2024 Gas supply (Vaporizer)

Permission to print:	Yes
Category	Gas Supply
Incident type	Good Catch No Harm Incident
Duration of incident:	minutes
Description:	Within the last few months our institution has swapped from isoflurane to sevoflurane and its respective Baxter vaporizer without issue in this time period. During this case, I turned my sevoflurane vaporizer on to 2.5% to lower the patient pressure. The value for BIS was below 40. After several minutes I noticed that my sweep value on the Spectrum M4 monitor had dropped from 2.5 to around 0.7. The change in M4 gas flow reading only emerged once I turned on the sevoflurane vaporizer to manage HTN, which occurred ~ 20-30 minutes into CPB. From CPB start to the start of this event, gas flow readings including M4 and all my ABG values were in normal range - I had even reduced my gas flow from an initial 3.0 to 2.5 L/min. The M4 values for SaO2 and SvO2 were unchanged and acceptable, with an acceptable visual colour in the arterial and venous lines. pO2 was unchanged at ~224 mmHg however I had been unable to get the sensor to read pCO2 since initiation of CPB even with recalibrations and factory resets. Capnography from the oxygenator outlet had increased, very slowly, by ~ 8 mmHg. The LivaNova electronic gas blender and HLM still recorded sweep at 2.5 with no alarms. I checked the gas line connections around the vaporizer but all were still attached. On this investigation I could not hear or smell anything out of the ordinary. Patient ABG showed a pCO2 of 48.7 mmHg but otherwise normal pO2 and pH. I had to increase sevoflurane. to 5% to manage the hypertension (despite having tried using reduced flows) at which point I had also called a colleague in to help identify the problem. Unfortunately, at the time the anaesthetic team was not in the room, and as the 2nd/supporting perfusionist around was closer and available at the time I opted to call them in. The second perfusionist noticed the smell of sevoflurane and when investigating the lines around the vaporizer could now hear a hissing sound near the unit. The vaporizer refill twist cap was found to be in the open position (turned horizontal), closing the cap (setting it vertically) resolved the issue. Unlike the isoflurane vaporizer, which had a more complex refill system with both a lever and a knob and would leak isoflurane if open, the sevoflurane vaporizer refill is a very simple single knob cap that twists to open and does not leak fluid as it is angled upward.
GOOD CATCH - what went well	Identified changes in monitored patient values rapidly and in line with the use of sevoflurane. Aware of when the cause of the issue was escaping my recognition/identification and called for support/help from another available team member
What could we do better	Recognising the importance of the M4 sweep gas change (2.5-0.7LPM) and a more robust system of checking the gas system - not just at connections of the lines and units but also where the vaporizer is refilled. An anaesthetist in attendance.
Preventive actions	I have drawn (in permanent marker) a pair of " C's " to indicate 'Closed' position on both the twist cap and the (stationary) vaporizer unit, that line up when the cap is correctly oriented in closed position. This allows for quick visual clarification that the cap is closed by recognising that they line up in vertical position. The perfusion leadership to ensure the team is all aware of this event.
Type of incident:	Management
Hospital incident filed:	No
Ext Authority Advised	No
Discussed with team:	Yes

Knowledge issue	Yes
Rule issue	Yes
Protocol issue	No
Skill issue	Yes
Team Issue	Yes
Patient outcome variance f	Nil
Commentary	Reports of loss of gas supply to the oxygenator due to vaporizer leak are not uncommon. However, this is the first report to PIRS2 due to the position of the filling cap on a sevoflurane vaporizer. The simple preventive measure of marking up the cap position illustrated in the attached photos provides an effective preventive measure that should be incorporated in the device design. There are other human factors at play in this account (rule based, skill based, knowledge based, team based) including distraction where the electronic blender readout obscured identification of loss of gas flow despite the Spectrum M4 sweep reading of 0.7, and management of this situation in the absence of the attending anaesthetist. PIRS Ed