: Oregon makes risky bet on fixed-budget ACOs to curb Medicaid costs."[3] A year into Oregon's five-year plan, 16 Coordinated Care Organizations (CCOs) are caring for 90 percent of Medicaid beneficiaries using a patient-centered medical home model. CCOs receive per capita monthly payments for care delivered in this pilot program that is underwritten by $1.9 billion in federal funding from the Centers for Medicare & Medicaid Services (CMS). The provider organizations must include dental and mental healthcare and focus on chronic conditions, including addiction problems and mental illness. A principal goal is to transition from costly fee-for-service to a program that emphasizes primary and preventive care. This requires social workers, nurses, medical assistants, and physicians to work together to systematically keep track of complex patients to anticipate their needs and reach out to them for adjustments to medications and to get them to the clinic for preventive care. These are the patients who end up in the ER repeatedly if not closely managed.

Governor Kitzhaber negotiated a waiver with the CMS to get funding to kick off this initiative and, in return, the deal requires progress on 33 quality and access measures. The program is not without controversy from those who wonder if a capitated payment will cause providers to stint on care, and hospitals express concern that success will result in a reduction in admissions. This is a bold plan in the national spotlight. Several other states are proposing to follow Oregon's lead, and only time will tell whether it is possible to get a handle on soaring healthcare costs and, at the same time, improve the health and well-being of Americans.

Mayo OB Nest: Redesigning Continuity of Care

A project undertaken at the Mayo Innovation Center was the study of outpatient OB care.[4] They realized that the current schedule of appointments was based on a provider-centric sense of continuity that did not address what happens between visits, and this may even be more important to patients. Looking at ways to give mothers the opportunity to tap into their own knowledge base—to be able to validate their wisdom—led to experimentation with different options. Patients were given the ability to text a nurse, and to be able to Skype in for a patient visit. They were given portable Doppler devices to be able to listen to the baby's heartbeat to help build the mother's sense of confidence. This continual feedback loop is designed to reduce the bottleneck around the scheduled appointments and allow mothers to enjoy a sense of well-being, rather than stress.

Village Family Medicine

Breaking the mold for primary care practices led the two physicians who formed this practice to examine the patient encounter to see how they could improve the patient experience. To begin with, they have a same-day appointment policy and most visits are 30 minutes from arrival to checkout. As they worked with their architects to program the space, they realized that 85 percent of patients did not need to sit on an exam table during the visit. Instead, they developed assessment rooms (Figure 1-1) that serve for everything except minor procedures or disrobing. The following functions occur in this room:

- Registration

- Check vitals (BP, height, weight, pulse, O_2)

- Immunizations, injections

- Collect patient history, discuss reason for visit

---

[3] Joe Rojas-Burke. "Inside Oregon's Medicaid Lab," *Modern Healthcare*, September 9, 2013.

[4] Marnie Meylor. "Mayo OB Nest" (Lecture, Center for Health Design, Pebble in Practice, Chicago, IL), May 8, 2013.

Figure 1-1. Assessment examination room at Village Family Medicine, Spartanburg, South Carolina. *(Courtesy of McMillan Pazdan Smith Architecture; Photographer: Kris Decker/Firewater Photography)*

- Diagnosis: perform tests such as EKG, spirometry, tympanometry in office, and order other tests; access point-of-care databases

- Patient education: provider advice, coaching, handouts printed from EHR

- Referrals, checkout, and payment; book future appointment

The background for this project is interesting in that this medical practice is part of a large system, Spartanburg Regional Health System in Spartanburg, South Carolina, and they are also a member of Spartanburg Regional Physicians Group, a large multispecialty group. The lead physician was given considerable latitude in the design of this facility with the goal that it would become a prototype for the system. It opened in January 2011. The design was influenced by the Disney concept of on-stage/off-stage and the emphasis on creating a great experience. In the space plan (Figure 1-2), there are dual entries to the assessment rooms with staff entering from a rear corridor adjacent to the nurse station and lab (see Figure 3-65) and
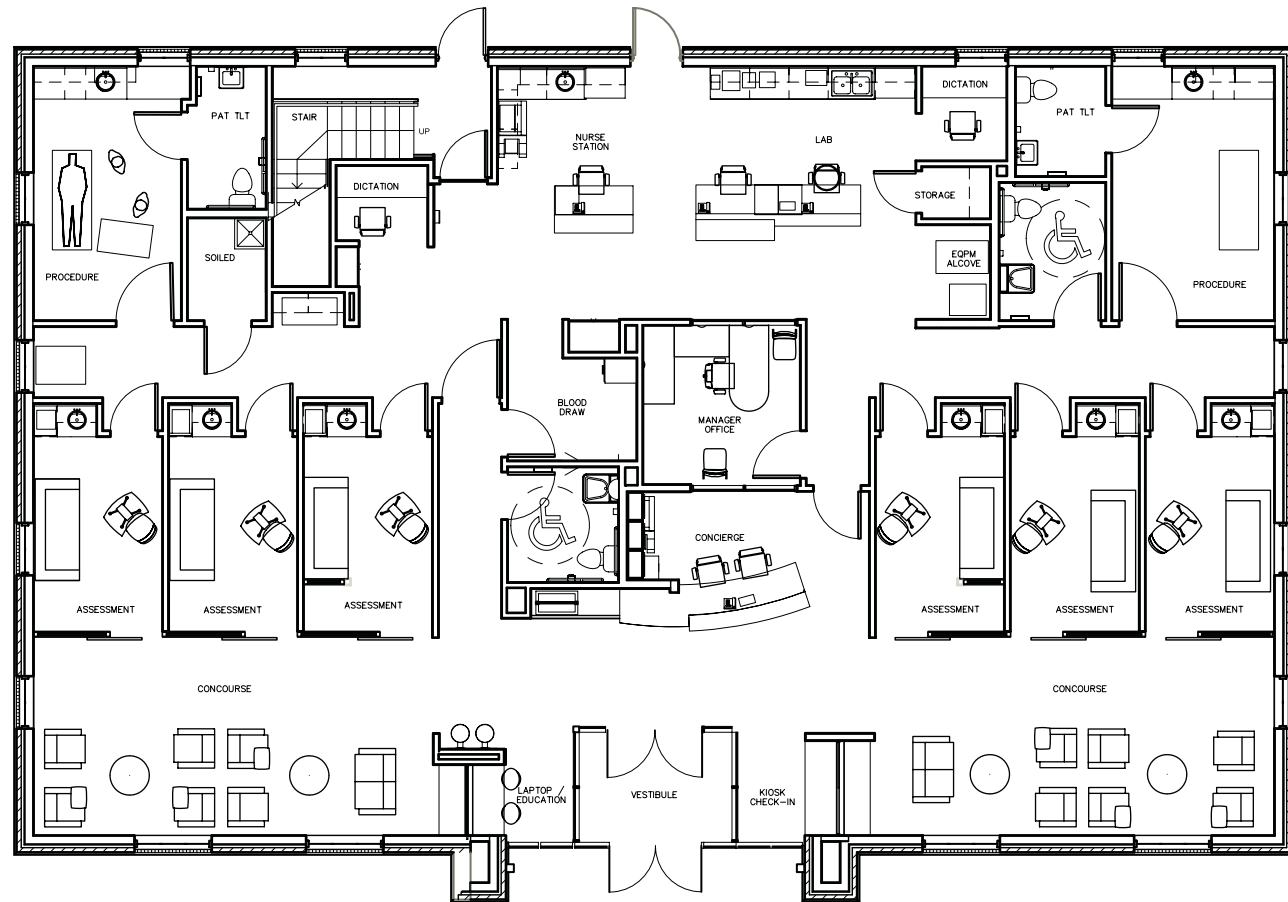
Figure 1-2. Space plan, Village Family Medicine, 5,680 square feet. *(Courtesy of McMillan Pazdan Smith Architecture)*

patients entering through acoustically sealed sliding barn doors off of what is called the "concourse." Patients are able to check themselves in upon arrival at a kiosk. Other influences in the design were based on the architects' analysis of retail models with a strong customer-centric philosophy such as Apple and Nordstrom. In addition, students from Clemson University Architecture + Health posed as mystery shoppers, visiting three or four family practice locations in the health system to enable them to experience the care and to make suggestions for improvement.

Last, NXT Health, a nonprofit organization with leadership from Clemson University's Architecture + Health master's degree program graduates, participated in the project. Innovation through collaboration is the goal of NXT Health.

The interior design of the office is contemporary with finishes in various neutral colors that have enough contrast to avoid being bland (Figure 1-3). The pattern in the flooring is no-wax, vinyl plank. The distressed appearance was selected to reflect the history of the area, which was farming and horse land.

BUILDING BLOCKS OF HIGH-PERFORMING PRIMARY CARE

Across the nation, primary care is being transformed from physician-centered practices to patient-centered teams. To better understand the dynamics of this change, Rachel Willard, MPH, and Tom Bodenheimer, MD, studied seven high-performing large primary care practices in California, Oregon, Washington, and Colorado, doing research that involved extensive site visits and interviews with the leadership and all levels of staff at these organizations.[5] "High-performing" was defined as having high levels of patient and staff satisfaction, a stable financial base, and clinical quality metrics that have improved over time.

Six building blocks were considered essential for success in the new model of healthcare delivery by the seven organizations studied. Readers are encouraged to read the entire white paper as it has many specific examples of innovation and an extensive reference list.

1. **Data-driven improvement.** Collect, clean, and summarize performance data for use by clinicians to drive effective action. "Data provide the bedrock of high-performing health practices...."

2. **Empanelment and panel size management.** Assign patients to a clinician and team in the process of empanelment, actively manage panel size, balancing capacity and demand to maintain continuity of care.

3. **Team-based care.** Includes front-desk personnel, clinicians, MAs, RNs, psychologists, social workers, and the like. Rely on clear vision and principles, working in shared space, using well-honed communication skills and defined workplans.

4. **Population management.** Patients with complicated medical and psychosocial needs receive a different level of care and management. Employ health coaching for patients with chronic diseases. Use panel

Figure 1-3. Waiting room, Village Family Medicine. *(Courtesy of McMillan Pazdan Smith Architecture; Photographer: Kris Decker/Firewater Photography)*

---

[5] Rachel Willard and Tom Bodenheimer. White paper: "The Building Blocks of High-Performing Primary Care: Lessons from the Field," California HealthCare Foundation, April 2012. www.chcf.org/publications/2012/04/building-blocks-primary-care.

management to support the preventive care needs of all patients.

5. **Continuity of care.** Improves quality of care, the patient's experience, and lowers costs. Actively control panel size to ensure demand does not exceed supply.

6. **Prompt access to care.** Timely access cannot be achieved without managing panel size to balance capacity and demand. Strategy: Open the schedule only a few weeks at a time, space visits by taking care of more needs at each visit, and offer phone visits, Web-based patient portals, group visits, and visits with nonclinician team members.

THE SMARTPHONE WILL SEE YOU NOW: THE mHEALTH REVOLUTION

If there is a prophet in the transformation of medicine as we know it today to what it will be in five or ten years, it is surely Eric Topol, MD, director of the Scripps Translational Science Institute in La Jolla, California. He is both a practicing cardiologist and a professor of genomics at the Scripps Research Institute. He is widely acknowledged as a visionary, a pioneer, and a charismatic change agent whose book *The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care* (Basic Books, 2012) forecasts that smart consumers—patients—will push healthcare providers to accelerate the adoption of technology. His book is intended to educate consumers about the possibilities because he finds the medical community frustratingly slow to change and unwilling to let the digital world "pierce the medical cocoon" in his words.

Dr. Topol's vision is of a world in which healthcare diagnosis and treatment will be personalized according to an individual's genome. In certain types of cancer treatment, this has already been put into action. Chemotherapy agents can be tested in the lab prior to administering them to know which will be more effective for a specific tumor in a specific person. Miniature ultrasound imaging devices are replacing the stethoscope. The goal is to capture as

much data as possible about an individual to enable precisely targeted therapies and to prevent major side effects of medications. This is very timely in view of the nation's increasing escalation of healthcare costs, growing number of preventable chronic illnesses, and the shortage of primary care physicians. Through the use of wearable sensors and smartphone apps, email communications, and e-visits through Skype and other video conferencing modalities, considerable time and cost can be saved by not having to schedule face-to-face visits when it is unnecessary. The problem is, in fee-for-service models, billing for this type of care is currently not possible. As patients move into patient-centered medical homes and capitated fee arrangements, providers will be only too delighted to handle routine matters for generally healthy patients in the most expeditious manner possible.

In Dr. Topol's vision, patients become informed consumers who are in the driver seat, armed by access to genomic information and real-time bio-data derived from nanosensors and enabled by wireless technology. According to J. Craig Ventor (the scientist who sequenced the human genome), whose research institute is a stone's throw away from Dr. Topol's institute in La Jolla, "Our sequencing of the human genome eleven years ago was the beginning of the individualized medicine revolution, a revolution that cannot happen without digitized personal phenotype information."[6]

Medical Body Area Network Systems

Mobile sensors will record and transmit personal data wirelessly to physicians by way of Medical Body Area Network (MBAN) systems. The Federal Communications Commission (FCC) has proposed to allocate radiofrequency spectrum for secure transmission of personal data derived from multiple body sensors used for monitoring physiological data. It is expected to be a few years before

---

[6] Eric Topol, *The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care* (New York: CRC Press 2012), Foreword.