

‘Getting out of the dark’: Implications of load shedding on healthcare in South Africa and strategies to enhance preparedness

Power failures and the lack of a robust contingency plan could prove catastrophic in any healthcare environment, with varied and far-reaching consequences. In 2003, a 28% rise in both accidental and non-accidental deaths was recorded in the USA as a result of mass power outages.^[1] For every day with a power outage lasting longer than 2 hours, hospital mortality has been estimated to increase by 43%.^[2]

In recent times, Eskom, the largest and main provider of electricity in South Africa (SA), has not always been able to meet the electrical demands of the country, implementing various stages of power outages dubbed ‘load shedding’.^[3] Lack of maintenance of existing power stations, failure to successfully introduce new infrastructure, poor management and allegations of corruption are some of the suggested reasons.^[4]

SA already has a strained healthcare system, largely owing to inefficient financial management, a disparity in the distribution of resources and a quadruple burden of disease.^[5] In a 2017 survey of 19 developing countries, SA was ranked last on efficiency in healthcare-related expenditure.^[6]

More than 80% of South Africans are reliant on public healthcare services.^[7] There are approximately 420 state-run hospitals and more than 3 000 state-run clinics across SA.^[7] While private facilities and secondary- and tertiary-level public hospitals appear to be well equipped with generator banks,^[8] smaller healthcare facilities including primary healthcare clinics are often left in the dark.^[9,10] The cost of alternative sources of power can be substantial. Recently, a private hospital group reported an average monthly expenditure of ZAR800 000 to run its generators.^[11]

Increased load on healthcare services

Approximately half of South Africans live below the upper-bound poverty line and therefore lack the financial resources to obtain safer alternatives to electrical power.^[12] The use of unsafe alternative sources of energy such as paraffin, gas, petrol, wood and plastic may potentially increase the risk of carbon monoxide and cyanide poisoning as well as burn-related injuries.^[13,14] An increase in emergency medical services (EMS) use by more than 50% as well as longer scene times have been reported during disaster-related power outages.^[6] Similarly, increases in emergency department visits^[15,16] and hospital admissions have been noted during power outages.^[2,17]

Hygiene and infection control

According to the General Household Survey, electricity is used by 76.8% of South Africans to cook food.^[18] Load shedding may potentially increase the risk of foodborne diseases for a variety of reasons, from dirty utensils to food not being kept fresh.^[19]

The maintenance of sewage and running water systems is vital for healthcare facilities to ensure adequate infection prevention. SA’s sewage and water systems are known to be poorly maintained and already struggle to meet the demands of public sanitation and water requirements.^[20] When load shedding occurs, these systems become further dysfunctional. In the case of a prolonged power failure, reservoirs may even run dry.^[9,14]

In addition, during load shedding staff may not be able to sterilise surgical instruments and other essential items, thereby potentially delaying emergency interventions and increasing the risk

of complications.^[21] Ultraviolet light sources, which are useful for reducing the presence of resilient microbes in critical care areas, may also be dysfunctional during periods of load shedding.^[22]

Light and temperature control

A well-lit environment is of paramount importance to any medical facility. According to the regulations pertaining to private healthcare facilities, hospitals are required to provide lighting in maternity delivery rooms, operating rooms, ward corridors and critical care areas during power failures.^[23] Currently there is no legal requirement for healthcare facilities to provide backup power for maintaining thermal regulation.^[23] Temperature control during power failures presents a unique challenge in the healthcare industry.^[13,14] Excessively high temperatures have been associated with an increase in the proliferation and spread of infection, whereas excessively low temperatures may induce hypothermia and hypocoagulability.^[24]

Cold storage

Various medications, vaccines and blood products need to be stored within specific temperature ranges.^[25,26] The efficacy and safety of these products may be compromised during prolonged and unpredictable power outages.^[27] Erratic temperatures in hospital mortuaries may accelerate the decomposition of corpses, which may potentially compromise postmortem examination, delay the burial of the deceased and potentially increase the risk of spread of infection.^[28]

Equipment

Tertiary hospitals provide care for a large number of critically ill and injured patients, who often require the use of multiple electronic devices.^[29] Although most critical devices have built-in back-up battery power, they are subject to various limitations that include a limited duration of power supply. Should these devices fail, healthcare staff may be required to intervene manually, thereby decreasing the availability of staff for other essential duties. Although portable oxygen cylinders can be used when the central oxygen supply system is dysfunctional during power outages, such contingencies would be likely to fail during prolonged periods of power loss and ultimately affect patient outcomes.^[14,30,31] In addition, non-function of hospital elevators during load shedding can severely restrict the movement of patients and staff.^[14,27]

Diagnostic services

There have been reports of complete loss of radiological and pathological services during instances of natural disasters and extreme weather events as a result of power outages.^[27] Although these services may be fully functional at larger facilities with adequate back-up power supply,^[32] smaller facilities with inadequate power back-up would be unable to provide them, necessitating transfer of patients to larger facilities and further burdening both the EMS and the receiving hospital.^[27]

Communication and administrative services

The loss of communication during power outages presents a great challenge. This includes but is not limited to an inability to

Table 1. Summary of recommendations to enhance preparedness for load shedding

- Installing uninterruptible power supply (UPS) technology to run computers, label printers, fridges, blood gas analysers, etc.
- Storage and maintenance of fully charged back-up batteries for essential devices
- Limit opening of fridge doors during power outages
- Stocking of an adequate supply of non-perishable foods
- Load-shedding roster to activate additional clinical and administrative staff when required
- Point-of-care ultrasound and laboratory testing as an alternative to formal radiology and laboratory services
- Stringent maintenance and oversight of generators and back-up devices
- Connecting of sensitive and life-sustaining medical devices to red electrical power outlets that are capable of automatically switching between municipal and emergency generator power circuits
- Adequate fuel reserves at hand, with due consideration to cost and shelf-life (~6 - 12 months)
- Implementation of alternative energy sources (wind, solar)
- Consideration of biomimicry architecture and multi-storey ramps when designing new facilities
- Implementation of load-shedding action plans and regular drills to test back-up power sources
- Government intervention to limit power outages at healthcare facilities
- Storage of additional oxygen cylinders with regulators, bag-valve-mask resuscitators, oxygen tubing, portable pulse oximeters, manual sphygmomanometers and additional blankets per high-dependency bed
- Establishing of community-based shelters where technology-dependent patients are able to access adequate power supply for continuation of medical care

recharge cellular phones, inadequate network signals and loss of internal electrically dependent telephonic systems. Patients, family members and other members of the public may be unable to communicate with the affected hospital or clinic. Inside the hospital, communication between wards, staff members and departments will also be compromised, which could cause significant delays in relaying pertinent information.^[14,33] Many hospital pharmacies use electronic scripting and dispensary systems to provide and issue medications to patients and healthcare staff.^[34] Although contingencies may be in place for the manual dispensing of medications, this may increase the time taken to process medication prescriptions, thereby causing major backlogs.

Financial and psychological implications

Prolonged or frequent loss of basic services, including power outages, has been shown to precipitate the onset of several mental health conditions such as depression, anxiety and post-traumatic stress disorder,^[14] which may add further strain to local mental health services. Staff morale plays an important role in the execution of professional duties, particularly among those employed in the healthcare industry.^[35] Healthcare workers are not immune to the psychological implications of load shedding.

Suggested measures to enhance load-shedding preparedness

Although at the time of writing there had recently been a decrease in load-shedding episodes, analysts indicated that load shedding was expected to return soon.^[36] Healthcare facilities and related services, in conjunction with the National Department of Health, need to implement various contingency measures and strategies. Suggested strategies are summarised in Table 1.

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