


Storyline: Convert the IOWA

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

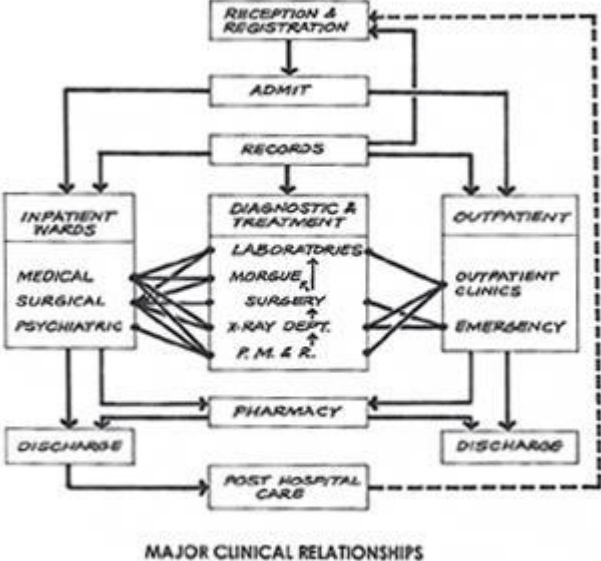
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Anchoring Phenomenon: The COVID-19 virus is infecting thousands of people who will need hospitalization. The USS Mercy came to the Port of Los Angeles to provide hospital services.

Driving Question: How can the USS Iowa be converted into a hospital ship that will support the USS Mercy?

Focus Questions	Making Sense of Phenomena with Science Practices	What we Learned
<p>Preface: Why does the Iowa need to be converted to a hospital ship? How will the conversion of the Iowa into a hospital support/affect the Covid-19 surge?</p>	<p>Viewed videos of Mercy coming into port. Viewed Iowa at port of LA. Analyzed data on Covid-19 surge. Introduced Driving Question. Generated observations and questions https://public.flourish.studio/visualisation/1712761/?fbclid=IwAR1vXf23066aascKoyBrEJiGhw02v-HaBtgS0fX2ZIJ-mnFM46kgliDt8wg https://www.theverge.com/2020/4/2/21201832/novel-coronavirus-covid-19-best-graphs-tracking-data</p>  <p>Introduced Design Process</p>	<p>People infected with the COVID 19 virus will increase exponentially and require hospitalization. The available hospital beds will not meet this demand. We need to create more hospital space to deal with the regular hospital patients.</p>

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<p>Plan Chapter 1 What do hospitals do?</p>	<p>Read article about hospital functions. Formed groups to analyze needs of various roles within a hospital.</p>  <p>The diagram, titled 'MAJOR CLINICAL RELATIONSHIPS', illustrates the flow of patients and information through a hospital. It starts with 'RECEPTION & REGISTRATION' at the top, which leads to 'ADMIT'. From 'ADMIT', the flow goes to 'RECORDS'. Below 'RECORDS' are three main service areas: 'INPATIENT WARDS' (subdivided into Medical, Surgical, and Psychiatric), 'DIAGNOSTIC & TREATMENT' (subdivided into Laboratories, Morgue, Surgery, X-Ray Dept., and P.M. & E.), and 'OUTPATIENT' (subdivided into Outpatient Clinics and Emergency). Arrows show bidirectional relationships between 'RECEPTION & REGISTRATION' and 'ADMIT', and between 'ADMIT' and 'RECORDS'. 'INPATIENT WARDS' and 'OUTPATIENT' both lead to 'DISCHARGE'. 'DISCHARGE' leads to 'POST HOSPITAL CARE'. A dashed box encloses the 'RECEPTION & REGISTRATION' through 'ADMIT' and 'RECORDS' sections. Below the diagram is the caption 'MAJOR CLINICAL RELATIONSHIPS'.</p>	<p>Hospitals serve many functions</p> <ul style="list-style-type: none"> ● bed-related inpatient functions ● outpatient-related functions ● diagnostic and treatment functions ● administrative functions ● service functions (food, supply) ● research and teaching functions
<p>Plan Chapter 2 Who works in a hospital?</p>	<p>Researched personnel needs of a hospital. Engaged in writing persuasive essay in support of a specific occupation including numbers and costs. See document below and Bureau of Labor Statistics website https://www.bls.gov/bls/blswage.htm</p>	<p>Hospitals employ:</p> <ul style="list-style-type: none"> ● doctors ● nurses ● therapists <ul style="list-style-type: none"> ○ respiratory ○ physical ○ occupational ○ speech ● technicians <ul style="list-style-type: none"> ○ radiology ○ pharmacy ○ ultrasound ● janitorial ● clerical

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		<ul style="list-style-type: none"> ● information technology ● food services ● environmental services (plumbers, electricians, etc.) <p>Created a budget for personnel.</p>
<p>Design Chapter 3</p> <p>What are the criteria for converting the Iowa into a hospital?</p> <p>What are the constraints?</p>	<p>Analyzed information from chapters 1 and 2 to set criteria for designing the IOWA conversion. Reviewed floor plans and budget constraints. Submitted proposals. Refer to Iowa Blue prints.</p>	<p>An engineering project has specific criteria and constraints that direct the design process.</p>
<p>Deliver/Present Chapter 4</p> <p>What is our solution to the design problem?</p>	<p>Created and presented model of our design to convert the IOWA into a hospital. Demonstrated that the model met design criteria and constraints.</p>	<p>Engineering projects go through various stages – planning, designing and construction. Revisions occur throughout the process.</p>

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- **Doctors.** If you're a patient at a teaching hospital, this includes medical students (people in school to become doctors), interns and residents (people who have earned the title of "doctor", but who are still learning their craft), and attendings (people who have completed their formal training as physicians). If you're not at a teaching hospital, it's less likely you'll see medical students and other trainees (the army of white coats tromping through the hallways). Instead, you'll see lone attending physicians.
- ADVERTISEMENT
- **Nurses.** Nurses play vital roles in patient care; without them, hospitals simply would not work. Nurses arguably spend the most time with patients. They monitor and observe patients around the clock. As a result, they're often the first to realize that something has changed and thus have the responsibility to do something about it.
- There are different kinds of nurses, such as registered nurses, licensed practical nurses, and certified nursing assistants. Their roles differ in terms of their training, skill sets, and responsibilities, but they all serve to observe and monitor patients and their conditions.
- **Therapists.** Not the talky kind. There are respiratory therapists, speech therapists, physical therapists, and occupational therapists. They focus on skills and function: How can we help this patient walk? How can we help this patient talk with less difficulty? How can we retrain the muscles in this patient's hand so he can write again?
- **Technicians.** Radiology technicians, pharmacy technicians, surgical technicians, electroencephalogram technicians, patient care technicians ... the list is long. They assist other professionals in the hospital in their duties and may have more contact with patients than the professionals themselves.
- Consider an ultrasound technician. A physician may order the ultrasound, but it is the technician who will explain to the patient what an ultrasound is and perform the procedure. A radiologist will interpret the results.
- A special note about patient care technicians (PCTs): These individuals often spend the most time with patients and are often a treasure trove of data for nurses and physicians. If you are a physician working in a hospital, make a point of talking with the PCTs. They're the ones who will know if the patient slept, went to a procedure, has a change in mental status, etc.
- **Janitorial staff.** These individuals have one of the most important jobs in the hospital: They help with hospital-wide infection control. They help prevent people from getting more sick. If you work in a hospital, thank a janitor today for what they do.
- **Clerical staff.** This includes the clerks who serve as receptionists for the hospital units (not an easy job: imagine juggling phone calls from patients, managing the anxiety of family members of patients, paging physicians multiple times because they don't call back...), hospital operators, all the people working in medical records, and the staff who work with the hospital administrators. Hospitals generate a lot of data. Someone has to help manage and organize all that data.
- **Information technology staff.** Electronic health records now hold patient information. The networks fail. The mouse doesn't work. There aren't enough terminals. Someone can't remember their password. The radiology images aren't showing up. The orders didn't go through. The IT department gets a lot of pressure to get it all right.
- **Food services staff.** There are all the people who cook hospital meals, transport and deliver the meals to each patient, and wash the leftover dishes. These people also prepare the food in the hospital cafeteria, which feeds the rest of us who are well enough to get it on our own.

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- People want to eat and they want to eat food that tastes good. In the hospital it is hard to please all of the people all of the time.
- **Environmental services staff.** These are the plumbers, electricians, HVAC experts, etc. who make sure that the electricity stays on, that there are backup generators available, that the water temperatures are satisfactory, that the ambient temperatures are within a certain range, that the windows seal tight, etc. If the building doesn't "work", then the hospital doesn't work.
- **Pharmacy staff.** I don't know how many thousands of medications are available, but the pharmacy takes care of all of them. Whether they are amazing antibiotics that will drip through an IV or cartons of chicken soup (yes, doctors can order chicken soup), the pharmacy takes all of those orders and fills them. They ensure that medications are available in every single hospital unit and prepare medications for patients to take with them when they leave the hospital. And they have to make sure that they fill the right drug at the right dose at the right time for the right person.