Title:Electrical, Biomedical and Civil engineering departments issues dealing with poor power source systems and electrical recharging in hospitals.

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Word count: about ~1500 word.

Statement of problem scenario:

Introduction: (~200 words) all as a group.

-Background to the topic.

Hospitals requires lots of energy since they work for long hours day and night. And majority of the hospitals in need to have a continuous and safe energy source to equip themselves with needed lighting, heating, ventilation and to be able to perform any kind of operations along with having the tools and the machinery fully powered up. Providing hospitals with the efficient source of energy is one of top global priority, and there are organisations that their goal is to provide electricity to low and middle-income countries such as Electrify Africa act. The importance of providing hospitals with a safe and continuous source of energy is be able perform as many operations as they do through their daily routine(Chawla,2016).

The methodology of this essay is what is the main issue, where it happen and why. Next is the first approach to solve this problem is toward power sources, generators and what solution have been used by some hospitals. Followed by what could be improved in the hospital as a building from structure and wiring, which will conclude about the electrical energy within medical tools and machinery.

Main body:

P1: Electricity - Israa ~275

Israa: Explaining the possibilities for energy loss & impacts, especially in middle and low income countries.

Electricity is considered as the major energy cost in modern hospitals (moghimi,2014). As a result, the vast majority of medical equipment being used has a high energy consumption. Hospitals in unstable or war torn countries are unable to rely on electricity as a power source (Dyer,2008). For example, the Gaza Strip has been suffering from power cuts for eleven years. In fact, electricity is operational for only eight hours at a time to save. However, access to this power source has significantly reduced from eight to six hours or less.

The project is based on the installing solar panels in major hospitals throughout the sector. Mainly, the panels convert sunlight into electrons that are transported by wires to charge batteries that save electricity from sunlight (Wei and Liu,2008). It follows that the energy stored in the batteries is then converted into electrical transformers, that distribute electricity to the hospital during power outages. Therefore, the panels will provide a reliable source of energy for emergency rooms, intensive care units and operating rooms (Wei and Liu,2008).

Parise explained that the system works with power generation up to three thousand watts, meaning that electricity is available for use twenty-four hours (Parise,2011). Which reflected positively in improving the level of services in the hospitals and the quality of efficiency, in addition to the importance of this project in the conservation of the environment and reduce carbon emissions. Indeed, Investment in the solar energy sector will save more than half of the value of electricity bill.

Although using solar systems in hospitals is beneficial, the level of investment in unstable countries for renewable energy remains low, due to the cost which is considered high compared to the income of these countries.

P2:Electrical-Salman ~275: Solutions & substitution for the issue of energy sources & generators.

Hospitals in some parts of the world have found a number of supporting methods to keep electricity running for a longer period. Two of the most popular methods are gas fired cogeneration (CHP) and Solar Suitcases.

CHP is used in the vast majority of Brazilian hospitals. According to Szklo, Soares & Tiomno Tolmasquim (2004) the reason why some hospitals in Brazil still uses this method is due to its cooling system, low efficiency loss, high electricity yield and a low power load will not go higher than 70% of it is capacity.

Limitations of CHP would include their high cost and their low electrical capacity range in comparison to other energy sources such as hydropower generators which is more commonly used in Brazilian hospital.

In Africa where many have no access to any source of energy, an organization called We Care Solar a nongovernmental organization (NGO), has produced a solar power suitcase to resolve this energy problem (Humphreys, 2014).

As it is a mobile power generator that get charged and recharged easily, and they have been enhanced to include more features such as LED lambs, a headlamp, a fetal heart rate monitor, an outlet for 12-volt direct current (DC) medical devices, as well as batteries and phone chargers.

However, there are limitations of these suitcases that, as they are useful, they still do not offer the needed amount of energy, since their capacity is limited to a certain amount of voltage

Both options have proved their ability and worth according to number of organisations such as WHO, and despite the flaws of these solution it is still a step forward toward inviting an improved generator that would satisfy hospitals needs for energy.

P3: Civil - Madina ~275

Explaining: the method of the electrical wiring diagrams and building’s design and structure .

Solution:modifying the structure so it will be able to have enough amount of energy.

Designing a structure on its own is a hard task to complete and can take a very long time. Along with designing the structure, civil engineers must also keep in mind the electrical wiring system in the design of the buildings. Civil engineers must work with electrical engineers in order to determine and design the best system possible to sustain the building.

It is important to understand and keep track of all the regulations of the area because they are different everywhere. How much total power the building needs must be calculated and how many power supply sources are available with how much power they give must be considered. We must know what each part of the building has a different load of electricity is needed, after that the electrical wiring system can be designed in the structure of the building. The electric wiring system has to be well concealed with the structure of the building to decrease the risks of things reaching the wires or other things that can damage them, but at the same time they must be easily accessible in case they need to be reached for maintenance or if something is wrong or not working properly.

The solution in hospitals it is important to have a backup generator in case there is a blackout or electricity shortage as most surgeries must be performed with generators not a regular power source to reduce risk in case there is a loss of power in the building.

To sum up , With the help of electrical engineers, civil engineers must join the wiring system into the design of the structure showing where the different voltage generators are placed and what is protecting the wires and what the different purposes of the wires are, for example for sockets and cables, are different from the lighting wiring.

P4: Medical - Mohammed ~275

The poor supply system in hospitals caused problems in hospitals, by the middle of the 1950th more than 1200 patients were killed or harmed every year by hospital electricity problems. This problem needed to specialists to take care of this problem this leaded to explode the use of Biomedical engineers in 1970. Biomedical Engineers play an important role in hospitals system as they ensure that all of medical devices are accurate and safe. Crino (2011) states BMEs play a significant role in testing new equipment for any hospital or company to ensure its proper functionality and electrical safety, that means it is a great way to keep the safety of hospitals always high is to find out the problems before they occur. That is why all machines are checked at least once a year on a regular basis. Also, Tucker (2013) states that the electrical problems such as electric shock caused by the medical devices even if they are new devices can be from the bad delivery to hospitals or the bad storage, this means even if the devices are new they have to be checked before they send to be run.

Both options are similar and useful for both hospitals and patients but relying on electricity itself should not be a permanent solution for health care facilities. An article published on clinicinacan.org states the alternative options for electricity that healthcare facilities should have in future such as solar power as a true turn-key solution and a second power supply in case of loss of the main power supply.

To conclude this, medical devices are crucial and should be run all the time to keep patient safe as all healthcare facilities in the meantime rely on these devices, alternative power supplies should be an option for all these facilities to keep the safe level high.

Conclusion: all as group (200 words).

Over all, the issue is not an easy one to tackle, since the costs of fixing the issue is high and no source of energy till this day have been found both safe and continues, even for electricity. The places that suffer from the issue mainly, parts of Africa where they do not have electricity available and Gaza hospitals where they face power outage. Therefore, improving the method used for generating power into the hospitals is being considered for real(Humphreys, 2014). Such as: using solar panels to generate electricity, wiring under the structure of the building. In addition to improving the the medical tools. As a results, these projects and innovation are going to change the environment of the hospitals significantly.

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