

1 **A new equine anaesthetic mortality study two decades after**

2 **CEPEF2: CEPEF4 is going live!**

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4 Goñalo-Marcilla M¹, Redondo JI², Johnston M³, Taylor P⁴, Bettschart-Wolfensberger R⁵

5 ¹The Royal (Dick) School of Veterinary Studies and The Roslin Institute, The University of
6 Edinburgh, UK

7 ²Universidad Cardenal Herrera – CEU, CEU Universities, Valencia, Spain

8 ³ Vetstream, Cambridge, UK

9 ⁴Topcat Metrology, UK

10 ⁵University of Zurich, Switzerland

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14 Anaesthesia of horses carries a higher risk of mortality compared with other domestic species.
15 For instance, the overall mortality which includes healthy and sick patients was reported to be
16 10 times higher in horses [1] than in dogs [2], 1.9 *versus* 0.17 % respectively.

17 A number of studies have been published in an attempt to determine the mortality rate
18 associated with general anaesthesia in horses, however most of them have the disadvantage of
19 being single-centre and retrospective [3]. The Confidential Enquiry into Perioperative Equine
20 Fatalities 2 (CEPEF2) study by Johnston et al. (2002) is still the largest observational study of
21 equine anaesthetic mortality [1], with 41,824 cases collected from 62 clinics all over the world
22 in a period of 6 years. The overall death rate of 1.9% was reduced to 0.9% in healthy patients
23 and increasing to 11.7% in colics. These percentages included a seven days follow-up from the
24 induction of general anaesthesia. That study provided information on the protocols being used
25 at that time, and also indicated factors that increased (or decreased) the risk of anaesthesia in

26 horses. A clear example was age of the patient; the risk of death was high in the very young,
27 lowest for young adults, gradually increasing with age. Fracture surgery, for instance, was the
28 type of operation associated with a higher risk of death, presumably because these procedures
29 were often long and were performed after trauma and hard exercise. Also, it included the causes
30 of death in that seven day of follow up. Approximately one third of them were due to cardiac
31 arrest or cardiovascular collapse, another third due to fractures or myopathies and the final
32 third due to as abdominal, respiratory or central nervous system complications, post-operative
33 haemorrhage, horses found dead or even “other” reasons.

34 In 2004, the same group of researchers followed CEPEF2 with a randomised controlled
35 trial (CEPEF3) investigating the difference between isoflurane and halothane as the
36 inhalational agent. [4]. That study did not demonstrate that isoflurane was safer than halothane,
37 although isoflurane appeared to be safer in young horses and when cardiac compromise was
38 present.

39 In comparison with today, it is clear that much has changed. Isoflurane and sevoflurane
40 are now the most commonly used inhalation agents, and halothane is neither manufactured nor
41 used in most of the countries contributing to CEPEF2&3. Many other advancements have been
42 made, with new drugs and protocols, more sophisticated monitoring systems, anaesthetic
43 machines, ventilators and ancillary equipment such as infusion pumps, all considered likely to
44 improve safety. All these improvements have been supported by residency training
45 programmes supervised by the American College of Veterinary Anesthesia and Analgesia
46 (ACVAA) and the European College of Veterinary Anaesthesia and Analgesia (ECVAA).

47 However, it seems that “*we are still a long way from greatly reducing the mortality*
48 *associated with equine anaesthesia*” and “*we still lose horses after anaesthesia to a range of*
49 *catastrophes that would not occur if the horse were not anaesthetized*” [5]. Hence, the tendency
50 in recent years towards avoiding general anaesthesia when possible, using more refined

51 techniques for long term sedation and analgesia and ultrasound-guided locoregional techniques
52 [6].

53 At this stage, it is only possible to answer the question “*Equine anaesthesia-associated*
54 *mortality: where are we now?*” [5] by updating CEPEF2 as suggested in 2013 by Gent &
55 Bettschart-Wolfensberger [7]. Therefore, the aim of our proposed study CEPEF4 is to collect
56 a new, up to date dataset as large as CEPEF2 to record current trends in equine anaesthesia and
57 analgesia. Hopefully, this will detect any associations with successful or unsuccessful
58 outcomes. If any of the new developments prove beneficial this will point the way to further
59 improvements in equine anaesthesia.

60 More information about the team can be found at [www.](http://www.https://cepef4.wordpress.com/cepef-4-team/)
61 <https://cepef4.wordpress.com/cepef-4-team/>. We have created a digital, user-friendly
62 questionnaire for use on phone, tablet or laptop designed for collecting anaesthetic and horse
63 related data to describe the current worldwide equine anaesthetic practice and to detect factors
64 associated with higher or lower mortality.

65 We aim November 2020 for the CEPEF4 “*kick-off*”. If you are involved in equine
66 anaesthesia and are interested in contributing to this study, please contact us via
67 <https://cepef4.wordpress.com>. We hope that this letter will be “*the end of the beginning*” and
68 that CEPEF4 will document the current equine anaesthetic related mortality rate and throw
69 more light on how it may be improved. We also hope it will become a shared resource to
70 stimulate and enable further research for all those involved in equine anaesthesia.

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