

THE PARADIGM SHIFT: Transforming from an Acute to Chronic Care Model

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As new technologies continue to aid significantly in the diagnosis and treatment of medical conditions, the disease model has already started to shift from an acute state to a long term chronic state of illness.

Consequently, as periods of acute illness are diminished, the home and community will emerge as the new centers for health care delivery. This will serve to reduce hospitals' share of health care expenditures, forcing them to make critical strategic decisions concerning where they choose to allocate resources.

Institutions must be ready to act on the trend away from inpatient care and concentrate on providing community-based ambulatory Care for the chronically ill.

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Looking back on this century in the year 2015, we shall see that our society underwent two historic transformations in health care during the present century. The first was the dramatic defeat of acute illness. Diseases such as smallpox and tuberculosis essentially disappeared during the first half of the twentieth century. But the era of acute infectious disease left us two legacies. The first is the hospital. In its first incarnation, it was a setting for diagnosing diseases we could not cure, isolating the infected, and providing palliative care. The hospital's function has since changed, but vast buildings with hundreds of beds remain.

Our second legacy is the concept of illness that is still with us. An acute illness *was* a crisis brought on by an external agent that threw the body into violent, life-threatening disequilibrium. With luck, the threat would pass, but the health care system's primary function was to comfort the patient until death occurred.

That concept of disease remains to this day, though most of the diseases that fit the concept have been conquered. We are still troubled by infectious diseases like AIDS and hepatitis; our most significant scientific challenge may be to deal with these. Society has been perversely rewarded for its defeat of the past's most threatening diseases. We added almost 30 years to life expectancy. That's the good news. The bad news is that we now die of even more horrible illnesses later in our lives. The eradication of infectious disease made it possible for us to die from heart disease, cancer and Alzheimer's. As death from acute infection decreased, there were sharp increases in death from chronic diseases. The rising prevalence of these illnesses has been a constant theme in the middle part of this century. Yet our health care system has changed less dramatically than our ailments have. Today, chronic diseases account for 80% of all deaths and 90% of all morbidity. Chronic illnesses are degenerative diseases that do not conform to our model of disease discussed earlier. The threat of chronic illness is directly correlated with aging. Chronic illness is related to loss of resilience of our organ systems. We're all at risk, and the degree of risk is variable in our different organ systems.

To some extent, we are genetically programmed to age at different rates in each organ system, and we are beginning to predict the vulnerability of our hearts, brains, or endocrine systems based on our genetic makeup. Students of these diseases such as James Fries argue that chronic illnesses

appear gradually. We are asymptomatic for many years, and if unchecked, the illness eventually becomes a life threat. Our organ systems decline in viability at varying rates; at some point, one betrays us, and we die. This is a fundamentally different model of illness than that of acute illness, but society has not grasped that difference. A chronic illness is not like a fire in your house. It's like a fire in a pile of leaves it slowly reaches the point of flame. Chronic illness isn't really disease so much as a natural process that culminates in death. As a society, we have piled a staggering amount of resources around the life threat, and ignored 90% of the disease process. Because we confuse the life-threatening symptoms with the disease itself, we spend the vast majority of our medical dollars there. The zenith of technical achievement is to drag the patient at the point of non-viability back to life using elegant but "halfway" technologies like organ transplantation.

A patient may have had coronary disease for 20 years, but the health care system didn't do much about it. Then he has a heart attack, and the helicopter lands on his lawn and spirits him away to a coronary care unit, where he is stabilized, diagnosed, and perhaps operated upon. Then he is thrown back into the world, still sick but no longer acutely ill. He still has the disease, but because the life threat has abated, our health care payment and delivery systems don't recognize that he is still ill. When the acute phase of illness passes, our society, including its financing system, seems to lose interest. An Alzheimer's patient wages a lonely and fruitless struggle, without much help from insurance, while his brain deteriorates; only when he is destitute and alone does the health care system kick in and provide terminal care in a nursing home.

Someone from mars looking at the way we distribute health resources would be baffled by the way we manage these chronic diseases. We'll discuss the reasons why this pattern of allocation persists later. But while we cannot cure most chronic diseases, we can manage them. Altering our diets, early diagnosis, new drugs, and other life-style changes can slow the progression of a disease, particularly from the point where symptoms emerge until a life threat exists. Rather than curing chronic illness, what we have been doing is learning to manage its progression.

The balance of this century, and a good portion of the next, will be devoted to the management of chronic illness. We are conquering these diseases by degree by postponing-not dramatically, not with silver bullet cures. This process represents the second historic transformation mentioned above. Evidence that we are beginning to succeed can be seen in the peaking of the cardiovascular mortality curve, and these data do not adequately represent the continuing downward curve. Since its peak in the late 1960s, there's been a 20% reduction in death from heart disease and a 50% reduction in stroke deaths. We've made major progress against this killer. And if lung cancer deaths were not included, the cancer death rate would also have declined (though not as rapidly). Something very exciting is going on here, and we've only begun to grasp its full import. We are in the process of defeating two of our greatest killers; consequently, we should consider how new technologies will be used in this light.

Consider heart disease first. In 1970, diagnosis was often made in an emergency room, during the patient's heart attack or stroke. This episode would typically be followed by a two- to three-week hospital stay. There would be partial rehabilitation, but little could be done to treat the disease; most patients died of a subsequent episode. A major contributor to the decline in deaths from cardiovascular disease is that diagnosis is now made at the point of restriction of function or shortness of breath. The introduction of beta-blockers to control hypertension and a new appreciation of the impact of dietary changes allowed us to retard the progression of the disease. We had an array of expensive technology that could be used as soon as symptoms emerged, though there is continuing dispute over whether those innovations, like bypass surgery, have

extended life expectancy. A heart attack patient in an emergency room today stands a good chance of avoiding catastrophic damage to the heart or brain because we have drugs like streptokinase to restore circulation to the affected organs. Because there's less damage, less time is spent in the hospital.

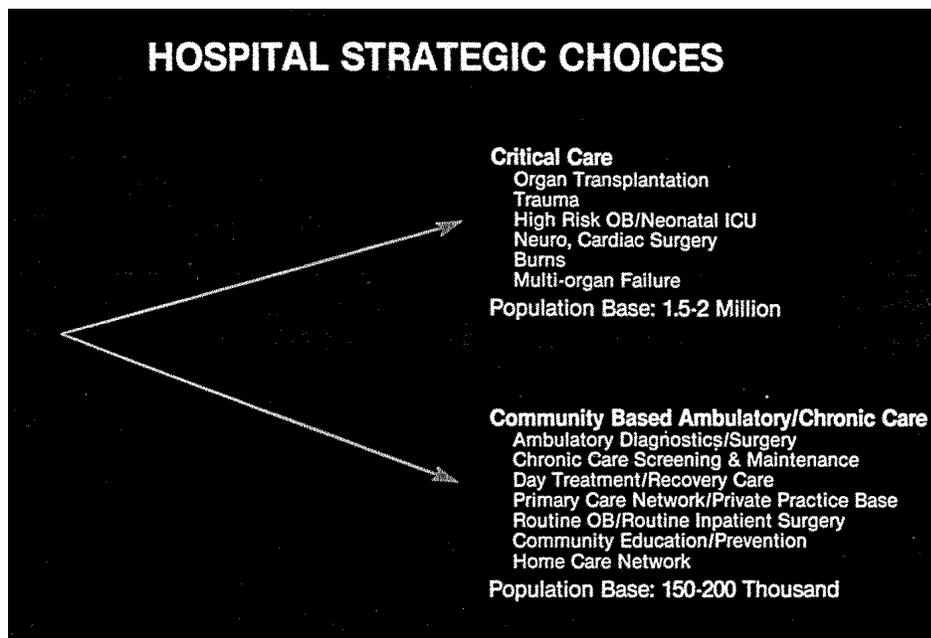
Today, patients who die of heart disease typically suffer severe myocardial infarction and die in a coronary care unit. By 1995, I think the pattern will have changed even more. We'll have the technological ability to diagnose heart disease when it is still asymptomatic. Some would argue that, with the advent of color-flow Doppler, ultrasound, and new generations of gamma cameras, we already have that ability. But whether the definitive diagnostic technology will be PET, cinematic MRI, or ultrasound, we will be able to detect coronary artery disease early enough to allow its regression, not merely its retardation. Research is in progress at the University of Chicago with that actual title: the Coronary Artery Regression Project. Using animal models, researchers have found that, at the point of 10% to 15% occlusion, the disease can be made to regress. We also have powerful new drugs that lower cholesterol levels and may prevent the disease from emerging.

Even if patients become symptomatic because they don't take advantage of new medications or make dietary changes, we'll have fourth-generation catheter-delivered technologies like laser angioplasty or atherectomy to restore circulation. When patients die, perhaps they'll die of cancer instead. Victory. Part of the reason for the rising cancer death rate is the falling heart disease death rate. People who don't die of a heart attack in their sixties die of cancer in their seventies. If we conquer cancer, Alzheimer's disease is behind that. The advances in treatment resemble peeling the layers of an onion. The outermost layers were the diseases of childbirth and infancy. Peel them back and underneath were the infectious diseases of childhood. Underneath that were the infectious diseases of adulthood like syphilis and pneumonia. Underneath that was heart disease, underneath that was cancer, and underneath that was Alzheimer's. Every time you peel back a layer, you get a few more years of life expectancy-and a more bitter taste in your mouth.

Consider AIDS. In 1984, when it became apparent that we were dealing with a viral illness and an unprecedented health crisis, the disease was typically diagnosed when a patient presented with Kaposi's sarcoma, *Pneumocystis carinii* pneumonia, or any of a number of horrible, unique infections. The course of treatment consisted of lengthening and futile hospitalizations. From diagnosis to death, the patient usually lived 18 months. We now diagnose the disease when someone in a risk group gets an antibody test. By 1990, treatment with drugs to slow down the replication of the virus or boost immunity to other infections *will* lengthen the patient's life.

As patients gradually weaken, they will be treated using what I call "community-based chronic care." This model has already emerged in the San Francisco area, at the Kaiser Foundation Health Plan. The Shanti Project in San Francisco is another example; therapies are administered, drug levels are monitored, and progress is followed on an ambulatory basis. The patient is sometimes offered home care, including homemaker services. There are day-care programs, as well as sheltered workshops for people who have lost their jobs. When multiple infections occur, patients are as likely to die in a hospice or at home as in a hospital intensive care unit. Though AIDS is an infectious disease, it behaves like a chronic illness. In fact, it is possible to construct a 1995 model of AIDS, under the realistic assumption that it will remain uncured. We will have added enough tools to our pharmacopoeia to fight the disease and the associated opportunistic infections. We will be able to extend survival enough to have a large population of people with the disease who

will live long enough to die of something else. Victory over AIDS will come by degrees not by a dramatic cure.



With cancer, there's a similar pattern. In 1970, we caught the disease so late that surgery was the typical first recourse. If a biopsy showed malignancy, we removed a very large portion of the patient's body. Crude radiotherapy or chemotherapy followed, but metastases still killed most patients. We now diagnose cancer much more effectively. With mammography, we can detect a lesion small enough to be removed using lumpectomy; more advanced radiotherapy and chemotherapy suppress recurrence. Radiotherapy and chemotherapy are often the first treatments. We still lose a lot of people to cancer, and we'll continue to do so, but by the year 2010, I think that the pattern will have changed. We'll be diagnosing the disease at or before birth by screening a sample of the patient's genetic material and identifying the markers that indicate, by organ system, the probability of "premature" breakdown of cellular reproduction in each organ.

We might even be able to predict the progression of the disease, giving people some idea of when they are likely to experience symptoms. We will also see perhaps somewhat later, the emergence of genetic therapy-the idea that we'll use viruses to introduce new genetic information into the patient's body. We will alter the flawed genetic codes that predispose organ systems to premature breakdown. We're still going to get cancer; we'll discover numerous new carcinogens. But when we do contract cancer, we'll know it immediately, using inexpensive blood tests that will detect a cancer pathogen before lesions form. We'll detect malignancy early enough to administer biologically engineered substances specifically tailored to fight it. People are still going to die of cancer, but it won't be due to a lack of diagnostic or curative technology; it will be the result of our inability to control the way we live.

I think that there is a pattern here, and it reflects what we can expect our health care system to achieve using technological advances in imaging and in pharmaceutical therapy. We have already seen an ability to detect diseases earlier, allowing us to prolong lifespan after diagnosis. The role of the acute care inpatient hospital is diminished because we're catching the disease earlier; fewer patients reach the point of extremis that requires acute care services. For both providers and

payors, it becomes increasingly important to control the diagnostic process. We're lengthening the period of therapy, so the diagnosing institution has fastened itself onto a stream of income.

The payor who does not participate in or confirm the diagnosis may be unable to afford the prescribed treatment. The sooner the diagnosis is made, the greater the effect on the economic outcome of the disease; that's the principle driving pre-admission review policies and health maintenance organizations today.

As we saw with AIDS, the focus of health care changes from curing life-threatening diseases to helping patients manage the progression of chronic diseases. Presuming these patterns remain, it's interesting to speculate on the cause-and year-of death of a baby born today. We may make enough advances to reach a fixed, genetically determined limit on life expectancy. The period of morbidity prior to death will shorten. This is how people will live and die as we move into the next century.

The life expectancy of American women beyond the age of 60 has not increased for the last five years, despite all the technological advances we've made; perhaps we have already reached that natural limit.

My pessimistic friends on medical school faculties believe that when we have suppressed heart disease and cancer, more of us will die of the degenerative diseases of the nervous system. That pessimism is based on the fact that we have so little basic knowledge about these diseases and that we have made so little progress in understanding the nervous system itself. It's clear that we will die more often of things we do to ourselves—accidents, homicides, suicides, substance abuse, and so on.

This future world of elegant diagnostic technologies and specific therapies may well reveal that the limiting factor in conquering chronic disease will not be the technology or overall health care funding so much as the cost of screening and patient compliance. How much will it cost to find out that you have a genetic predisposition to schizophrenia or diabetes? If it costs \$10,000 to run the genetic screen, we're not going to be able to use that tool effectively. If we use an \$800 scan to determine coronary artery occlusion, we're not going to apply it broadly. Besides the cost of screening, the most significant barrier to conquering illness will be our ability to manage our own lives. That's going to have a profound implication on the way we decide what we're willing to pay for through social programs and private insurance systems.

This admittedly speculative course leads us to other impacts. I believe that the home and the residential community will emerge as the center of our health care delivery system. I recently spent an interesting day with the California Association for Homes of the Aging, a trade association that represents the life care industry and the well-elderly housing and congregate-care industry in California. If I had to summarize what I found, it's that the elderly don't want to move into their projects. The elderly want to stay in their homes, and want to continue the pattern of living that they've had with their relatives and their children. What they're telling the providers of senior services is, "Bring the services to us. Let us contract with you for our housekeeping. Let us contract with you for our yard maintenance. Bring the nursing in once a week. Bring the drug monitoring and nutritional counseling to us." If a shortened period of morbidity will be the rule in the future, the idea that we all grow old and die in nursing homes may disappear. If we will face only a month or two of catastrophic collapse at the end of life, we may end up living happily in our homes for nearly all of our lives.

The health care industry's challenge will be to integrate its services into the home and community. We will not look for institutional solutions for dealing with the chronically ill. Physicians and care givers will make house calls as the number of office visits continues to decrease. We'll see a merging of technologies; voice recognition, interactive software, and patient monitoring devices may allow us to place consoles that talk, interact, and take and transmit vital signs into the homes of the elderly.

The hospital's central position in health delivery will certainly be challenged as we make progress in managing chronic illness. During the 1980s, the hospital's share of total health care spending in the United States dropped from 41% to 38.9%. As a result of frozen payments, increased cost-containment efforts, and the growth of alternate forms of health care delivery, the hospital's share of total health care spending will be closer to one third, including outpatient services by the end of the century. There has been a vast shift in the site of physician activity in the last decade that I think represents a long-term trend. Data from Janet Mitchell's research, sponsored by The National Center for Health Services Research, indicate that inpatient Part B physician billings were reduced from 65% to less than half of the total fees collected over the past three years. Even surgical Part B billings for inpatients dropped from 85% to 60% of total from 1983 to 1986. Outpatient services account for 63% of radiologic fee billings, and the hospitals' inpatient component had dropped to less than 40% by 1986. I don't think that these trends are going to go away, because new technologies have liberated the doctor from the around-the-clock intensive care setting. Diagnostic and treatment pathways are forming that completely bypass the hospital; the only reason some of them take place on the hospital campus is that all the doctors are there.

I once thought that a hospital should strive to control the pathways that lead patients to the hospital -- the private physician's office, transport systems, HMOs and PPOs, and industrial health contracts. It is now obvious not only that many patients never enter the hospital at all, but that the appropriate management of chronic illness is community-based. Hospitals that haven't entered that business are going to be cut out of the loop completely. This leaves hospitals with unpleasant strategic choices.

The hospital is being pushed in one direction by its medical staff and in another direction by the demand for health care services. Most medical staffs, even in small hospitals, will push for organ transplantation, trauma, perinatology, and neuro and cardiac surgery services. In order to perform these functions successfully, a hospital needs to rest on a very large population base. Procedure outcome is directly related to the volume of surgery done, which depends on the population base served. There is a direct relationship between the size of the population served and the quality of care rendered; unless you do enough trauma care, for example, you're exposing the patient to enormous risk. Costs also decrease as volume increases. The Office of the Inspector General of the Department of Health and Human Services issued a report in late 1987 stating that if all bypass surgery could be concentrated in high-volume centers, the program would save \$200 million annually and, by the way, cardiac surgical mortality rates would be sharply reduced. The unit cost of caring for 3,000 open-heart surgery patients is much lower than the cost of caring for 60. The problem is that hospital medical staffs still think that unless you have a cath lab, you're not a full-service hospital. Of course, you can't have a cath lab without open-heart surgery services. An inevitable progression toward rendering mediocre critical care is built into the value systems of our doctors and hospital boards. Every hospital, even the largest, faces a decision between allocating resources to critical care and allocating resources to the future mission of hospitals--community-based ambulatory and chronic care.

Patients won't come to this community-based ambulatory and chronic care facility as much as it will come to them. It may handle births, chronic pulmonary disease, and patients who need continuous monitoring, but it will function primarily as the hub of a network of facilities and services that reach into the patient's home. Inpatient care won't disappear, but it will be very significantly diminished as a percentage of the hospital's total activity.

I recently conducted a planning retreat for a small hospital in California. As a 90-bed hospital in a small community, it should have been in trouble -- yet it was generating \$4 million net income. The ratio of outpatient visits to inpatient admissions in the institution was ten to one. Nearly all of its incremental capital had been invested in developing more medical office space, increasing the number of physicians on the campus, increasing the subspecialty diagnostic capability of its physicians, and supporting their activities with outpatient diagnostic and therapeutic services. That little hospital is the hospital of the future. Hospitals begin to say, "We're not going to spend \$2 million building a coronary care unit, because we're not going to be able to do it well. Let's use that \$2 million to add another 100 physicians to our medical staff and increase our diagnostic capabilities."

There's a real opportunity for hospitals to change the definition of their business. Unfortunately, community-based institutions that can't reach the population threshold of 150,000 may not survive the next five to ten years. I believe that the general purpose, acute care hospital will not survive this wave of change.

The changing role of medical technology in the physician's practice is also complicated. Clearly, physicians have profited from new technologies. New and powerful diagnostic tools like ultrasound and the desktop dry chemistry analyzer have had a major role in increasing physicians' incomes. Physicians, if not hospitals, have been spectacularly successful in adding technologies and services to their armada.

However, the world of chronic illness will frustrate many physicians. Many are discovering that they don't like taking care of the chronically ill. The needs of the chronically ill are not strictly medical, but social as well; some doctors lose patience, become frustrated, and send these patients back to their families. There's no drama-no victory-in dealing with the chronically ill, so physicians trained in a world of high drama, high tech, and helicopters landing are frustrated in a world without heroics. Physicians also don't like sharing power, and chronic care is team care. In fact, in some of the emerging chronic care models, like the "social health maintenance organization," the doctor isn't even the gatekeeper. The gatekeeper is a case manager; the entry into the chronic care health system is case management. An elderly person's disease, extent of disability, and risk are evaluated, and then decisions regarding care are made by a team that may or may not include a doctor. The physician was unquestionably the gatekeeper of the acute care system. But unless physicians' attitudes change remarkably-or we can train a generation of specialists in geriatric medicine-the physician is, of necessity, going to be a troubled actor in the chronic care delivery system of the future. The physician will be a vitally important actor, because we must rely on that physician to make the diagnostic decision. We have not yet been able to find a substitute for what that doctor does.

Q and A:

In the transition from treating acute illness to chronic illness, a key player is the patient, shifting his attitude toward dealing with health problems by making lifestyle changes. What do you predict concerning the use of public economic policy to influence individuals to make health-preserving changes?

That may be the most significant constraining factor in constructing a health care system that can spend its funds effectively. The private portion of our payment system has been slowly but insistently shifting economic responsibility for services to the patient by raising deductibles and premiums-and, in the process, forcing the patient to consider the value of the medical service received. Some 170 million Americans are privately insured, and paying more of their own money for care has led them to -think about the health consequences of their actions. Another 37 million are totally exposed to financial risk because they have no health insurance at all. Yet the Medicare program has gone in the opposite direction, eliminating the patient's financial risk by providing free care. There must be a societal decision that care isn't free. Perhaps the person who persists in smoking and develops lung cancer should pay for a large portion of his care himself. If we attach economic consequences to the health importance of life-style, we may see a lot of changes.

Is it possible that some of the services proposed on a decentralized basis are actually more expensive and of lower quality when they're done in that manner?

We can begin to learn that in situations where someone is watching the trade-offs in value-this is where an organization like Kaiser becomes really important. Unless you can follow the health care of -a given population over an extended period of time, you can't learn the answer. Cost-effectiveness studies on home health care have been in progress for years, but they have been unable to prove that home health care saves nursing home dollars, since, they were really expanding the ability to treat certain kinds of diseases and lowering the threshold of acuity that caused a health problem to be noted. Unless you've got a population you can follow, you'll never know the answer.

In Montana, we are faced with long distances and sparse populations. It would take the south quarter of North Dakota, Idaho, and Montana to make up the 2 million people your model requires. We are going to have to create a hybrid of critical care and community-based hospitals.

In Montana, a number of small hospitals are turning themselves into subacute and holding facilities. They may have some ambulatory services and may stabilize heart attack victims, but they link to larger facilities at some distance for critical care. It's a very innovative idea, and it's one of the strategies we'll see more often. The critical care facility doesn't have a population base of more than half a million, but it links with 20 or 30 smaller facilities that reach remote areas, each of them serving an area with a radius of 40 or 50 miles. Some of the diagnostic decisions can be made locally, but there are monitoring and transport facilities capable of bringing patients to the critical care facility.