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RESEARCH ARTICLE

ABOUT VARIABLES THAT AFFECT THE PROPER OPERATION OF ANESTHETIC MACHINE

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Abstract

The number of patients having surgery grew by 13.93% between 2017 and 2018, from 4,867 to 6,444, according to the hospitals polled. Therefore, there is an increased risk of equipment damage occurring during operation as a result of adjustments and management. Consequently, the purpose of this study was to examine the safety of anesthetic equipment, the contributing variables to that safety, and accident prevention strategies. The research indicates that there are 51 devices spread throughout 8 locations, including 12 devices at the First Central Hospital of Mongolia, 3 devices at Intermed, and 3 devices at Gurvan Gal and the Second State Central Hospital, respectively. At the hospitals surveyed, 40–50% of the most frequent breakdowns were caused by sensor malfunctions. At these institutions, 15–35% of the operational equipment was out-of-date, and only 45% of spare parts were replaced on a regular basis within the allotted time. Therefore, it is essential to ensure the availability of spare parts for frequently damaged parts, prompt replacement of spare parts, increase the number of engineers and technicians, uninstall any equipment that is outdated or that has been in use for more than eight years, or check it daily with an analyzer for safety and specialists must adhere attentively to the safety recommendations.

Introduction:-

According to the hospitals surveyed, there was a 13.93% increase in surgical patients from 4,867 in 2017 to 6,444 in 2018, and there was a corresponding growth in the use of anesthetic devices. Because there is a potential that the anesthetic machines might sustain damage during surgery due to a lack of control and adjustment, engineers and technicians do research to find methods to avoid damage in order to ensure the normal, dependable, and safe performance of the devices.

Purpose:-

To research the factors influencing the safe operation of anesthetic equipment and the best approaches to reduce damage.

Methodology:-

The study's scope includes 51 anesthetic equipments from 8 institutions. The survey was conducted by questionnaire method and the results were developed.

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Results:-

Flow sensor failures, disposable breathing circuit seal leakage, oxygen sensor failures, and other failures, such as electrical problems, were frequent failures in the hospitals evaluated. These damages are influenced by variables such effect of gas supply, electricity fluctuations, consumption, service life, and the frequency of replacement of periodic spare components.

The most frequent faults, according to the state hospitals studied, are flow sensor damage (20–38%), oxygen sensor damage (20–35%), respiratory seal leakage (12–33%), and miscellaneous damage (15–25%). Intermed and Gurvan Gal hospitals from the private sector had flow sensor damage of 20–23%, O_2 sensor damage of 33–38%, respiratory seal damage of 32–34%, and other damage of 9%. Failures of the power supply, gas valves, control panels, and associated components are some other frequent failures.

The service life is one issue that has a 15–35% impact on state hospitals, and the low (or 45%) replacement frequency for spare components is another. Intermed and Three Gal, two private hospitals, have a 25% service life status and a 43% replacement frequency for spare components.

Conclusion:-

51 anesthetic machines from 8 hospitals were surveyed. Research has shown that 40–50% of typical anesthesia machine failures are caused by sensor damage. The study also found that the variations in electricity, usage, service life, frequency of temporary spare component replacement, and effect of gas supply are the elements influencing the device's damage. Of these elements, the service life status for public hospitals was between 15 and 35%, and the frequency of spare component replacements within the allotted time was low (45%).

Therefore, to reduce the factors that contribute to common failures:

1. Install a power stabilizer, surge arrester or UPS for power fluctuations.
2. To improve usability, engineer and technician use checklists for each device before each operation.
3. When preparing for planned surgery, calculate and implement a checklist or monitoring period.
4. Use analyzers to ensure the safe operation of older devices and undergo monitoring and inspection by the Health Development Center.
5. Ensure the availability and stock of the most common wearable parts to avoid delays in ordering parts.
6. In order to assess the gas supply, use an analyzer.
7. Appropriate time has to be allotted for the proper checking and maintenance of the anaesthetic machine in the surgical timetable. At hospitals with several or more than ten devices, the checklist cannot be performed prior to each surgery, and maintenance cannot be conducted on time owing to a lack of medical engineers and technicians. It is likely to lead to delays in maintenance and operation, thereby deteriorating the state of the operating devices.

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