EM CASES SUMMARY

Prepared by Dr. Keerat Grewal, July 2014

Episode 47 – Emergency Medicine Update Conference 2014 Highlights

Dr. Walter Himmel – Evidence Based Medicine

Evidence Based Medicine (EBM)

Three Spheres of EBM[1] (David Sackett): An integration of factors are required to help improve patient outcomes when using EBM: 1) Best research evidence; 2) Clinical expertise; 3) Patient values

Fig 1: Spheres of EBM

Hierarchy of Evidence (see Fig 2): Strength of evidence increases from **Expert Opinion** – which can be biased and not always correct; **Case Reports**; **Cohort Studies**; **RCTs** - closest to the truth without bias; **Systematic Reviews / Meta-Analysis** – a combination of trials and the highest level of evidence

Fig 2: Hierarchy of Evidence

Another model of levels of evidence is the **6S model**[2] (see Fig 3). The quality of evidence increases from single studies; synopses of single studies; syntheses (e.g. Cochrane reviews, can include systematic reviews); synopses of syntheses (e.g. summary of a systematic review); summaries (e.g. evidence-based textbooks, clinical practice guidelines); systems (fully developed clinical decision systems)

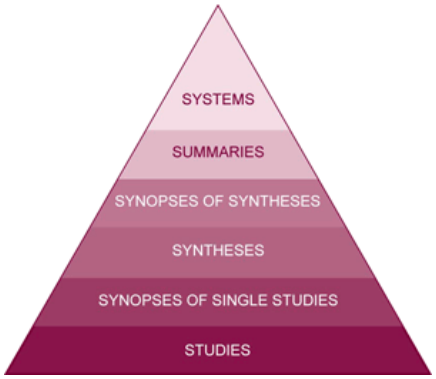

Fig 3: Levels of Evidence - 6S Model

EBM asks specific, useful, efficient questions:

P: who is the patient, population, or problem of interest
I: what is the intervention
C: what is the comparison
O: what are the outcomes

Minimizing Error in EBM

consider sources of error, or deviation from the truth, of evidence:

- Systematic Error: is BIAS, or non-random error (e.g. failure to blind, unconcealed allocation, patient drop out, etc.

- Random Error: due to chance, unavoidable; revealed by consideration of statistical concepts such as p-values and confidence intervals

Critical Appraisal of Evidence

When assessing evidence/literature, ask yourself questions about the study and the results. Avoid BARF (Brainless Application of Research Findings). Critical appraisal of a study can be based on the JAMA User's Guide to Medical Literature[3]:

1. Are the results valid? Is it free from bias?
   Were the patients randomized? Were patients in the study groups similar? Was the study blinded? Was follow up complete?

2. Are the outcomes important? Is there significant clinical importance to the patient?
   What were the results? How large was the treatment effect? How precise were the results? Are all patient-oriented outcomes considered (harms and benefits)?

3. Are the results relevant to my practice?
   Were the study patients similar to your population (inclusion criteria)? Is the setting similar? Are the treatment benefits worth the potential harm and costs? What are your patient's values? Is it feasible in your institution?

Examples of Application of EBM

Tissue plasminogen activator for acute ischemic stroke
(NINDS stroke study group, NEJM, 1995)[4]

- two part study, part 1: assessed whether TPA had clinical activity (resolution of symptoms, improvement in NIHSS); part 2: clinical outcomes assessed at 3 months

- randomized trial (TPA vs. placebo), blinded

- Results: 26% of placebo arm had good function at 3 months (based on modified Rankin score); vs. 39% of the TPA arm. However, 6% of the TPA arm had intracerebral hemorrhage (with about half of those patients dying)

When critically appraising this article, it is important to note that patients in the placebo arm were *sicker* than the TPA arm (NIHHS 15 vs. 14, respectively). This suggests that randomization failed. Moreover, patients were not consecutively enrolled. Given the findings of this study, incorporation of ***patient values*** in administration of TPA is very important (i.e. ICH/mortality risk vs. functional recovery).

Transfusion strategies for acute upper gastrointestinal bleeding (Villaneuva et al., NEJM, 2013)[5]

- N= 900 with UGIB (melena or hematemesis)

- no active heart disease, no LGIB, no massive bleeding, no stroke history

- Patients had access to gastroscopy within 6hrs

- Patients were randomized into one of two groups: 1) restricted transfusion group: blood transfusion for Hb <70; or 2) liberal transfusion group: blood transfusion for Hb <90

- If patient had SOB, was symptomatic, looked unwell, patient received blood transfusion regardless of Hb

- Results: Mortality in restricted transfusion group was 5%, in liberal transfusion group, mortality was almost doubled. Adverse events in liberally transfused group was significantly higher than those in the restricted group.

When critically appraising this article, note that patients who were unwell, unstable or symptomatic were transfused as per clinical judgment, **not** according to the group they were randomized to. Moreover, patients in this study had access to gastroscopy within 6 hours, which may be difficult to achieve depending on your local resources. This is a good example of the need to carefully assess the details of patient enrolment (does your patient fit the precise enrolment criteria?) and whether the circumstances of a study are applicable to your Emergency Department (can you get a gastroscopy at your hospital within 6 hours?).

KEY REFERENCES

1. Sackett, D. et al. Evidence based medicine: What it is and what it isn't. 1996. BMJ, 312: 71. Free Full Text available at: http://www.bmj.com/content/312/7023/71

2. DiCenso, a. et al. Accessing preappraised evidence: Fine-tuning the 5S into a 6S model. 2009. ACP Journal Club, 151(3): JC2-3. Abstract available at: http://www.ncbi.nlm.nih.gov/pubmed/19755349

3. Guyatt, G. et al. JAMA User's Guide to Medical Literature, 2nd edition. 2008. JAMA. Free Full Text: http://jamaevidence.com/resource/520

4. NINDS Stroke Study Group. Tissue plasminogen activator for acute ischemic stroke.1995. NEJM, 333(24): 1581-1587. Free Full PDF available at: http://www.nejm.org/doi/full/10.1056/NEJM199512143332401

5. Villaneuva, C. et al. Transfusion strategies for acute upper gastrointestinal bleeding. 2013. NEJM, 368(1): 11-21. Free Full PDF available at: http://www.nejm.org/doi/full/10.1056/NEJMoa1211801