pathology predisposing the dog to intra-operative complications, veterinarians should review the entire anesthetic and analgesic regimen and *all* monitoring parameter trends (heart rate and blood pressure plus respiratory rate, temperature, oxygen saturation, end-tidal CO₂) with veterinary staff and the investigator. Refinements should focus on balanced anesthesia and development of anesthesia record templates that allow the anesthetist to easily track trends and respond to them immediately. This response may include consulting a veterinarian if there are any

intra-operative concerns with the level of anesthesia or analgesia being provided by the protocol-approved regimen. Finally, the protocol should be modified to include a range of doses for anesthetics and analgesics that support the flexibility necessary to adhere to the veterinary standard for judging and adjusting the depth of anesthesia as needed.

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Published online: 22 July 2019

<https://doi.org/10.1038/s41684-019-0350-6>

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No harm in picking up the phone and making the call

The circumstances surrounding the unanticipated death of any research animal should always be reviewed critically. However, the IACUC Chair should not compare an investigator voluntarily halting a study (for any reason) to a suspended protocol, an action that can only be determined by a quorum of a fully constituted IACUC¹. On the other hand, Ionnelli should be commended for voluntarily halting the study and for promptly contacting and collaborating with the IACUC to identify the cause of the dog's unanticipated death. We assume this study is conducted at a PHS-assured institution and funded from an NIH grant, hence the concerns about contacting OLAW.

Multiple sections of the Animal Welfare Act Regulations² clearly outline the need for the veterinarians and/or IACUC to both provide and monitor adequate training and use of anesthesia (§ 2.31, 2.33 and 2.40); therefore the veterinarians could also provide the IACUC with additional information concerning all methods by which all personnel are expected to monitor the depth of anesthesia. The IACUC's investigation suggests the veterinary technician acting as anesthesiologist was using the machine in the prescribed manner and administering the isoflurane at what she thought was the appropriate dose. However, the details surrounding the length of time the animal was anesthetized were not provided and it's not perfectly clear if the anesthesiologist could have adjusted the dose fast enough to save the animal. Perhaps it was deduced by the simple

process of elimination (i.e., diagnosis of exclusion), but it's also not clear how or why the investigative team determined the vaporizer was most likely miscalibrated and providing excessive isoflurane. Collectively, the investigator and staff appear to have followed the approved protocol and all relevant IACUC policies and standard operating procedures (not stated but implied), and therefore the unanticipated death of this research animal appears to be caused predominantly by a malfunctioning piece of surgical equipment.

We agree with the IACUC Chair that OLAW should be contacted. There was no wrongful intent or obvious deviation from the approved protocol, but as outlined in NOT-OD-05-034, a reportable incident to OLAW includes harm or death to an animal due to an accident or a mechanical failure³. Additionally, OLAW's stance on reporting noncompliance due to equipment failure was recently reinforced in a Protocol Review column of Lab Animal—in that scenario, OLAW commented that it is the IACUC's responsibility to oversee the investigation into the cause(s) of unanticipated animal deaths and further commented that unanticipated deaths due to equipment failure must be reported to OLAW⁴. As outlined in the Animal Welfare Inspection Guide and described in detail in a relatively recent Tech Note, this anesthesia-related incident of noncompliance should also be reported to the USDA to promote transparency and two-way communication⁵.

This matter should be discussed with the Institutional Officer, re-evaluated at a

meeting of the IACUC, and then reported. OLAW and the USDA (as well as AAALAC, if this is an accredited institution) should be contacted promptly and informed that equipment failure—in this case, the miscalibrated vaporizer—caused the unanticipated death of a research animal. The matter was investigated thoroughly, everyone involved (Ionnelli, veterinarians, staff, and IACUC) acted judiciously and conscientiously, and therefore there is no harm in picking up the phone to ask OLAW and the regional USDA representative for guidance.

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Published online: 22 July 2019

<https://doi.org/10.1038/s41684-019-0351-5>

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