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Battleships

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In 1906, the British Navy launched HMS *Dreadnought*. At 527 feet long and displacing 18,000 tons, it was the largest warship ever built. It was fabricated entirely of steel. Three boiler rooms drove high-pressure turbine engines generating 23,000 horsepower. Armed with five turrets containing 12-inch guns, *Dreadnought* could hurl 850-pound explosive shells 14 miles. This was a significant upgrade from the first Royal Navy *Dreadnought* (1573), which flung solid shot weighing 10 to 12 pounds several hundred yards in "broadsides" against other wooden ships.

Dreadnought rendered other warships obsolete. The Great Powers—Great Britain, the USA, Germany, Russia, Japan, and Italy—scrambled to build their own. Poorer nations could only look on with envy. A single battleship accounted for more than 2 million pounds sterling, the equivalent of over US$5 billion today, or almost 10% of Great Britain's naval budget in 1900.

In World War I (1914–1918), most British battleships served defensive duty, keeping the German fleet bottled up in port. The battle of Jutland in 1916 was an exception, bringing 28 Royal Navy battleships face to face with 16 German battleships. The engagement, however, was a draw. Both sides held back to ensure that their battleships were not sunk. None were. But while battleships on all sides spent much of the war safely at anchor, two new disruptive technologies emerged: submarines and naval aircraft. Ignoring these developments, Great Britain built an additional 30 battleships during the war, at a cost that left it virtually bankrupt by war's end.

Following German defeat in World War I, battleships remained *the* symbol of naval power. US Naval Academy graduates jockeyed for assignment to battleships, which remained the most coveted appointments for both officers and enlisted men. The expense remained high. Submarines, which Germany used in World War I to effectively strangle British imports, cost 90% less. The real bargain was aircraft. More than a hundred could be built for the price of a single submarine. But few commanders had the imagination needed to see aircraft as more than flying scouts for surface ships.

An American brigadier general named Billy Mitchel could see their potential. In June 1921 he organized a demonstration against actual warships during which his squadron sank a destroyer, a light cruiser, and the captured German World War I battleship *Ostfriesland*.

There were two immediate results. First, news that aircraft had sunk a battleship was suppressed by Army Chief John "Blackjack" Pershing. Second, Mitchell was demoted to the rank of colonel and transferred to San Antonio, Texas, where he continued to antagonize his superiors. His career ended in 1925 when he was court martialed for criticizing the Army following the crash of the dirigible *Shenandoah*. Stripped of pay and forced to resign, he died of heart disease in 1936, at age 56. Four years later, on the night of November 11, 1940, a squadron of 21 British Swordfish biplanes sank a large portion of the Italian fleet at anchor in Taranto. This feat was carefully studied by the Japanese, who carried out a similar attack on the US Pacific fleet at Pearl Harbor the following year.

Despite their vulnerability, battleships continued to be built. The Japanese constructed the largest: the *Yamato* class. These monsters, including *Yamato*, *Musashi*, and *Shinano*, were 839 feet long, displaced 72,000 tons, and sported 18-inch guns capable of hurling 3200-pound shells over 26 miles. By the end of the war, all three had been destroyed thanks to action by either carrier-based planes (*Yamato* and *Musashi*) or submarines (*Shinano*). Only *Yamato* succeeded in sinking opposing warships.

The ironically named *Vanguard*, launched by Great Britain in 1946, was the last battleship built. World War II veterans USS *Missouri* and *Wisconsin* were the last to see combat, launching cruise missiles and firing 16-inch guns to support Operation Desert Storm in 1991. Today, there are no battleships in service anywhere in the world.

Why? Despite their high cost and advanced technology, battleships quickly became obsolete. They were replaced by

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disruptive technology that was both less expensive and more effective. Does this sound familiar? For those of us in health care it should. We have perhaps clung to battleships of our own for too long and with an even tighter grip.

The word *hospital* comes from Latin, sharing roots with "hospitality" and meaning a place to shelter. No hospitals existed in Imperial Rome. Their development accompanied the rise of Christianity in the West. Hospitals were usually organized by religious orders and served primarily to provide food and shelter to the sick and the poor. Hotel-Dieu, founded in 651 CE in Paris, is the oldest hospital in continuous service.

Prior to the 19th century, little medical care existed. What did was at best harmless. Bald's *Leechbook* (9th century CE), for example, contains the following treatment for "elf-kind and nightgoers":

> Take eowohumelan, wormwood, bishopwort, lupin, ashthroat, henbane, harewort, haransprecel, heathberry plants, cropleek, garlic, hedgerife grains, githrife, fennel. Put these herbs into one cup, set under the altar, sing over them nine masses; boil in butter and in sheep's grease, add much holy salt, strain through a cloth. … If any evil temptation, or an elf or nightgoers, happen to a man, smear his forehead with this salve, and put on his eyes, and where his body is sore, and cense him [with incense], and sign [the cross] often. His condition will soon be better.[1]

The wealthy would not be caught dead, so to speak, in a hospital. Rich citizens preferred to die in their own beds. For thousands of years, a house call by a physician, rather than hospitalization, defined the practice of medicine. And surprisingly, there was good reason to call the doctor. Physicians brought with them an effective treatment for pain and suffering: opium. Extracted from the poppy plant, this drug was well known and widely used. Opium was first mentioned in Sumerian texts in 2100 BCE, which called it *hul gil* or "joy plant."[2]

Hospitals were completely transformed by medical breakthroughs of the 19th and 20th centuries. Anesthesia and antisepsis allowed for longer, more successful surgeries, and a heroic age of surgery ensued. Thoracic surgery, cardiac surgery, and neurosurgery developed as physicians such as Lillehei and Cushing invaded previously inaccessible parts of the human anatomy. More recently, catheter-based and endoscopically guided treatments, implantable medical devices, and minimally invasive approaches have led to an explosion of new therapies.

At the same time, hospitals became not only centers of care but, by extension, the focus of medical expenditure. Government and private insurers paid increasingly large fees for modern hospital-based care. And for the first time, hospitals attracted the wealthy. It was big news when rich sheiks first paid to use entire wings.

As a child, I underwent a tonsillectomy and spent several days in hospital. I remember being impressed by the large oxygen tent I was required to use and by how tasteless the food was. Today, a tonsillectomy can be performed without hospitalization. Ambulatory surgery centers, specialty hospitals treating a single organ, and freestanding emergency rooms are ascendant. The wealthy and the well-insured increasingly prefer outpatient care. Ambulatory surgery is often more efficient, less expensive, and safer, with less risk of infection.

Yet today, the USA has over 6000 hospitals with 1 million beds. More than 36 million people are admitted each year at a cost of $1 trillion. Large office complexes house physicians practicing at these hospitals. Enormous parking structures are built to accommodate the hundreds of thousands of patients who visit each day.

Patients undergoing surgery are expected to visit for evaluation, lab work, imaging, preoperative checks, postoperative checks, and referral to specialists, including anesthesiologists, radiologists, cardiologists, pulmonologists, and oncologists. There is often at least one trek to the business office. Such pilgrimages require days off of work and are filled with hours of unproductive driving, sitting, and waiting. And woe be to the patient who arrives late for a scheduled appointment. With luck he may be rescheduled in a month or two.

Today, a large number of consumer goods and services, from groceries to pet grooming, are delivered to people's doors within hours of being ordered. The quality and reliability of these products and services are often excellent. I recently received a full refund after mistakenly ordering the wrong socks. Have you ever heard of a refund for an unnecessary medical test? Or if a prescribed treatment fails?

The world is changing quickly. Most industries are racing ahead with less expensive, more reliable, and simpler solutions to human needs. But as I write this, I am late for a meeting to discuss whether patients should arrive 30 minutes early for appointments, to ensure that they complete all required tasks, forms, and procedures. Oh yes, and to make sure that they have time to visit our business office as needed.

Someday our waiting rooms may be empty. A new generation of patients is demanding care when, where, and how they choose. Pearl Harbor may come again and sink hospital-based care.

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