Sustainability related subjects seem difficult to find in the biomedical arena.

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In the facilities areas, sustainability subjects seem to be everywhere. Waste management, energy conservation and water conservation to mention just a few. But the biomedical industry uses heaps of water, gobbles up electricity like there's no tomorrow, and possibly leads the world in the total acceptance of the "disposable everything" philosophy. Our biggest sustainability issue might perhaps relate to where the next big refuse disposal site will be.

One small contribution to sustainability biomeds could achieve involves keeping electro-medical equipment in service; something we should be easily able to achieve but there are factors that often inhibit our success rate.

Keeping electro-medical equipment in service doesn't mean extending the life of ancient or superseded equipment. When a supplier has a new model to sell, parts for the old one tend to get scarcer and more expensive until keeping the gear is no longer cost effective. But the newer, better, equipment isn't much use to the user, or the patient, if it is not in its place, ready to use. And much more than is necessary, equipment isn't available for use. It is in the workshop awaiting repairs.

Biomeds do all of the preventative maintenance the users allow, and even some they don't. But a significant portion of the equipment is in for some repair or demand maintenance. Analysis of the demand repairs shows a number of them turn out to be unnecessary work. There is call for unnecessary demand maintenance caused primarily by a lack of basic understanding on the part of the user.

For example:

In an Intensive Care Unit, two patients are under the care of one nurse. One of her patients is restless and his movements cause intermittent alarms on the bedside monitor. The nurse has become quite used to going in and hitting the 'silence alarms' button to keep it quiet.

For some reason the nurse takes a portable television and plugs it into a hot-point in the patient's room. As she turns it, on the fact that it fails to operate is missed as yet another alarm sounds on the patient's monitor. As she leaves the room after another reset of the alarm, the nurse is reminded by a colleague that TV's should be plugged into the 'cleaner only' sockets and moves the plug. The TV bursts into life.

About an hour later, after a few more alarms and resets, the nurse goes in to cancel yet another and as she watches, the screen display suddenly disappears. The immediate issue is solved quickly by swapping out the monitor from another room and the faulty monitor is set aside for repair services the following morning. About an hour later the second monitor fails under similar circumstances and, as it is very early in the morning, a biomedical engineer is called out to find the cause of the multiple problems.

The TV had earth leakage issues. It had tripped the Earth Leakage Breaker put in there to protect the patient from electric shock but was running happily on an unprotected circuit.

The two infusion pumps were still running on their back up batteries. All the hot-points in the room, that were part of the protected circuit, had 'power available' lights on them and every single one was not lit. The nurse involved had no knowledge that the 'power available' lights existed nor what they were for. The nurse also had no knowledge that modern monitors had battery back up and an on screen display to indicate the state of that battery.

Infusion pumps provide a similar problem. Many are sent to Biomedical Engineering for unnecessary repairs. The fault report is often similar to 'doesn't work' or 'alarms all the time'.

The error log will tell the technician that the battery went flat but not why. In case the reason for flat battery is battery failure the device needs an all day battery charge followed by a two hour battery discharge test. Assuming it passes, it will need another all day battery charge to ensure it doesn't come straight back with a fault report that says 'doesn't work' or 'alarms all the time'.

There is a huge difference between battery operated and battery backed equipment and a lot of people don't seem to know. Battery operated is like your cell phone. You charge it for a while then use it for a while and then repeat the process. It will tell you if the battery is getting flat and if you let it go completely flat you are able to plug it into a charger and it's ready to go again immediately.

Battery backed equipment runs on the mains but has a battery to help out if the mains goes off for any reason. Sometimes you need the mains on to start using it. Sometimes you don't. But the battery is only there to keep the device going after the mains power goes off. When it is on battery power the device will probably alarm every few minutes to remind the user that a potential failure is likely. The device will certainly warn the user when the battery is getting low. If the user allows the device to run the battery flat then the device will cease functioning and normally, using an additional redundant alarm battery, will make a really annoying noise to encourage the user to connect functioning mains to the device again.

Once in this state, the redundant alarm state, nothing will make the device function except the battery having sufficient charge to provide mains back up again. Plugging it into the mains at this point won't allow the device to restart. It is necessary to charge the battery for half an hour or so first.

Today's nurses have much to do and there are fewer of them to perform their tasks. There is an expectation that the biomeds know all this information and process and it's not the clinical staff's core business to manage the equipment. But everyone in health has patient care as the inner core of their core business. Having equipment available and functional will assist in patient care.

Running the infusion pumps on mains will mean the battery remains in a charged state. Heeding the alarm advising the battery is low will prevent the device moving to the shut-down state.

Most rechargeable batteries don't like being flattened completely and their total life is reduced significantly each time it happens. It is possible that more correctly maintained batteries would result in lowered need for disposal of failures.

Knowledge of the power systems in use and that there is a 'power available' light is necessary information for the user to be able to sustain the patient care service.

A long time ago such things were general knowledge or common sense. But it appears that common sense isn't really all that common any more. If the user hasn't had relevant experience, 'common sense' about it doesn't occur.

Non biomedical or electro-medical equipment may have related issues as in the following example.

An office space built with the only exterior wall on the coldest south east facing wall has all its natural lighting coming from the wall being mostly windows. The space was originally designed as an open plan office with all the hot water radiators under the windows to heat the incoming cold air and prevent draughts. A thermostat sensor sits on a short wall near the centre of the space to control the radiators.

Over the years and a few redesigns the space is now cubicled up. This has modified the air flows a little but generally the place is still warm enough in winter. Complaints of "it's really cold" start to come in. A check of the Building Management System (BMS) indicates the room is sufficiently warm and no action is required. But the office workers continue to complain of the cold. An engineer attends and discovers some areas are very cold while others are quite warm. A check of the radiators shows them to be completely cold. A check of historical data on the BMS confirms that the valve for admitting hot water hasn't been driven away from closed for some time. The BMS is satisfied that sufficient heat exists in the room without heat input from the system.

The engineer found a small fan heater under the desk that was closest to, and directed heat at, the room sensor. Several other similar heaters existed under each of about half of the desks. The office workers individually wanted warm feet and thought "one little heater won't make a difference". The company was paying for the gas to make the steam for the calorifier for radiators that weren't being used and paying again for the electricity to power several inefficient little electric heaters. Similar power wastage occurs in the summer months where office workers open windows and doors in air conditioned areas in an expectation of better cooling from a hotter, more humid, exterior.

Common sense appears to have actually decreased in recent years.

The solution is the passing on of relevant information. The writer used to be part of a staff education team. The subject was electrical safety but often included was information regarding other things that almost related, such as information regarding the 'power available' light and what to do if it isn't on, and remembering to plug battery backed devices into the mains as often as possible to prevent the battery going flat. It was an opportunity to remind people of 'common sense' things they had neglected to remember or maybe never even knew. This process used to work.

Several years ago, risk management assessments of education needs for staff indicated 'common sense' information was no longer required to be continuously advised. But we currently have more lead and mercury and cadmium from the batteries that needs to go somewhere. We could perhaps halve that by managing to keep the batteries in place for another couple of years. We could save energy by having people understand how their heating and cooling systems work. We could keep electro-medical equipment in service and keep a lot of clinical staff happier and serve a lot more patients.

Perhaps this is a rather simplistic view but sustainability is a lot about reducing waste or loss. Education in areas of 'common sense' is key.