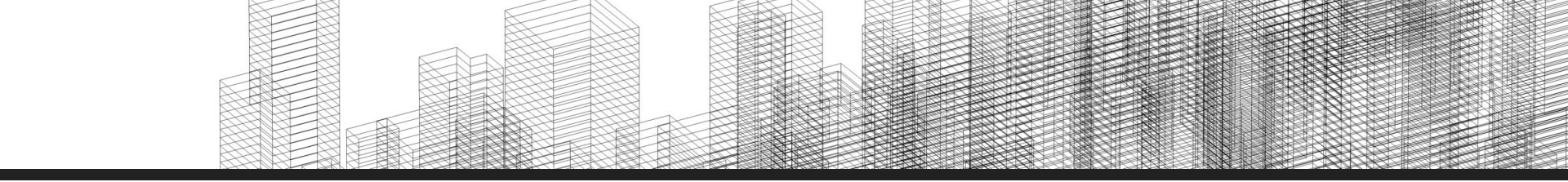


# Emergency Room Design

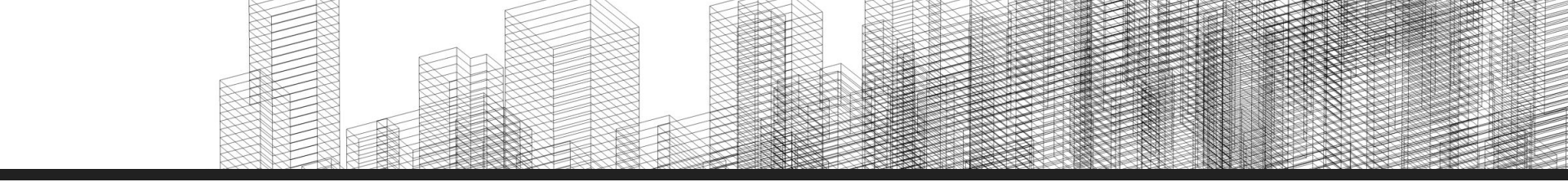
*Students in Biomedical Innovation, Plymouth, MA*

# What makes a good E.R?

A lot of factors need to be considered when trying to make an emergency room run as efficiently as possible. Several questions need to be answered; is there enough room? Are there enough staff members? Will the patients have enough privacy?

# Our goal

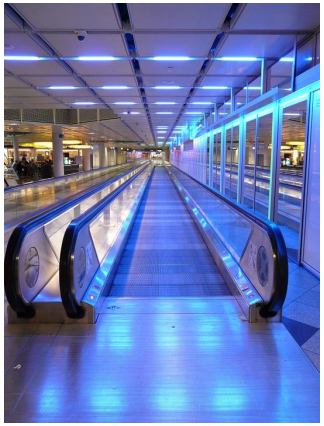
Here, our goal is to answer all of the questions mentioned in the previous slide and more. We are trying to design an emergency room with a large capacity, cutting edge technology and more, so that every patient that walks into the E.R walks out satisfied and in good health.



# Addressing Concerns and Issues

# Congested hallways

Congested hallways seem to be a constant issue in many emergency rooms. Crowded hallways slow down movement of personnel and equipment leading to longer wait times. We took this into consideration with our design, and thus made sure to make our hallways very wide, as well as include trauma lanes and moving sidewalks for those who are in a hurry.



# Long wait times for lab work

We were also aware that, in many cases, lab work and diagnostic imaging can take a long time to return to patients. This can be due to long distances between the ER and diagnostic labs. Therefore, in the middle of all facilities we included our lab and diagnostic imaging room. Its close proximity to all other departments means that wait time for lab work is hopefully decreased.

# Trauma cases slowing down other care

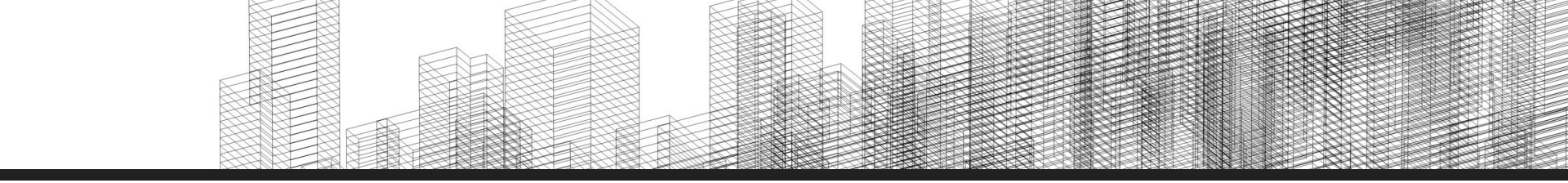
Almost always, when a severe trauma case arrives at an emergency room it slows down the care process for all other patients. This is due to the ned to triage and prioritize patients. To combat and limit this, we have 3D scanners and X-Rays that are used to find the source of potential unknown pain.

# Movement of heavy equipment

The transportation of heavy and bulky equipment can often be tedious and take away from precious time that could be channeled into caring for other patients. Therefore, for large pieces of equipment, we have attached tracks to the floor that allow them to slide around more easily, making it much smoother to move large equipment.

# Inadequate patient coverage

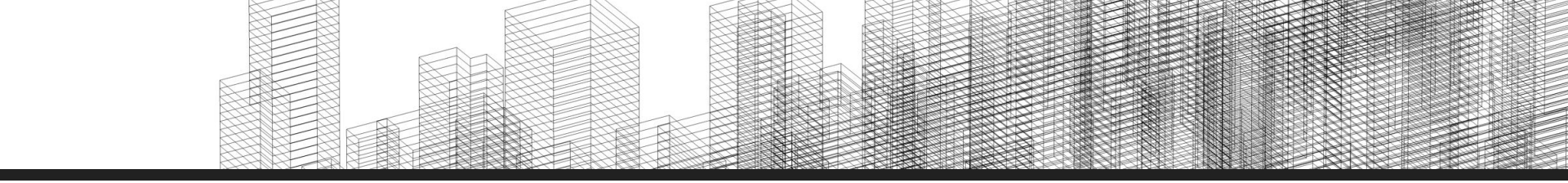
One of the most detrimental issues that can be found in any ER is that there aren't enough physicians and/or nurses that can cover and keep track of every single patient. This is one of the largest causes of long wait times. Thus, we will make sure that every staff member is certified in nursing, such as those who may be cleaning,so that when things get busy they will be asked to hop in and speed up the process of patient care.



# Pediatric wait times

Many times, pediatric patients (children) who visit the emergency room will become very nervous and uneasy. This is a natural reaction, however we plan on limiting this by providing these patients with a child play area where they will be able to play and be monitored until they are seen by a doctor.

The child play area is also used for patients whose children had no other option but to go to the hospital with their parent.



# Slow room prep for next patient

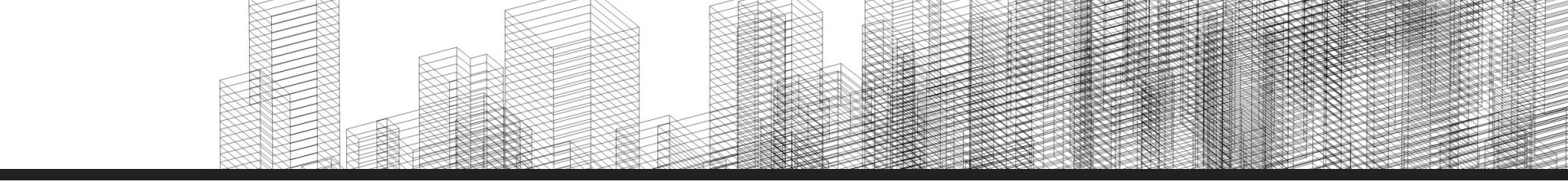
We need to ensure that rooms can be cleaned and set up and rearranged properly for the patient that will be next to enter the room. However, we also need to put an emphasis on speed to make sure that the emergency room operates at maximum efficiency. Thus, all rooms will be set up very similarly, if not identically.

We will also implement UV light that will clean and disinfect the room when the door is closed.

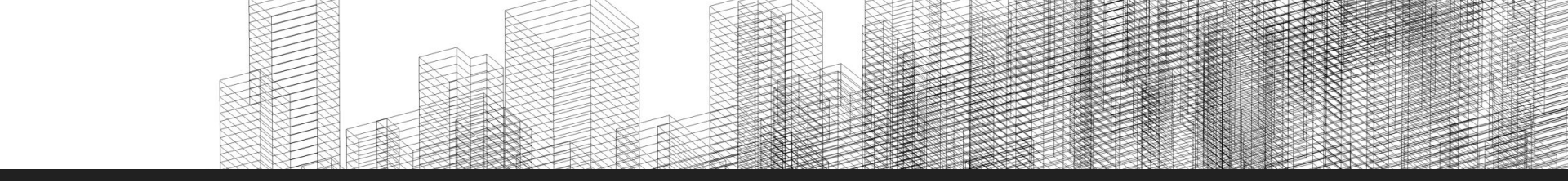
# Limited ability to track patients

We have to make sure that we know where our patients are in order to ensure their maximum safety. In addition to safety, trying to locate missing patients can increase wait times for other patients. Therefore, to increase our ability to track patients they will be given wristbands with small chips in them that can store their vital information as well as their identifying information.

These wristbands can be scanned to gather all of their information easily and efficiently.



# Floor Plan

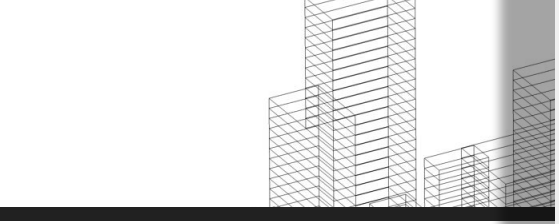


# Patient 12

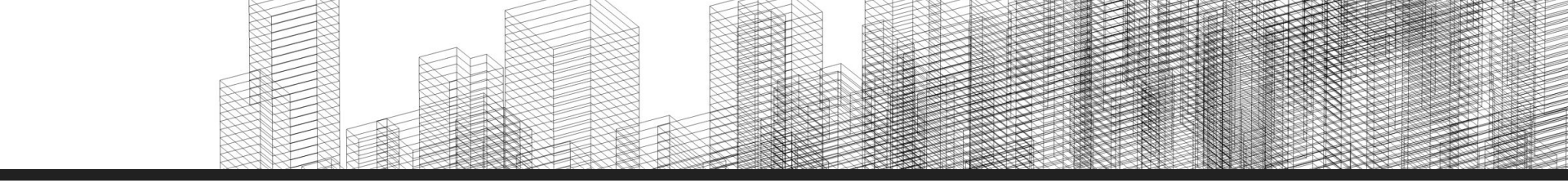
Our first patient is walks into the hospital through the main entrance after suffering 3rd degree burns on both of his hands from an accident using the grill while talking on the phone.

The first person he meets at the hospital is the receptionist, who send him down the hall to triage. Triage admits him to the hospital and he is sent to the burn wound area. There, he will see nurses specialized in treating burn victims. He will also be sent to the blood draw area for a transfusion, following the operating rooms where he will see specialized surgeons for burn wounds and skin grafts. Diagnostic tests will include a blood test to check for infection, as well as a urinalysis to test for dehydration.

Much of the large equipment used throughout the procedures will be slid along tracks in the floor making it easier for the nurses and surgeons to move.



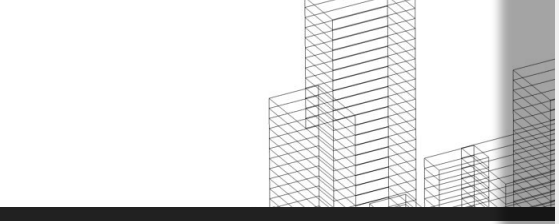
1. Decontamination
2. Operating Rooms
3. Burn Wounds
4. Scrub Area
5. Patient Beds
6. Blood Draw Station
7. Pharmacy
8. Nursing Area *AND* Break Area
9. Visitor Beds
10. Diagnostic Testing
11. Triage
12. Blood Draw Station
13. Storage/Chemicals
14. Robotics Area
15. Infectious Diseases
16. Mental Health
17. Child Care
18. Child & Mental Health Beds
19. Reception
20. Atrium



# Patient 14

Our second patient is coming into the emergency room with complaints of numbness in his left arm and a sudden onset headache, as well as difficulty speaking.

This patient will first see the receptionist, and then get sent to triage. At triage, he is admitted and sent to diagnostic imaging in order to try to find a source of his issues. While at diagnostic imaging, he would receive an MRI from a radiology technologist to find out any possible brain issues as well as an EKG to determine if heart problems are causing anything else. If he needs surgery, then we will send him to the operating rooms. After, he will go to see nursing for proper further care and medication. This patient will most likely be staying overnight, so after that he will go to the patient beds so that he can rest.



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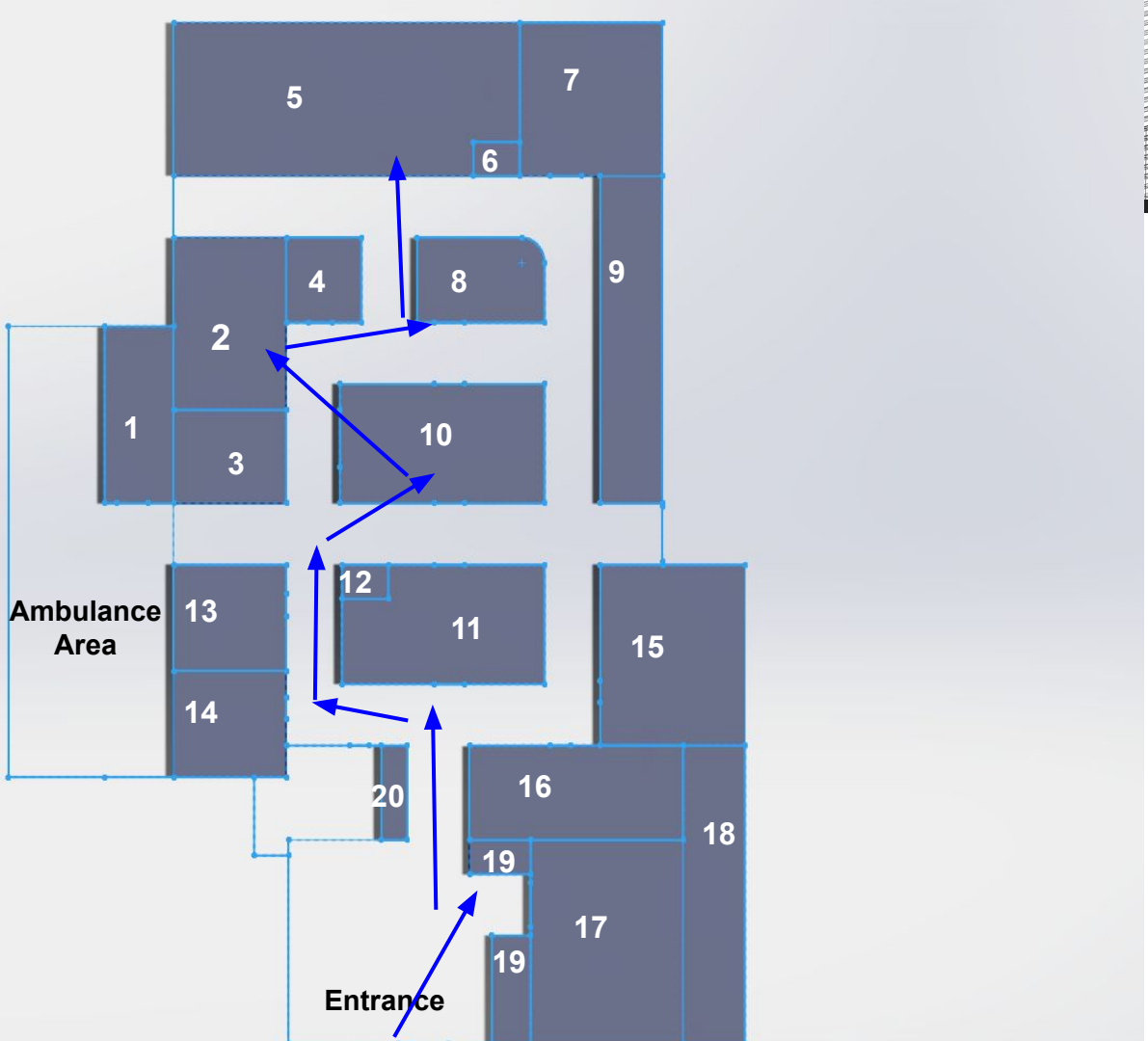

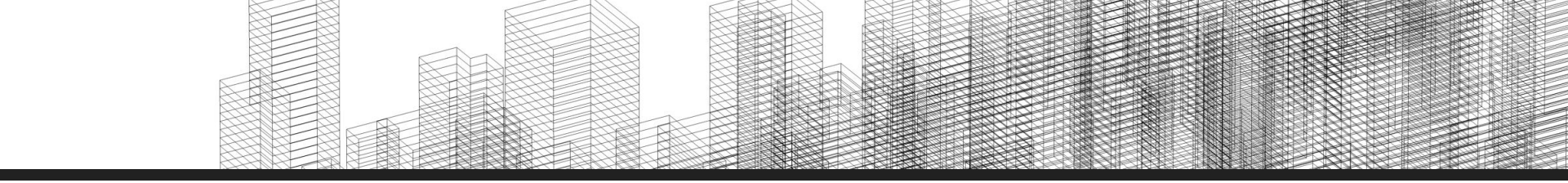

# Fictional Patient

Our third patient is a single mother named Emily who fell down the stairs and is suffering from a compound fracture in her forearm. She calls and ambulance and they bring her and her child to the hospital.

The first medical professional Emily will see will be a Paramedic in the ambulance where she will receive pain medication. While in the ambulance she will also get blood drawn for a blood test to see if she has an infection. After entering the hospital, her kid will be taken to the childcare center, and Emily will be sent to triage via the moving walkways. She will be directly sent to the operating rooms where she will receive surgery to reset the broken bones. Then she will meet an anesthesiologist who will aid in the surgical process. After the operation she will be sent to the patient beds where she can stay the night.

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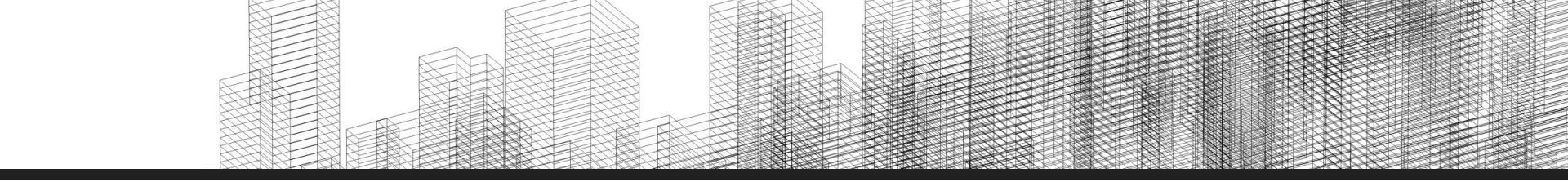


# Justification

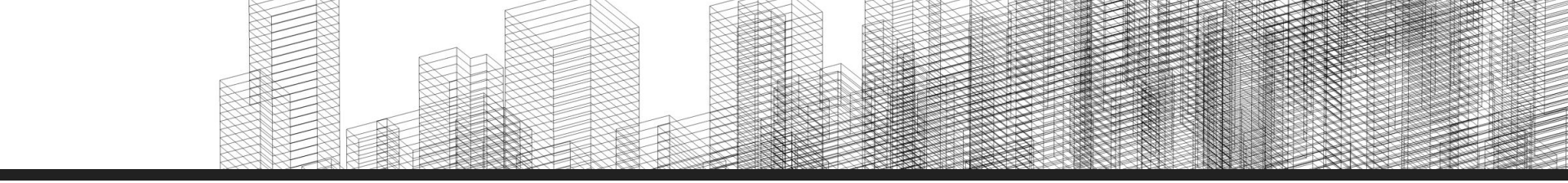
- The triage and OR are located right next to the ambulance bay in order to allow for unobstructed and quick access to necessary facilities.
- The main entrance is located away from the ambulance bay to allow for these emergency patients to be brought in and triaged more easily.
- The mental health and child care beds are separated from other beds to allow for privacy.
- Child care is in the corner of the hospital to reduce the noise for the rest of the hospital.
- Diagnostic imaging is located near the center of the E.R, because many departments need to use that area.

# Justification cont…

- Operating rooms and burn wounds are near the ambulance entrance, in the case of a severe injury arriving via ambulance.
- Diagnostic imaging and triage are close to each other in order to maximize the efficiency of the triage process.

# Innovations

Our innovations include the introduction of automated robots and advanced health monitors in the form of wristbands. The robots will be used to help clean rooms and perform menial tasks in order to free up more staff to assist with patient treatment. The wrist bands will be used to track patients, and take readings of vitals. This will also help to free up more staff as nurses will not have to check vitals as often. Nurses will then be free to treat more patients.

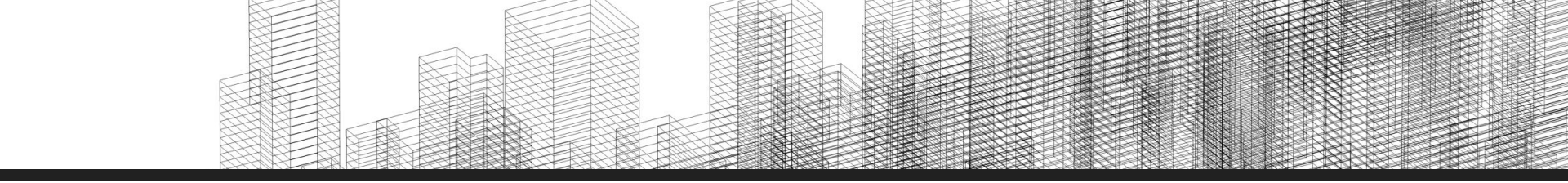


# Staffing

Our innovations allow staff to leave the menial time consuming tasks such as cleaning and monitoring to automation. This allows staff to put all of their focus into the efficiency and effectiveness of patient care.

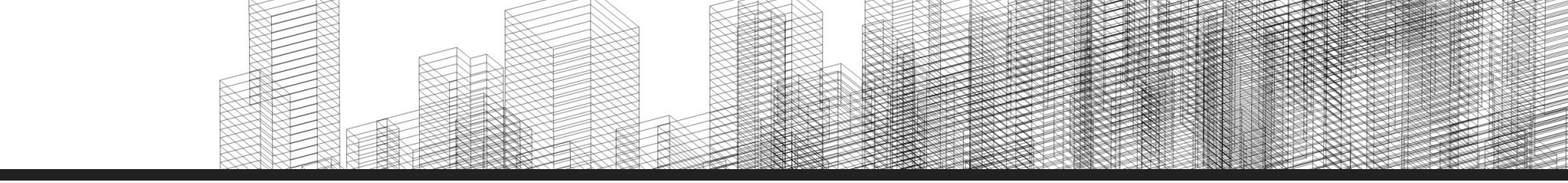
If a patient is lost, they can easily be found and identified using their wristband. In addition to this, nurses no longer need to allocate their time to cleaning floors and equipment. They are now free to work with patients, effectively increasing the number of staff.

If a large number of patients enter the hospital all at once, triage staff will be increased by pulling nurses from less urgent areas such as the childcare area and then the mental health facility. If needed, nurses who are on the break will be moved to triage, and their break will be resumed afterwards.



# Interconnectedness

Under our system, departments will be better connected via our layout. Departments that may need to work more closely with one another such as triage and the OR are located directly across from each other. Diagnostic imaging is also located centrally and close to triage to improve the efficiency of the ER, as many departments require diagnostic imaging in order to determine the best treatment.



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