CEBIS: Bringing research knowledge to the clinician and patient to inform evidence based practice.

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Abstract

Problem: In the acute hospital setting, we need a way to integrate research evidence, clinical expertise, and informed patient preference to enable evidence based decision making at the point of care. This needs to take into account:

- The need for speedy, targeted evidence reviews
- Individual patient complexity and concerns
- The lack of high level evidence in many situations (such as rare conditions, multiple comorbidities, populations or treatments that are not of interest to funders and/or publishers).

There is a tension between rigorous studies with low risk of bias versus applicability to the local setting.

Solution: The Clinical Evidence Based Information Service (CEBIS) is a team of 3 full time equivalent Information Specialists based at University Hospitals Coventry and Warwickshire NHS Trust. CEBIS specialists are embedded within clinical teams, attending clinics, multi-disciplinary meetings, and ward rounds. They provide a search and summary of the best available evidence in response to queries raised by clinicians and patients. CEBIS also facilitates Evidence in Practice Groups (EPGs) for full discussion of the evidence and how to apply it to real patients. CEBIS utilises an innovative ICT system, which captures all work undertaken, thereby linking the evidence and the decision-making process to individual patient records.

Examples:

Is the macular hole closure rate after Jetrea (Ocriplasmin) lower than after surgery without Jetrea? As a result of CEBIS involvement, Ophthalmologists are able to put their patients' minds at rest and empower them to make evidence informed decisions as to whether to go ahead with Ocriplasmin injection or vitrectomy as an initial treatment.

Evidence for the use of Montelukast for treatment of chronic lung disease in preterm neonates: Despite a lack of evidence for the use of Montelukast in this specific population, CEBIS identified one recently published case series and two completed but unpublished trials. Communication with the clinical lead of the American trial led to treatment initiation on a case by case basis after careful discussion as to its suitability for each infant.

The use of hypertonic saline nebulisers in infants with bronchiolitis:
Recommended by a Cochrane review in 2008, and standard practice in some NHS Hospitals. Critical analysis identified that the evidence did not apply to our population, where average length

of stay was substantially shorter than in Cochrane's included trials. Several months after the EPG, a UK multicentre study confirmed our findings.

In a patient with acute retinal necrosis, is there any evidence for using systemic steroids after initiating the antiviral treatment to reduce disease complications such as retinal detachment? Avoided unnecessary use of steroids (and their potential adverse effects), as CEBIS identified no convincing evidence for their use.

Conclusions: CEBIS facilitates clinicians' point-of-care decision making to help improve the patient experience, even where the evidence base is low or does not apply to the local population.

Key words: Evidence-Based Practice; Information Services; Information Dissemination; Diffusion of Innovation; Knowledge; Case Studies

Background

The evidence-based healthcare movement has from the beginning identified itself as the integration of the best available research evidence with individual clinical expertise, including the "thoughtful identification and compassionate use of individual patients' predicaments, rights, and preferences in making clinical decisions about their care" (1). In many healthcare settings, librarians/information professionals use their discovery and appraisal skills to identify the best available evidence. However, the clinician and the patient must not be forgotten; in order to best support the clinical decision-making process, evidence reviews need to be provided in a timely manner at the point of care, should take into account the complexity and concerns of individual patients and encourage clinical input and questioning of the evidence with regard to its applicability to the situation at hand. By working closely with clinical staff, information professionals can better understand and meet the needs of clinicians and their patients.

Development of the Clinical Evidence Based Information Service (CEBIS)

Setting
University Hospitals Coventry and Warwickshire NHS Trust (UHCW) is one of the largest acute teaching hospitals in the UK, comprising University Hospital in Coventry and the Hospital of St Cross in Rugby. The Trust employs over 6,000 staff, sees over 600,000 outpatients and nearly 150,000 inpatients or day case surgical patients per year.

History
The first Clinical Librarian joined the Library and Knowledge Services team at UHCW in 2004. Whilst this met the needs of clinicians requiring access to advanced literature searching and critical appraisal skills, after working closely with selected clinical teams, a broader picture was emerging; requesting research evidence should be as routine a part of the patient care process as referrals for blood and radiology testing. In order to provide direct access to the skills of an information professional and critically appraised evidence at the point of care, an expanded service with supporting IT infrastructure was needed.

In 2007, a business case was compiled for additional clinical librarian posts, alongside development of an IT system with the capability to link directly to the electronic patient record. Despite the first

business case being unsuccessful, by 2009 the growing evidence of impact on patient care resulted in investment from the executive team in the service and system now known as CEBIS. Three full time equivalent CEBIS Specialist posts have been in place since 2010.

The service
Whilst the service is available to all Trust staff, CEBIS Specialists are embedded within and work particularly closely with certain clinical specialties. For broader subject referrals, an initial list of scoping search results is provided allowing clinicians to view the breadth of literature available on their chosen topic; following discussion, this search can then be refined to best meet their needs. For more specific topics, the clinicians are provided with an evidence summary document, displaying literature by level of evidence, listing all databases searched and search terms used. CEBIS Specialists also facilitate Evidence in Practice Groups (EPGs) for full presentation and discussion of the evidence and how to apply it in practice. This often results in changes to treatment options or advice offered to patients, development of guidelines or care pathways, or confirmation of best practice.

The system
All work is stored on the in-house CEBIS system, providing seamless access to the evidence. Referrals can be submitted either via the CEBIS system itself, or via the electronic patient record (where relevant to the care of an individual patient). Each referral generates a unique ID number and has its own page and discussion forum, ensuring that all work is easily accessible and kept together in one place for future reference. Multiple clinicians can be added to these referrals and the discussion forum acts as a record of communication between all involved.

CEBIS in practice

Focus groups conducted at UHCW in 2013 asked clinical staff under what circumstances they would be most likely to make a referral to CEBIS, and the main categories identified were:

- "When you're stuck"; something new or unusual, beyond the clinician's current level of knowledge (patients presenting with information from the internet or newspaper was mentioned specifically)
- compiling or reviewing guidelines
- clinical presentations or publications.

The second and third of these categories are not directly patient-related, and we can often find randomised controlled trials or systematic reviews to support general clinical practice, education or research. However, the first category identifies a need for information professionals' input when faced with something new or unusual, and therefore less likely to be well covered in the literature. Clinicians talked about how making a CEBIS referral would not be routine for every patient, as they know how to deal with conditions and problems encountered on a day-to-day basis, but might need help when faced with something more complex or out of the ordinary. In these situations, an information professional might be able to find very few or no published trials, and rely on case reports or unpublished evidence. A discussion and critical appraisal of the applicability of this "low-level" evidence to the local setting or individual patient is essential, and can be very productive in terms of informing clinical decision-making. Even when randomised trials or systematic reviews are identified, they might not be relevant to the local population; trials often exclude patients with complex comorbidities and are not undertaken in populations where it is unethical to experiment

(preterm babies for example), or there is little commercial interest (rare diseases, non-drug interventions). Much has been written about the tension between rigorous study methodology versus applicability to the local setting:

> "On the one hand, we would like our evidence to be based on rigorous study designs with a reduced susceptibility to bias – technically known as 'internal validity'. On the other hand, we would like such studies to be comparable with our own setting within which we plan to use the findings – technically known as 'external validity' or generalizability." (2)

The following examples illustrate how CEBIS deals with these issues:

Is the macular hole closure rate after Jetrea (ocriplasmin) injection lower than after surgery without Jetrea?
Intraocular ocriplasmin injection is approved by the National Institute for Health and Care Excellence (NICE) in the UK for people with a small macular hole (a hole in the centre of the retina). In clinical trials, such holes closed within 28 days after ocriplasmin injection in about 40 per cent of cases (3). Eyes in which the hole did not close following an injection would normally go on to have vitrectomy surgery (the usual treatment for macular hole) to improve vision. Patients with small macular holes are therefore presented with the initial choice of whether to undergo vitrectomy or to try the less invasive ocriplasmin injection as a first line treatment, with the possibility of vitrectomy if this is not successful. Patients had asked the ophthalmologists whether having the injection would have any impact on the effectiveness of subsequent vitrectomy, and the ophthalmologists were concerned that it might make the surgery more difficult. An unpublished comparative study looking at this issue was identified via a video on an American medical education website, and the primary author contacted for further information. This study of 73 vitrectomies (since published in the British Journal of Ophthalmology) identified similar anatomical and visual outcomes regardless of whether eyes received ocriplasmin prior to vitrectomy (4). Other small case series and subgroup analyses of the ocriplasmin randomised trials supported this finding and identified no major cause for concern. As a result of CEBIS involvement, ophthalmologists are therefore able to put their patients' minds at rest and empower them to make an evidence-informed decision.

In a patient with acute retinal necrosis, is there any evidence for using systemic steroids after initiating the antiviral treatment to reduce disease complications such as retinal detachment?
This was an urgent referral related to an inpatient being treated for a serious case of acute retinal necrosis, a viral disease. The CEBIS search identified multiple case reports and small case series where patients were treated with systemic steroids. Whilst some of the cases experienced visual improvement, others deteriorated. Some experienced retinal detachment despite steroid treatment, and one developed central serous retinopathy, attributed to the steroid use. A larger study of 45 cases reported to the British Ophthalmological Surveillance Unit found no difference in mean visual acuity six months after treatment between eyes treated with steroids and those who did not receive steroids (5). A retrospective multicentre study from the USA also found that different treatment strategies, including use of steroids, did not seem to have an effect on outcomes of acute retinal necrosis which were generally poor (6). No convincing evidence for the use of steroids was therefore identified. An email from the consultant who submitted the query stated:

> "This is a terrific piece of work. I did not want to use steroids and now I feel supported by evidence not to. This is a very bad case and is unlikely to do well whatever we do. I see no reason to poison the patient with steroids. […]
> You can add this case to the list of CEBIS making the difference to patient management. I would not have had the slightest chance to do this piece of work myself, definitely not within the timeframe of 40 hours from commencement of antiviral treatment."

Evidence for the use of Montelukast for treatment of chronic lung disease in pretem neonates:
UHCW provides neonatal intensive, high-dependency, special and transitional care to infants with a gestational age as low as 24 weeks. Chronic lung disease is a growing concern in this population and the long term outcomes of treatment, although improving, are still unknown. Initially the CEBIS search uncovered two ongoing clinical trials (7, 8) and the specialist communicated directly with one of the trial leads to discuss safety concerns with UHCW clinicians. Following on from this a renewed search found a published case series (9), which although of a low level of evidence, demonstrated promising outcomes in a group of patients matching the local population. This evidence was discussed at length during the grand round leading to treatment initiation on a case by case basis after careful discussion as to its suitability for each individual infant. This is an ongoing CEBIS referral, as searches will be updated on a regular basis to ensure new evidence is not missed.

The use of hypertonic saline nebulisers in infants with bronchiolitis:
This question arose following recommendation for use of hypertonic saline to reduce length of stay (LOS) in this patient group by a 2013 Cochrane review (10). Although it had become standard practice to initiate hypertonic saline treatment in infants in other NHS Trusts, UHCW had not followed this practice. CEBIS critically analysed the studies upon which this recommendation had been made. An EPG was then delivered to the Paediatric multi-disciplinary team, who agreed that although the use of nebulised hypertonic saline could reduce LOS, the local patient population already had a substantially shorter LOS (without the use of hypertonic saline) than that in the Cochrane review's included trials. The evidence therefore did not apply to our population. Several months after the EPG, a UK multicentre study confirmed our findings (11).

Conclusion

CEBIS Specialists have developed specialist subject knowledge, built strong working relationships with clinicians and gained a clearer understanding of the local patient population. Clinicians have come to recognise our specialist skills and the integral part they play in evidence based practice. The above examples demonstrate how CEBIS facilitates clinicians' point-of-care decision making to help improve the patient experience, even where the evidence base is low or does not apply to the local population.

REFERENCES

1. Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS. Evidence-based medicine: what it is and what it isn't. BMJ 1996; 312: 71-72
2. Booth A. On hierarchies, malarkeys and anarchies of evidence. Health Info Libr J. 2010 Mar;27(1):84-8.
3. National Institute for Health and Care Excellence (NICE) Centre for Technology Appraisal. Ocriplasmin for treating vitreomacular traction. NICE technology appraisal guidance [TA297]. [Internet]. London: National Institute for Health and Care Excellence; 2013 [cited 2016 Apr 13]. Available from: https://www.nice.org.uk/guidance/ta297
4. Greven MA, Garg S, Chiu B, Shah SP, Wolfe J, Fine HF, et al. Vitrectomy After ocriplasmin for VitreOmacular adhesion Or Macular hole (VAVOOM) study. Br J Ophthalmol. 2015 Dec 9. [Epub ahead of print]
5. Cochrane TF, Silvestri G, McDowell C, Foot B, McAvoy CE. Acute retinal necrosis in the United Kingdom: results of a prospective surveillance study. Eye (Lond). 2012 Mar;26(3):370-7
6. Tibbetts MD, Shah CP, Young LH, Duker JS, Maguire JI, Morley MG. Treatment of acute retinal necrosis. Ophthalmology. 2010 Apr;117(4):818-24.
7. Children's Hospital Medical Centre Cincinnati, Merck Sharp & Dohme Corp. Montelukast in Very Low Birthweight Infants. In: Clinicaltrials.gov [Internet] Bethesda (MD): National Library of Medicine (US). 2000- [Cited 2014 Nov 10]. Available from:
8. https://clinicaltrials.gov/show/NCT00492102 NLM Identifier: NCT00492102
9. Ajou University School of Medicine, Severance Hospital, Seoul National University Hospital, Gangnam Severance Hospital, Korea University. The Efficacy and Safety of Montelukast Sodium in the Prevention of Bronchopulmonary Dysplasia. In: Clinicaltrials.gov [Internet] Bethesda (MD): National Library of Medicine (US). 2000- [Cited 2014 Nov 10]. Available from: https://clinicaltrials.gov/show/NCT01717625 NLM Identifier: NCT01717625
10. Rupprecht T, Rupprecht C, Harms D, Sterlacci W, Vieth M, Seybold K. Leukotriene receptor blockade as a life-saving treatment in severe bronchopulmonary dysplasia. Respiration. 2014;88(4):285-90. Erratum in: Respiration. 2014;88(5):370.
11. Zhang L, Mendoza-Sassi RA, Wainwright C, Klassen TP. Nebulised hypertonic saline solution for acute bronchiolitis in infants. Cochrane Database Syst Rev. 2013 Jul 31;7:CD006458
12. Everard ML, Hind D, Ugonna K, Freeman J, Bradburn M, Cooper CL, et al. SABRE: a multicentre randomised control trial of nebulised hypertonic saline in infants hospitalised with acute bronchiolitis. Thorax. 2014 Dec;69(12):1105-12.