The Link between Epidemiology and Theriogenology

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Evidence-based Veterinary Medicine: Best discipline intersection for clinical practice?

My Purpose (as a mild heretic):
Stimulate your reflection on:
• What is EBM?
• The 30,000 ft perspective
• Why EBM?
• Why did EBM develop in human medicine?
• How is EBM evolving?
• Getting to EBVM from EBM and here:
  • The differences between human and veterinary medicine?
  • Obstacles?
  • What can we do about those obstacles?
  • Any dangers in this process?
  • Who will (or can) do what?

What is “Evidence-based Medicine”?
EBM is “an approach to practice in which the clinician is aware of the evidence in support of their clinical practice and of the strength of that evidence” (1992, McMaster U, Hamilton, Ontario)

Practicing EBM is simply practicing knowing the answers to two questions:
1. What is the evidence for that?
   • “that” being the use of a diagnostic test, establishing a prognosis, administering a therapy, or recommending a preventive measure
2. How good (strong) is this evidence?
   • How likely are the conclusions based on the evidence correct?
This implies awareness of the kinds of evidence and possession of the skills to critically assess evidence

The proceedings paper provides entry points for further pursuit of these questions

Some quick definitions:
Belief:
• State of mind after accepting an external concept or idea, which then becomes part of further thought processes, often unrecognized, on related issues
• Internalized deeply, belief becomes intuition
  ▪ The state of the expert (drives students nuts)
  ▪ Occurs after deliberate, systematic, critical thinking or occurs with immediate, non-reasoned, uncritical acceptance
  ▪ Your choice
• Once accepted in error, accepting a more correct belief is considerably more difficult than if no previous belief were held

The fundamental reason for "blinding"!

Most discussions are about how to do this
My purpose is to provide the background on why
Anecdotal Evidence

- The occurrence of a single or a series of desired events, such as medical recoveries – *Case reports*
- The occurrence is often interpreted as being due to a particular therapy and thus validating the theory that selection of the therapy was based upon
- The probability of apparently unusual events is considerably higher than expected by intuition
- Other unrecognized factors (confounders) may have invalidated the initial prediction of demise, thus making the event not that unusual
- Because anecdotes are extremely weak evidence, an accumulation of similar anecdotes does not significantly increase support of a theory – *Case series*

**The plural of anecdote is not evidence**

Analogical Evidence

- Reasoning from comparing known similarities between two systems that a relationship shown to exist in one system but unknown in the other also exists in the other
  - If drug $X$ has been shown to be effective against disease $Y$ in a species $Z$ under particular conditions, reasoning that the same relationship exists between similar drug or similar disease or similar species under different conditions
  - Susceptible to unavoidable error because of the likelihood that different but unknown factors are operating in the two systems
  - Very common in medicine
    - A necessary basis for action when empirical evidence is lacking
    - Detailed mechanisms of action for particular processes are often established in selected species (rodents) and then extrapolated to other species or situations in which direct investigation is impractical

**Empirical Evidence (Facts)**

- Knowledge obtained by looking rather than reasoning or feeling
  - Empirical: based or acting on observation or experiment, not on theory; based on, concerned with, or verifiable by observation rather than theory or pure logic (OED)
  - Comprised of the objective findings (not the interpretation!) derived from formal observational or experimental procedures that are repeatable (verifiable) and that meet currently accepted standards of design, execution, and analysis
  - Strengthened by rigorous methods in an experiment designed to have a clear, unequivocal supporting or refuting outcome
  - Weakened by the degree of opportunity for other explanations that could account for the findings
    - Your judgment as to the degree of opportunity

**Considering Empirical Evidence**

- As the opportunity for verification (repeatability) and for assessment of strength is key, the methods used to acquire the evidence must be described or referenced sufficiently to enable this verification and assessment (transparency)
  - John's Rule:
    - If the authors did not include all the important study design elements, they likely did not do it properly because if they understood their importance, they also would have understood the importance of including the description
  - Remember: The empirical evidence can be correct (e.g., the sun "rises" predictably) but the underlying theory that it is believed to support is wrong (e.g., the sun moves around the earth)

**Dogma as Information**

- Those beliefs held as established or put forth as an authoritative or expert opinion without supporting empirical evidence
  - May be derived from unevaluated biological hypotheses and uncritical observation or experience without recognition of the effects of chance, natural biological variation, and observer bias
  - Repetition across sources or the number of people, whatever their qualifications, that hold this belief does not change the status of such information (textbooks?)
  - Some dogma is right, some dogma is wrong; the problem is which is what?

**EBM Story Timeline & Dignitaries**

- Early 1900’s - Ernest Codman’s (1869 – 1940) "The End Result Idea" led to empirical outcome evaluation

**The importance of the "materials and methods" fine print**

**Tree Shakers are Important**
Ernest Amory Codman, 1869-1940: A Pioneer of Evidence-Based Medicine: The End Result Idea

- "The End Result Idea": The common sense notion that every hospital should follow every patient it treats, long enough to determine whether or not the treatment has been successful, and then to inquire "if not, why not?" with a view of preventing similar failures in the future.
- End Result System of Hospital Organization: Tracking and publishing the results of hospitals and of individual surgeons
- Fired as instructor of surgery at Harvard
- Led to establishment of the American College of Surgeons
- Acerbic, bitter, flamboyant, eccentric, combative, outspoken
- Codman's Sign, Classification, Tumor, Exercises, Triangle
- http://www.whonamedit.com/

Use of randomisation in the Medical Research Council's clinical trial of streptomycin in pulmonary tuberculosis in the 1940s

- Demand for Streptomycin, isolated in 1943, was far in excess of supply
- Study problem was the occurrence of spontaneous cures of the respiratory form
- Previous poorly controlled studies had led to the adoption of inefficacious, even harmful, treatments
- Blind randomisation relieved the MRC's clinicians of responsibility for deciding who would be treated
- Trial design was an integration of prior developments rather than novel
- AB Hill "quite simply the world's leading medical statistician"
- Physician smoking study with Doll
- http://www.edwardtufte.com/tufte/hill

EBM Story Timeline & Dignitaries

- Early 1900's - Ernest Codman's (1869 – 1940) "The End Result Idea" led to empirical outcome evaluation
- Late 1940's – Professor Austin Bradford Hill's (1897 – 1991) use of blinded randomization in a controlled trial of streptomycin for human tuberculosis established the RBCT as the evidence "gold standard"

Tables from the original paper


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<th>TABLE 1: CRITERIA FOR ASSESSMENT OF BACTERIOLOGICAL IMPROVEMENT</th>
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<th>CONTROL GROUP</th>
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<td>4</td>
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<tr>
<td>Moderate improvement</td>
<td>36</td>
<td>15</td>
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<tr>
<td>No change</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Moderate or slight deterioration</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Cured and deterioration</td>
<td>4</td>
<td>12</td>
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<tr>
<td>Total</td>
<td>60</td>
<td>32</td>
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</table>

Even giants stand on giant's shoulders

The name behind the Cochrane Collaboration
http://www.cochrane.org/docs/archieco.htm

Archie Cochrane

- In 1976, Dr. Kerr White, deputy director for health services at New York’s Rockefeller Foundation, was giving a talk on evidence-based medicine
  - He was telling his audience that only 15 to 20 percent of doctors' interventions had been proven to do more good than harm, when a voice called out in mid-sentence: "Kerr, you're a damned liar. You know perfectly well that it isn't more than 10 percent!"
- The voice belonged to Dr. Archie Cochrane — noted British epidemiologist, pioneer of evidence-based medicine, and a man never afraid to speak his mind
  - http://www.smj.org.uk/0802/cochrane.htm

Was it really 10%? What is the evidence? Does it matter?
What proportion of healthcare is evidence based?
http://www.shef.ac.uk/scharr/ir/percent.html

Resource Guide (Andrew Booth):
• Summary of 18 studies, executed between 1995 and 2000, to determine the strength of evidence supporting clinical procedures on patients
• Of 128 clinical procedures per study (range of 40 to 1,990 procedures per study, unweighted median values)
• 38% were supported by RBCT Type I (strongest) evidence
• 22% were not supported by convincing experimental or non-experimental evidence

What is it in veterinary medicine??

Evidence of Process Problems
Pseudodoxia endoxica
NEJM 232:691-697 (1945)

Three groups of pediatricians examined children suffering from tonsillitis

Classic Tonsillectomy Study

389 11 year old children with tonsillitis

Examined by physicians

174 (45%) Tonsillectomy Recommend
214 (55%) Tonsillectomy Not Recommend

Other MD's

99 (46%) Tonsillectomy Recommend
115 (54%) Tonsillectomy Not Recommend

What do you think the other MD's conclusions were?

EBM Story Timeline & Dignitaries

• Early 1900's - Ernest Codman's (1869 – 1940) "The End Result Idea"
• Late 1940's – Professor Austin Bradford Hill’s (1897 – 1991) establishing the RBCT as the evidence "gold standard"
• 1972 – Dr. Archie Cochrane's (1909 – 1988) challenged physicians to base the selection of their practices on the RBCT
• Late '70's to present – Evidence of problems on a number of fronts began accumulating from studies undertaken after Archie Cochrane's challenge
  • Problems with current practices
  • Problems with evaluation of new interventions
  • Problems with information dissemination
  • Problems with information synthesis

Evidence of Process Problems

Is examining dogma important?
What proportion of veterinary medicine is dogma?
Clinician-Discoverers – Marshall, Warren, and H. pylori

The Nobel Prize in Physiology or Medicine 2005
"for their discovery of the bacterium Helicobacter pylori and its role in gastritis and peptic ulcer disease"

Evidence of Process Problems

Evidence of Process Problems
- Cardiologists evaluating high quality angiograms for stenosis of coronary vessels:
  - asked to estimate whether the percentage of stenosis was greater or less than 50%, they disagreed on 60% of the patients
  - on two successive readings of the same angiograms, the observers changed their minds from 8% to 37% of the time, depending on the vessel segment
  - In general, observers looking at the same thing will disagree with each other or even with themselves from 10% to 50% of the time
- Pathologists reading human biopsy slides (Not just a clinician’s problem)
  - A panel of expert pathologists disagreed two or more times on the interpretation of 38% of human skin melanoma biopsy specimens as benign or malignant. (Hum Pathol 27:528-31 (1996))

Autopsy evidence of Physician Diagnostic Error Rates

Changes in rates of autopsy-detected diagnostic errors over time: A systematic review
- 53 autopsy series published 1966 - 2002
  - 24% major error rate (4.1% - 49.8%)
    - Involved 1st cause of death but did not affect outcome
  - 9% class I error rate (0% - 20.7%)
    - Likely resulted in death!
- Of 850,000 individuals dying in US hospitals each year, 34,850 would have survived to discharge without misdiagnoses

Statistics and Ethics in Surgery and Anesthesia
Science 198:684-689 (1977)
How often do new therapies turn out to be superior when they are tested and how much better or worse are they likely to be?
- MEDLARS search for papers published 1964 - 1973
- Found 46 papers that satisfied four criteria:
  1. Randomized trial
  2. At least ten people in each group
  3. Compare surgical or anesthetic treatments
  4. Written in English (investigator’s limitations)
- Found 11 papers that were non-randomized but met rest of criteria

Randomized comparison results

Table 1. Qualitative comparisons between innovations (I) and standards (S) stratified by primary and secondary therapies. Where a paper had two comparisons, each was weighted one-half.

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<th>Primary</th>
<th>Secondary</th>
<th>Total</th>
<th>Percent</th>
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<tbody>
<tr>
<td>I &gt; S</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>I = S</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>I = S (success)</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>I = S (different)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>I &lt; S (disappointment)</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>S &gt; I</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>28</td>
<td>47</td>
<td>94</td>
</tr>
</tbody>
</table>

Statistics and Ethics in Surgery and Anesthesia
Science 198:684-689 (1977)
Non-randomized comparison results

By and large, the distribution leans more favorably toward innovations than that seen in Table 1

A tendency for nonrandomized trials to favor innovations is frequently noted

Gastric freezing for ulcers...
Human medicine is littered with these!

Science 198:684-689 (1977)

Do Study Design Weaknesses Matter?


Meta-analysis of 4 empirical studies relating key methodological quality aspects of controlled trials to their effect estimates.

Odds Rations from trials with inadequate concealment were 30% more beneficial than those with adequate concealment.

You betcha!

Problems with Information Dissemination

A comparison of results of meta-analysis or randomized control trials and recommendations of clinical experts:

- Contrasted the results from 182 RCTs with the recommendations of 43 review articles and 100 textbook chapters by publication date
- Classified recommendations of experts as:
  1. Routine – therapy should be used routinely unless there is a specific but uncommon contraindication
  2. Specific – therapy should be used only in selected patients with a particular indication
  3. Rare/Never
  4. Experimental
  5. Not mentioned

This study took a huge amount of work! And it had big impact – 606 citations to date

Not recommending a beneficial therapy

RCT meta-analysis vs. Expert Recommendations

Continuing to recommend a questionable therapy on basis of biological plausibility

RCT meta-analysis vs. Expert Recommendations
Failure (to date) of the Thorax Pump

Intended to improve blood flow during acute cardiac failure resuscitation
  • (+++) Biological plausibility
  • (+++) Lab experimental results
  • But equivocal field results to date

Reinforces lesson of the necessity of empirical field evaluation

The Medical Review Article: State of the Science

The Result – The Systematic Review

Systematic Reviews: Synthesis of the best evidence for clinical decisions

Per Jan Sargeant, McMaster Univ
2nd Symposium on EBVM, MSU (2006)
On-line Systematic Review Systems
The Current Path of Human Medicine

• Developed because:
  ▪ No clinician can read all of the relevant literature
  ▪ Even expert searchers find only half of the RBCTs in MEDLINE
  ▪ Systematic reviews often quickly outdate
  ▪ Busy clinicians do not have the time to practice EBM on a paper-by-paper basis! (Know how to do it? – Yes!)
• On-line collaborations enable experts at remote sites to cooperate in establishing and updating systematic reviews addressing important clinical questions

Time is the busy clinician’s scarcest resource
Usefulness = (Relevance X Strength) / Work
Initial EBM approaches overlooked this fact!

Knowledge for Knowledge Translation: The Role of the Cochrane Collaboration
http://www3.interscience.wiley.com/cgi-bin/fulltext/112549281/PDFSTART

• 50 Review Groups
• 10 Methods Groups
• 12 Centres
• 13,000 volunteers

“materials & methods”

Major undertaking in human medicine

Impediments due to Human Nature

• There is confusion and misunderstanding about the concepts of knowledge translation, knowledge transfer, knowledge exchange, research utilization, implementation, diffusion, and dissemination
• The implications of knowledge translation for continuing education in the health professions include the need to base continuing education on the best available knowledge, the use of educational and other transfer strategies that are known to be effective, and the value of learning about planned action theories to be better able to understand and influence change in practice settings
• Despite the considerable resources devoted to health sciences research, a consistent finding from the literature is that the transfer of research findings into practice is often a slow and haphazard process

The Cochrane Collaboration
"The reliable source of evidence in health care"
http://www.cochrane.org/

• International non-profit organisation dedicated to making up-to-date, accurate information readily available worldwide
• Produces and disseminates systematic reviews, promotes the search for sound evidence and develops tools for performing these reviews
• The Cochrane Database of Systematic Reviews is published quarterly
http://www.thecochranelibrary.com
• Professionals volunteer to work in a Cochrane Review Group with an editorial team overseeing the preparation and maintenance of the reviews, applying the rigorous Cochrane Review quality standards
• The activities of the Collaboration are directed by an elected Steering Group and are supported by staff in Cochrane Entities (Centres, Review Groups, Methods Groups, Fields/Networks) around the world

EBM Story Timeline & Dignitaries

• Early 1900’s - Ernest Armory Codman’s (1869 – 1940) “The End Result Idea” led to empirical outcome evaluation
• Late 1940’s – Professor Austin Bradford Hill’s (1897 – 1991) use of blinded randomization in a controlled trial of streptomycin in human tuberculosis established the RBCT as the evidence “gold standard”
• 1972 – Dr. Archie Cochrane’s (1909 – 1988) bestselling book “Effectiveness and Efficiency: Random reflections on health services” challenged physicians to base the selection of their on the RBCT.
• Late ‘70’s to present – Evidence of problems began accumulating from studies undertaken after Archie Cochrane’s challenge
• 1992 – The paradigm of EBM began coalescing from several pathways to begin addressing these problems
  • Journal clubs, critical review checklists . . . . . . . . . . . . . > EBM

Gordon Guyatt
(one of the original EBM Gurus)
Respir Care 46(11):1201-1211 (2001)

• A cardiologist coming back from a recent meeting told me that there was a recent trial that showed that the IIb/IIIa inhibitors probably did not reduce adverse outcomes in people who were presenting with acute ischemic syndromes.
• And all the cardiologists got up and said “Wait till the publication’s out; we have to look very carefully at that. There may be something wrong with that trial.”

By nature, our brains are refractory to new ideas
• On the other hand, a recent report of a single big trial suggested that clopidogrel reduces adverse outcome events in people who were presenting with acute ischemic syndromes, given in addition to aspirin.
• Everybody walked out saying, "Yes, let's do it."
• People have entrenched biases, beliefs, and ways of doing things. We tend to be resistant to new evidence, and we're more receptive to some new things than others.
• If evidence contradicts our general mindset, we're going to be much more resistant.

What Is Evidence-Based Medicine and Why Should It Be Practiced?  
http://www.rcjournal.com/contents/11.01/11.01.1201.asp

• Responding to the limitations of traditional expert recommendations as a guide to clinical practice, evidence-based medicine has presented a paradigm shift in the way clinicians learn and practice medicine.
• The practice of evidence-based medicine requires careful examination of the evidence, using a set of formal rules applied in an explicit manner, followed by its judicious application to decision-making, with an understanding of the patient context and values.
• We believe that this approach leads to optimal patient care.
• At the very least, evidence-based practice facilitates an explicit decision-making process that is transparent and thus open to evaluation and improvement.

This is a tough business

• When a physicist drops a brick out the window, it goes down—every time
• When a cell biologist plates out endothelial cells, they grow to confluence—most of the time
• When an aggressive surgical oncologist resects a hepatic metastasis, he or she cures the patient—some of the time
• When a surgical intensivist infuses tumor necrosis factor–binding protein into a critically ill patient, he or she reverses multiple organ failure—almost never

I may well be sawing the limb off but:

Based on the evidence from human medicine, the consequences of not going down the EBVM path are huge!
George Santayana (poet, philosopher, essayist 1863-1952)

**Saying as commonly attributed:**
- Those who cannot learn from history are doomed to repeat it

**What he actually said:**
- Those who cannot remember the past are condemned to repeat it

From *Reason in Common Sense, vol. 1 of The Life of Reason*

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**Broader Issues:**

Consilience across academic disciplines:
- Do we know & account for our intrinsic mental limitations?
- How do adults (students or practitioners) learn best?
  - What motivates or blocks learning? Adoption?
  - Basic sciences vs. clinical contexts
  - Students dealing with uncertainty
  - Clinicians with out-dated paradigms
- What knowledge foundation is required:
  - To facilitate clinical decision making?
  - To facilitate adoption of new paradigms?
- Information Science:
  - How do we best increase the value of our professional knowledge base?

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**EBVM is *Personal Protection* in the World of Ideas**

Why "personal protection"? Because of the way our minds naturally work if we let them!
- Be very careful what you put in that head, because you will never, ever get it out. Cardinal Wolsey (1475-1530)
- It ain't so much the things we don't know that get us into trouble. It's the things we know that just ain't so. "Artemus Ward" (Charles Farrar Browne, 1834-1867)
- It is impossible for anyone to learn that which he thinks he already knows. Plutarch

As one wag observed, is the only route to change the dying of the "old guard"?

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**Fundamental Science Literacy**

To understand EBVM, would the profession benefit from a sounder understanding of the fundamentals of science?
- Philosophy of Science
- History of Science

Why the fundamental processes of science and the scientific method were developed and why they are practiced
- Why blinding, randomization and concurrent controls are essential
- The potential costs of compromises (case-control, cohort studies)

The Logic of Scientific Discovery
- Hypotheses vs. theories vs. truth
- Proof or truth vs. uncertainty
- The anvil of independent replication

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**Consider our Learning:**

- *Most of the veterinary curriculum is taught as dogma*
  - The information necessary to judge its credibility is not provided
  - Lectures, core textbooks
  - Habits of continual deliberate, systematic, critical thinking are not well developed (and, given resource limitations, possibly cannot be)
  - Analogical evidence is the most prevalent basis of reasoning taught in much of the curriculum
  - Most of everyone’s individual case experience remains anecdotal

**Resource Efficiency vs. Educational Efficacy**

**Major Problem: Lack of Quality Evidence**


- **OBJECTIVE:** Evaluate the literature reporting surgical interventions for canine cranial cruciate ligament (CCL) injury using EBVM
- **STUDY DESIGN:** Systematic literature review
- **METHODS:** An search through Medline, PubMed, VIN, and CAB Abstracts performed August 2004 identified 240 sources of information
- Studies were evaluated with regard to study design (retrospective, prospective, randomization), surgical technique, short- and long-term follow-up, and evidence classification

**Why did they pick this procedure?** $$$$
**Evidence Classification**

- **Class I:** Systematic reviews based on multiple RBCT's
- **Class II:** High quality clinical trials using historical controls
- **Class III:** Uncontrolled case series
- **Class IV:** Expert opinion or extrapolated from other studies

**RESULTS:** 28 (12%) sources qualified for evidence classification

- No class I or class II studies were present, 5 studies were categorized as a class III and 23 studies were categorized as a class IV
- 17 studies were retrospective and 11 studies were prospective
- Proposed results ranged from a wide variety of subjective findings including clinical impression, radiographic analysis, synovial fluid analysis, gross pathology, and histopathology
- Objective results, although infrequent, included force plate analysis and cadaveric biomechanical testing

**Poor evidence has a price, particularly when its poor quality is not recognized!**

Sir William Arbuthnot Lane

- Scottish surgeon, 1856 - 1943
- Known for developing internal fixation to improve fracture alignment
- Started using silver wire, then screws followed by plates and screws
- Hence, the label "Lane’s plates"

**But:**
- Eccentric, regarded humans as machines
- Performed many total colectomies as a cure for "auto-intoxication"
- 10% mortality risk

**The danger of authorities without evidence**

**The lack of quality evidence is a consistent finding across EBVM systematic reviews**

From some 800+ reports initially identified:
• "We are impressed with the small number of useful reports... while there are hundreds of reports in the literature, most suffer from one or more design flaws or limitations... it suggests that we may be making less than optimal recommendations on vaccine use because of a lack of clinically relevant information."
• "It is time to critically evaluate vaccination as a management tool"

Perino LJ, Hunsaker BD. A review of bovine respiratory disease vaccine field efficacy

• During a period in which 60 studies relevant to a particular veterinary clinical question were published in the veterinary literature, 5,400 studies were published in the human literature for the equivalent human clinical question
• Almost a 100 to 1 ratio
• Many of these were based on inherently stronger study designs

Keene BW. Towards evidence-based veterinary medicine

Dangerous pitfalls for EBVM
Entrenchment and resistance of clinicians
• EBM is arguably the most important contemporary initiative committed to reshaping biomedical reason and practice
• The move to establish scientific research as a fundamental ground of medical decision making has met with an enthusiastic reception within academic medicine, but has also generated considerable controversy
• Cognitive dissonance from the pressure to do something in the face of weak or non-existent evidence?
• EBM and the broader forms of evidence-based decision making has occasioned raise provocative questions about the relation of scientific knowledge to social action across a variety of domains

We are much too small of a profession for EBVM to succeed in the face of clinician resistance

Dangerous pitfalls for EBVM
Not continually making clear the weakness of evidence in each EBM product
• Medical practices, clinical practice guidelines, ... are claimed to be “evidence based” with increasing frequency
• When is evidence sufficient for “evidence-based” to rightfully apply?
• “friends” include practitioners of a crude version of EBM (uncritical acceptance of randomized controlled trials while rejecting all other forms of evidence)

Simply labeling something “EBVM” or a “systematic review” does not make it either. Yet it is human nature to do so!

Dangerous pitfalls for EBVM
The myth that veterinary academics alone will create EBVM
Simply not enough academic clinician person-hours or $$$$
• The number of human oncologists at a typical university cancer center equals all the boarded veterinary oncologists (Keene)
• More physicians have privileges at the University of Washington Hospital than there are veterinarians in the entire state of Washington
• The total 2005 NIH research budget was 28 billion $$; the total 2005 USDA research budget was 2 billion $$ and ½ of that was for plants

Data ownership issues
• Large entities may recognize a proprietary advantage in their data
  • Large feedlots, large corporate practices
  • Sources of compensation for data collection?

My proposed solution

Abstract: ... The recent emergence of the evidence-based medicine paradigm in human medicine, and the associated developments of systematic reviews and meta-analysis, present new opportunities for collaboration and synergy between the two disciplines

My goal was to provide entry points for considering EBVM
Make EBVM the Major Mission of the Boards

To generate the evidence-containing literature, I propose that all Boards adopt the requirement of continuing active EBVM evidence generation by all Diplomates.

- Diplomates have:
  - self-identified as being interested in a particular clinical specialty
  - the greatest depth of understanding of that particular literature
  - the most to gain from quality evidence

- Everybody has to put their shoulder to the wheel if we are to succeed
- Requires a major paradigm shift in Board mission, structure and function
- Requires changes in many related paradigms, such as the academic reward system for $$$ and papers

Otherwise, I fear that EBVM will remain primarily a “state of mind” for much of clinical medicine.

Personal computers and the Internet

The core of the opportunity

- Take full advantage of this technology to facilitate multi-practitioner, multi-center collaboration
- Enables:
  - More rapid case accumulation
  - Broader base for external validity
  - Reduced load per participant

This will not be easy! Or quick! Covey’s Effective vs. Efficient

Addendum

- Internet is evolving rapidly in ways that facilitate community input and discussion
  - How can these be used to facilitate EBVM?

- Two examples:
  - Blogs (“web logs”)
  - Wikipedia

Evolving Internet Communication

Google “ScienceBlogs”

Evolving Internet Technology

Google “wikipedia evidence-based medicine”

Enables Community Input & Editing

Evidence-based medicine

For any version listed below, click on its date to view it. For more help, see Help Page History.

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Primary care practice-based research networks: Working at the interface between research and quality improvement

http://www.annfammed.org/cgi/content/full/3/suppl_1/s12

• PBRNs are clarifying the reasons for disconnects between discovery and implementation, research and practice
• Stakeholders agree on their goals; apply their collective knowledge, skills, and resources to accomplish these goals
• PBRNs appear to be evolving from clinical laboratories into learning communities, proving grounds for generalizable solutions to clinical problems, and engines for improvement of primary care delivery systems

Evidence-based Veterinary Medicine:
The best discipline intersection for clinical practice

A way forward?
1. Establish the structure to manage information translation
2. Assemble species x discipline interest groups and establish the communication structure within
3. Establish criteria for determining the important clinical questions
4. Determine the most important clinical questions
5. Perform systematic reviews on each to establish the state of evidence and identify the weak but critical evidence
6. Establish multi-group collaborative studies to generate strong evidence
7. Update the systematic reviews as evidence becomes available

I don't have all the answers but I believe that for the good of the profession the discussion must start
Our clients do (or soon will) expect nothing less!