

VIRTUAL ANESTHESIA MACHINE

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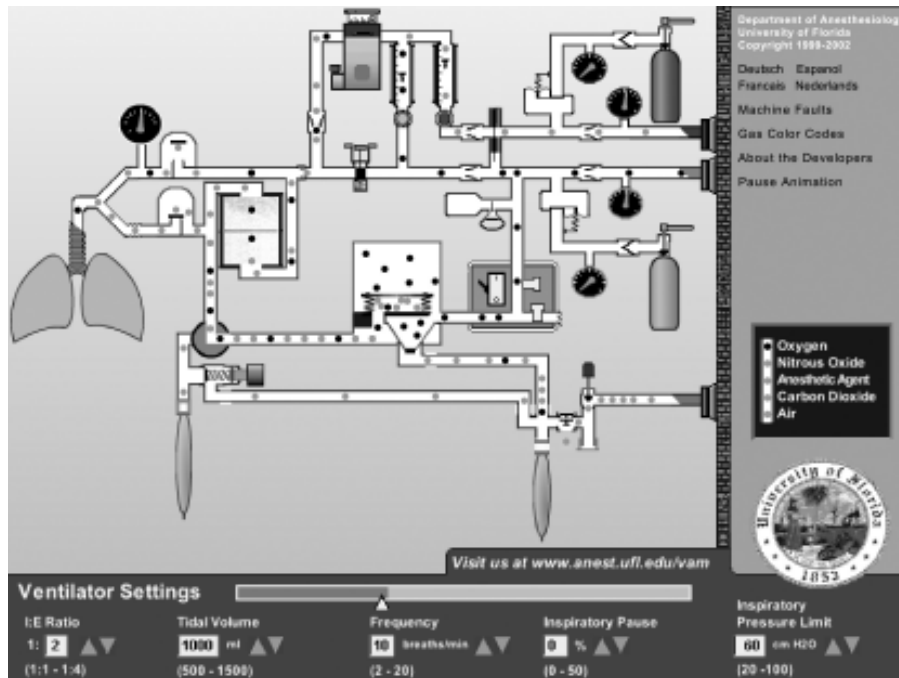
The Virtual Anesthesia Machine (VAM) is a free, interactive, real-time computer animation of a two-dimensional representation of a generic anesthesia machine that can be viewed on a Windows or Macintosh personal computer.

The VAM simulates the gas flows, pressures and volumes in a “generic” anesthesia machine. Gas molecules (O_2 , N_2O , air, CO_2) are not only made visible but are also color-coded to assist comprehension. The user can interact in real-time with the animation and set more than 15 anesthesia machine controls like the APL valve (adjustable pressure limiting), ventilation selector

knob, O_2 and N_2O flow control valves, scavenging vacuum adjustment valve, tidal volume, respiratory rate, I:E ratio and inspiratory pause settings by clicking upon the corresponding icon with a mouse. Subsequently, the user can observe in real time the consequences of his or her action on lung, bellows, manual bag and scavenging bag volumes as well as inspired gas composition. The operation and function of safety features like the “ O_2 failsafe” (cuts off the N_2O supply if O_2 supply pressure fails) and the “hypoxic guard” (prevents dialing an FiO_2 less than 0.25 with the flow meter control knobs) are clearly illustrated. The

patient can be manually ventilated by “squeezing” the manual bag with a mouse click. The absorption of CO_2 in the soda lime canister and the influence of fresh gas flow, O_2 flush and minute ventilation on the wash-in and washout of gases and vapors from different parts of the system, are also demonstrated. Gas and agent molecules are phased in and out in a realistic manner. The interactions between the pipeline and cylinder gas supplies are also depicted as well as the effect of a bellows tear.

In addition to the animation, tutorials about the anesthesia machine and the US Food and Drug Administration (FDA) 1993 recommendations for an anesthesia machine pre-use check are included. There are also instructions about how to use the VAM animation on the VAM web site, although it has a pretty intuitive user interface. The user simply clicks on any icon for the anesthesia machine control or component that he or she



wishes to set. When the cursor is placed on an icon, the actual photograph of the component represented by the icon appears in a photo box to assist the user in identifying the icon and its function.

The VAM computer simulation is provided as a free service of the University of Florida Department of Anesthesiology to the global anesthesia community. VAM was awarded the American Society of Anesthesiologists (ASA) prize for the “Best Scientific and Educational Exhibit” and the Ellison C. Pierce award bestowed by the Anesthesia Patient Safety Foundation to the “Best Scientific Exhibit for Patient Safety” at the recent annual meeting of the ASA in New Orleans.

VAM can be downloaded via the Internet at <http://www.anest.ufl.edu/vam> and used without charge worldwide 24 hours a day, 7 days per week. VAM will require the free Macromedia Shockwave plug-in. If the latest version of the Shockwave plug-in is not already installed on your PC, you will

be automatically prompted to download it. An Internet connection is no longer required after the program has been downloaded which may take 5 - 10 minutes on a dial-up modem from a home PC. For users who may wish to teach with VAM at locations where there is no Internet access, a solution is to download the program to a notebook or portable PC. Once the animation is downloaded and running, disconnect the Internet connection and transport the notebook to the desired teaching location while leaving the PC powered on and the browser running.

VAM is best viewed using the Microsoft Explorer or Netscape web browsers on a PC with a clock speed of at least 300 MHz and a 1024 x 768 monitor. If you have any questions, problems, comments or suggestions, please contact me at sem@anest4.anest.ufl.edu. If you find the VAM web site useful, we encourage you to set a link to it from your institutional or personal web sites. Thank you.