Recent investigations into the optimal treatment of ARDS have resulted in the slow adoption of low tidal volume and minimal inspiratory airway pressures to obtain significantly better survival from thoracic trauma and ARDS. Controlled clinical trials, some retrospective and some (notably the ARMA trial from the US National Institute of Heart Lung and Blood) prospective and randomized, have clearly demonstrated a superior survival rate from this approach, with recommended tidal volumes of 4-6 ml/kg of *ideal* body weight rather than the more traditional 10-12 ml/kg of tidal volumes. This approach may cause hypercapnia and mild acidosis, yet the results are positive and the nypercapnia and acidosis do not affect overall survival. Many patients are managed with hyperventilation and sodium bicarbonate infusions to offset the effects of low tidal volume, although these extra measures have not been shown to alter survival as compared to untreated patients.

PEEP is integral to the approach of low tidal volume ventilation, as the recruitment of alveoli is accentuated by the application of PEEP in these patients. PEEP also prevents the patient from having intermittent alveolar collapse during the ventilatory cycle by not allowing the pulmonary pressure-volume curve to pass through the inspiratory point of inflection, thought to be the point at which alveoli spontaneously close completely. Preventing the opening and closing of alveoli has been shown to decrease lung injury during ARDS and diminish the release of inflammatory mediator from the lung during ARDS.

Bilateral lung contusions

Management of bilateral lung contusions involves manipulation of ventilation with a single-lumen, standard endotracheal tube. Both lungs are subjected to the same airway pressures and PEEP with tidal volume distributed proportionally between nthe right and left lung. In many situations, however, the trauma may be unequal to the lungs, and thus independent lung ventilation must be achieved by the isolation of lungs with differential ventilation techniques. In general, this manipulation involves placement of a double lumen endobronchial tube in order to ventilate each lung independently.

Unilateral lung contusions

Trauma to one lung requires different ventilation strategies in order to achieve recovery. In some instances, it may be possible to manage the patient conservatively, without the need for positive pressure ventilation. Frequently, the trauma is of a severe nature so as to require controlled ventilation, frequently due as well to other extrathoracic injuries.

Unilateral lung contusions require separate ventilation strategies to avoid barotraumas and other injuries to the unaffected lung while maximizing therapy to the injured lung. Placement of a double lumen endobronchial tube is essential for achieving this differential ventilation. Management strategies may include differential positive end-expiratory pressure to each lung, or separate ventilators providing support to each lung separately, using different ventilator settings and PEEP settings to maximize recovery.

PHYSICIANS AND THE INTERNET

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What is the Internet?

The Internet was first designed by the United States Department of Defense as a method of ensuring data reliability and storage. It was originally called "ARPA Net" after the US Department of Defense's **A**dvanced **R**esearch **P**rojects **A**gency as a method of safeguarding loss of critical data from the destruction of a single computer during the Cold War. The original purpose was to enable automatic, reliable data "packet" sharing between multiple computers simultaneously. From this rather sinister beginning in August 1962, the Internet evolved.

Today the Internet is ubiquitous, and applications are everywhere. It is present in every lecture hall (there are undoubtedly multiple devices connected as I am speaking to you) and is portable and convenient, as a mobile "wireless" cellular telephone can now access more information than entire libraries. This explosion of information-sharing technology has brought with it new avenues to reach and utilize heretofore untapped resources for the purpose of medical advancement. But how are we, as medical professionals, to use this?

Beware of Greeks Bearing Gifts…

The Internet's ease of use has spawned a darker side of information sharing: The art of disinformation. We read constantly of individuals who take advantage of the Internet for illegal commerce, identity theft, stalking and assault of unsuspecting victims, and piracy. The unfortunate side of the anonymity of the Internet is the temptation to trust the untrustworthy. Information and facts can be invented and presented in such a manner to sway public opinion or ruin individual lives.

Medicine On Line

Given the advantages and risks of the Internet, how should physicians interact with this vast repository of knowledge and disinformation? Firstly, physicians should not trust without checking. The hallmark of modern medicine is the academic acquisition

of knowledge that is proven and repeatable. Like the laws of physics, "the laws" of physiology, pharmacology and anatomy are immutable and lasting. While many seek to "chip away" at these facts with unproven, spectacular claims, these charlatans are generally forced back into obscurity (or spectacularly discredited) when the scientific community evaluates their reckless claims (for instance, cold fusion, holistic dietary cleansing for artherosclerosis, and the "I saw Elvis" crowd).

Clinicians must rely on proven areas of the Internet to best gather information to serve their patients. As a first choice, the use of public libraries, or in this case, national medical library databases, serves as a first step toward the gathering of pertinent information. Index Medicus, a venerable publication listing medically related articles, has been almost completely replaced by such search engines as PubMed and Ovid to find articles on a particular subject or field. These powerful Internet tools are able to gather articles either by entering keywords, by entering author or publication information, or by linking from other articles via reference lists. This medical information can then be either saved (in various file formats) or printed for further use by the physician. This searching takes place in seconds rather than in hours and allows the clinician instant access to an almost infinite amount of medical literature in a variety of languages.

The Internet also serves as a valuable resource for practice guidelines and standards. The American Society of Anesthesiologists has been at the forefront in disseminating practice updates and guidelines via its Internet website, www.asahq.org. Many members have contributed to a wide variety of documents and statements concerning everything from pulmonary artery catheter insertion guidelines to billing information for clinicians in the United States. Similar sites with differing information are available from other societies in many different languages. The American Society of Anesthesiologists site is held in high regard due to its peer reviewed and membership approved statements.

Other trustworthy sites are associated with publications in anesthesiology and critical care medicine. Such publications as the British Journal of Anaesthesia (www.bja.oxfordjournals.org) and European Journal of Anaesthesiology (http://journals.lww.com/ejanaesthesiology) mainatain websites on the Internet which allow some viewing of publications to non-subscribers and access to a large archive of publications to subscription holders.

In a larger venue, such publications as the New England Journal of Medicine (www.nejm.org), The Journal of the American Medical Association (www.jama.ama-assn.org), the Lancet (www.thelancet.com), Circulation (www.circ.ahajournals.org), Chest (www.chestjournal.org), among others, also have websites that allow access to current and back issues of the publications.

How Do I Remember . . .?

One of the great advances in the Internet is the use of search engines and so-called "meta-search" engines. In the early development of the Internet, one must keep notes to find specific sites where "the good stuff" was located. These sites typically had narratives (no multimedia feeds) and small programs (download at your own risk) to enhance your knowledge (or leisure time). As time progressed, these sites multiplied to the point where it was impossible to find information merely by word of mouth (so to speak). Thus were born the Internet search engines.

The most famous search engine is Yahoo. This search engine was started in January, 1994 by Jerry Yang and David Filo, who were Electrical Engineering graduate students at Stanford University. In April 1994, "Jerry and David's Guide to the World Wide Web" was renamed "Yahoo!" for which the official expansion is "Yet Another Hierarchical Officious Oracle". Other search engines are Google, and Alta Vista, among others.

It is important to note that many of these search engines have become commercialized in order to maintain their Internet presence and to keep current listings (a problem initially with many Internet sites that persists to this day). Thus, some sites are given preference in a search engine over others owing to contributions made to the search engine to obtain a preferential position in a results display. Another important feature is that a given search engine may produce different results with the same terms, not only in terms of order but also in terms of content.

Meta-search engines are designed to combat these prejudicial searches by producing results from "crawling" through multiple search engines to produce search results combining multiple search engines. The below article summarizes these meta-search engines:

Metacrawlers and Metasearch Engines By Chris Sherman, Search Engine Watch, Mar 23, 2005 *(abridged from original)*

Unlike search engines, metacrawlers don't crawl the web themselves to build listings. Instead, they allow searches to be sent to several search engines all at once.

Dogpile [http://www.dogpile.com]

Popular metasearch site owned by InfoSpace that sends a search to a customizable list of search engines, directories and specialty search sites, then displays results from each search engine individually.

Vivisimo [http://vivisimo.com/]

Enter a search term, and Vivismo will not only pull back matching responses from major search engines but also automatically organize the pages into categories. Slick and easy to use.

Kartoo (http://www.kartoo.com)

If you like the idea of seeing your web results visually, this meta search site shows the results with sites being interconnected by keywords.

Mamma (http://www.mamma.com)

Founded in 1996, Mamma.com is one of the oldest meta search engines on the web. Mamma searches against a variety of major crawlers, directories and specialty search sites. The service also provides a paid listings option for advertisers, Mamma Classifieds. Mamma was an honorable mention for Best Meta Search Engine in the 2003 Search Engine Watch awards.

SurfWax [http://www.surfwax.com]

Searches against major engines or provides those who open free accounts the ability to chose from a list of hundreds. Using the "SiteSnaps" feature, you can preview any page in the results and see where your terms appear in the document. Allows results or documents to be saved for future use.

With the maturation of the World Wide Web, these search engines have become powerful tools and are the primary method by which many Internet sites (including some of those in this summary!) are located, obviating the need for a note pad next to one's computer to write down sites of particular interest or importance. It is important to note, however, that the commercialization of these search engines should interject a note of caution to the medical professional that the search results obtained may be ordered according to preferences by a commercial entity. This may be helpful in the case of buying a part for an automobile but a liability in locating objective medical information.

Great Lecture . . . What Do I Need To Know?

The Internet was originally developed by the United States Department of Defense as a military tool by academics interested in protecting information from destruction. Its development can be traced from the military through academic institutions to the commercial sector, along the way multiplying exponentially. What was "quirky" in 1989 is mainstream and viewed as essential in 2009. Multiple uses of the Internet, for commerce, for information or for disinformation, have been found and successfully applied.

Caveats to using the Internet

"Emails never die." This is a statement made by a colleague that I have tried (somewhat successfully) to keep in mind while fuming over the latest communication from a colleague. Electronic mail is an excellent way to communicate (and disseminate) information; however, it is admissible in American courts of law and can be resurrected (to one's advantage or disadvantage) at anytime in the future.

"Wherever you go, you leave breadcrumbs." There are methods to detect where you have been on the Internet (Buying Ferraris on company time?) and therefore how you live your life. While this may be helpful in designing a world of commerce to your liking, remember that your employers may be less than pleased with your time management. Likewise your personal home computer can be a source of tracking based on the record of your movements through various Internet sites.

"There is safety in numbers." Before one becomes paranoid of using a computer for searching, recall that the Internet is so ubiquitous, the online community so vast, that it is unlikely to notice a single user wandering through its various domains. For instance, the online game "World of Warcraft" (www.worldofwarcraft.com - I shudder to introduce you to this website!) advertises that 11.5 MILLION subscribers are active worldwide (with sales starting in China this year!). It is extremely unlikely that "they" will find you wending your way through the Internet with such vast online user communities active (not impossible, though!). So do not be paranoid, just be prudent.

Where to go?

One can start anywhere on the Internet. From a **P**ersonal **D**igital **A**ssistant (PDA) to a computer, one can tailor the Internet experience to look up a drug interaction (www.fda.gov for the US Food and Drug Administration or www.pdr.net for the Physicians' Drug Reference of the US), find the latest article referenced in a lecture or in the news (www.bbc.co.uk for the BBC or www.cnn.com for the Cable News Network), or check the latest sports results (www.sprtsillustrated.cnn.com for instance). Why do this? In the US, and soon I suspect throughout the globe, patients will have the access to medical information from the Internet at news and other layperson web sites and be asking about specific drugs and the drug's suitability for treating their particular problem.

It is our job as medical professionals to decide what information is scientifically and medically sound in order to advise patients regarding appropriate treatments (or information) regarding their health. In this regard, the Internet has made physicians' lives more interesting (and busier) as we struggle to keep up with the myriad of information and disinformation that is broadcast daily throughout the World Wide Web.

CAN THE PULMONARY ARTERY CATHETER BE REPLACED BY LESS INVASIVE CARDIAC OUTPUT MONITORS?

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Monitoring of cardiac output (CO) is used in the context of anesthesia and intensive care to: (i) detect, before clinical signs become obvious, that cardiovascular performance is altered ; (ii) find the causes of alteration ; (iii) change therapy ; (iv) improve outcome and resource utilization.