Delfini Pearls
Critical Appraisal Matters: Quick Facts

References available at http://www.delfini.org/delfiniFactsCriticalAppraisal.htm.

1. As of December 10, 2012 at least 37 deaths have been linked to fungal meningitis thought to be caused by contaminated epidural steroids, and 590 cases in 19 states have been identified with a clinical picture consistent with fungal infection. This may be yet one more example of healthcare professionals basing decisions on poor quality evidence and intervening with unproven—yet potentially risky treatments. **Issues: epidural steroids have been used for more than 50 years to treat low back pain and sciatica and are the most common intervention in pain clinics throughout the world. And yet, despite their widespread use, their efficacy remains unproven.**

2. Lack of critical appraisal skills by physicians and a **misreading of one paragraph** in an abstract about a Vioxx study may have contributed to an estimated 60,000 deaths and 140,000 heart attacks in the US between 1999 and 2003. To put this in perspective, roughly 58,000 US lives were lost in the Vietnam War. **Issues: absolute versus relative risk reduction; insufficient critical appraisal skills to detect potential spin**

3. Lack of critical appraisal skills by physicians resulted in roughly 63,000 preventable deaths were due to encainide/flecainide for premature ventricular contractions (PVCs) after acute myocardial infarction. **Issues: intermediate markers; observational design**

4. Roughly 42,000 women with advanced breast cancer were subjected to treatment with autologous bone marrow transplant and high dose chemotherapy. It is estimated that over 9,000 died from treatment. Yet, RCTs showed no benefit. Costs have been estimated at $3.4 billion. **Issues: observational design**

5. Leading experts estimate that 20 to 50 percent of all health care in the United States is inappropriate.

6. Training in medical schools and other schools for allied health professionals in the United States is shockingly poor when it comes to training in science. This affects the quality of medical research and the quality of medical care. **Roughly 70 percent of physicians and clinical pharmacists fail our basic pre-test**.

7. We have long estimated that **less than 10 percent of all medical research—regardless of source—is reliable or clinical useful**. Others agree. Professor John Ioannidis "...charges that as much as 90 percent of the published medical information that doctors rely on is flawed." In one survey of 60,352 studies, a meager 7% passed criteria of high quality methods and clinical relevancy, and fewer than 5% passed a validity screening for an evidence-based journal.

8. FDA approval is not sufficient for establishing scientific validity and usefulness. We know of no fully "trustable" healthcare information sources, and sources that claim to be "evidence-based" frequently are not. Some of the best and "most trusted" sources have frequently failed our critical appraisal audits. Most secondary sources are based on invalid studies or studies that do not have clinically meaningful outcomes. This includes reviews, meta-analyses, performance measures, compendia, clinical recommendations, health care economic studies, disease management protocols and more. Clinical guidelines vary in quality and the majority may be invalid, including many from professional societies.

9. **Bias in studies tends to favor the intervention under investigation**. Certain kinds of bias have been shown to distort research results up to a relative 50 percent or more—for each flaw.

10. Most physicians rely on abstracts which are frequently inaccurate. **One study found that 18-68 percent of abstracts in 6 top-tier medical journals contained information not verifiable in the body of the article**. One study concluded that there may be considerable bias in p-values reported in abstracts. Physicians and others who understand critical appraisal know it cannot be determined whether a study is valid by reading the abstract.

11. Physicians and others who do not understand issues with **findings that are not statistically significant frequently mistakenly interpret these findings as meaning there is no meaningful difference between the groups**. Those with critical appraisal skills understand how to use confidence intervals to avoid these erroneous interpretations.

12. Key skills required to critically appraise the medical literature are not difficult to learn. We believe all healthcare professionals should be competent in evaluating primary and secondary studies and secondary sources.