



# Medical Math Manifesto

I have had the unique experience of being the proverbial fly on the wall during major surgery on a (very) loved human twice in the past 4 years. Most recently, I listened intently to the surgical team engage in a practice that immediately made me smile—the surgeon herself leading the pre-operation checklist.

Atul Gawande put it best in his popular *The Checklist Manifesto: How to Get Things Right*: “Sometime over the last several decades ... science has filled in enough knowledge to make ineptitude as much our struggle as ignorance.”<sup>1</sup>

Thanks in part to Gawande, over the past 5 years, checklists have become widely accepted tools that save lives and reduce unintended medical team ineptitude during times of extraordinary complexity. I would argue that checklists represent one of many systems that can take the form of any carefully prepared template with the goal of consistent accuracy and thoroughness at the point of care (eg, operating room checklists, premade instrument supply packs, discharge instruction macros).

One other template deserves special attention: the medical calculator.

Medical calculations, in my experience, happen to be a particularly fallible part of modern medical care. Even in the hands of the brightest minds, medical errors frequently stem from the simple task of medical math.<sup>2,3</sup> Calculations are often done in haste and rarely double-checked—troubling indeed when a patient's care often hinges entirely on them.

Enter a host of technology-enhanced veterinary calculator tools.

### Web & Mobile Calculator Assistants

The Veterinary Information Network (VIN) hosts one of the richest libraries of veterinary calculators. Check out its new and enhanced “My Calculations” page, which includes calculations on everything from drug dilutions to echocardiogram normals to phlebotomy safety. Don't miss the chocolate toxicity calculator, complete with entertaining animations.

Another bookmark-worthy destination is the Veterinary Anesthesia and Analgesia Support Group, which maintains an exhaustive anesthesia and analgesia calculator bank in the form of spreadsheets, including calculators for complex

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continuous rate infusions (CRIs). (See **Medical Math Assistance**.)

Also, visit the App Store for useful mobile medical calculators. The University of California, Davis' Vet-PDA Calcs app is a little-known but very useful calculation tool. Some other favorites include Vet Calculator Plus, the Abbott Animal Health IV Fluids app, and Epocrates. (See also *VMDtechnology's* App Review Guide.)

### Emergency Drug Calculations

Emergencies are error-prone situations because practitioners are fighting the twin challenges of time and fragile patient health, so the benefits of prepared emergency drug calculators should be obvious.<sup>3</sup> Most are based on patient weight and can be printed on admission and kept with the patient.

Colorado State University maintains a popular emergency drug calculator. VetCalculators also offers a handy emergency drug calculator for rapid calculations for critically ill animals and includes chocolate toxicity and anesthetics calculators among its handy tools. The site is built to be responsive (ie, functional on a mobile device and a computer).

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## Medical Math Assistance

- Colorado State University: [csu-cvmb.colostate.edu/vth/veterinarians/Pages/emergency-drug-calculator.aspx](http://csu-cvmb.colostate.edu/vth/veterinarians/Pages/emergency-drug-calculator.aspx)
  - University of Georgia: [vet.uga.edu/hospital/rdvm\\_resources](http://vet.uga.edu/hospital/rdvm_resources)
  - VetCalculators: [vetcalculators.com](http://vetcalculators.com)
  - Veterinary Anesthesia and Analgesia Support Group: [vasg.org](http://vasg.org)
  - *VMDtechnology* App Review Guide: [vmdtechnology.com/category/veterinaryapps/](http://vmdtechnology.com/category/veterinaryapps/)
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For veterinarians treating exotic patients, the University of Georgia Veterinary Teaching Hospital maintains an emergency drug calculator gem in its RDVM Resources website.


### Excel at Medical Math

Learn to use Microsoft Excel (or better, Google Sheets) and build calculators (or save and customize the ones above) for everything from CRI dosing to anesthesia emergency doses tailor-made for your practice.

I maintain a dose book in Google Sheets that contains rows for useful calculations for everything from free water deficits to resting energy requirements to the most complex of CRI calculations. Work out the calculations, triple-check them during downtime, and then use them confidently to enhance efficiency and care during the heat of any case.

The exercise of calculator building is especially helpful for new graduates because they are forced to double-check the

calculations. They will see illuminating patterns and learn memory-setting dosing lessons that could prove handy.

Spend time testing (and double-checking) some of the tools above with team members and agree on protocols to leverage these in practice. Simple medical math calculators designed for this specific purpose can set a team up for success and reduce errors in patient care caused by a common culprit. 

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### References

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