Teaching Evidence-Based Practice to Speech and Language Therapy Students

in the United Kingdom

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Abstract

We outline three ways in which evidence-based practice (EBP) is formally embedded into the curricula for pre-registration Speech and Language Therapy students and experienced Speech and Language Therapists at Newcastle University in the United Kingdom. We describe key features of an undergraduate module, an undergraduate clinical placement and a new Master's degree program, each aimed at encouraging critical thinking and clinical problem solving skills in students.

Keywords: Education, academic training, teaching methods, instructional model, active learning, evidence-based practice

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In this paper, we describe our experience of introducing evidence-based practice (EBP) into the undergraduate curriculum at Newcastle University in the United Kingdom. We outline two distinct aspects of how EBP has been embedded into the curriculum – one involving an undergraduate module (i.e., a course) and the other involving a clinical placement. We then summarize a new post-qualification (i.e., post-certification) Master's program, which is aimed at introducing the principles and practice of EBP to experienced Speech and Language Therapists (SLTs) for the purpose of developing their clinical research skills. The main aim of the new postgraduate program is to enable experienced SLTs to learn a new set of clinical knowledge and research skills or build on and further develop an existing set of skills. Another aim of the new postgraduate program is to provide a well-rounded, substantive foundation year for those wishing to continue into a Ph.D. program, while stimulating others to consider pursing a Ph.D. who might not otherwise have done so.

Newcastle was the first university in the United Kingdom to award a degree in Speech and Language Therapy – in 1967. Currently, two degree-level programs are offered for the purpose of training students to become SLTs; each is recognized by the Health Professions Council (the United Kingdom's regulatory body) and the Royal College of Speech and Language Therapists as a university qualification that leads to a licence to practice as an SLT. The B.Sc. in Speech and Language Sciences is a four-year undergraduate degree and the M.Sc. in Language Pathology is a two-year postgraduate degree. Successful completion of either degree allows graduates to apply to register as an SLT with the Health Professions Council. In this paper we will focus on how EBP is currently embedded within the undergraduate program.

Both degree programs underwent a major review in 1999, resulting in changes to both their content and delivery. Among these changes was a pedagogical shift away from lecture-based modules to ones which employ case-based problem solving (Whitworth, Franklin, & Dodd, 2004) and an increased emphasis on developing students' research skills and applying research outcomes to clinical practice. Regarding the latter, students are required to take a series of research methods modules during the first three years of the program and conduct an empirical research investigation in their final year. The research project, known as the B.Sc. dissertation, is the equivalent of the Master's thesis that is undertaken at some universities in the United States of America in fulfilment of a degree in speech-language pathology. In what follows, we outline various aspects of how EBP has been formally implemented at Newcastle: in an undergraduate module, in an undergraduate clinical placement and in a new Master's degree program.

<center>The Undergraduate EBP Module</center>

The curriculum of Newcastle's B.Sc. program has always had a strong emphasis on theory and research, with these forming the foundation for training students in clinical practice. Consequently, clinical training is informed by theoretically-motivated interventions and, where possible, by empirical evidence supporting the use of such interventions. In 2005, however, teaching staff recognized the need to go beyond this by finding a way of equipping students with the tools and knowledge required to conduct evidence-based assessments and interventions after graduation. This is not to say that students were ill-equipped to engage in EBP before that time, but we felt what was needed was a way of distilling and presenting information in such a way that students would feel comfortable and confident in seeking out new knowledge and keeping up with developments in the field once they left university. Equally important was the need to foster an attitude in students which led them to question, in a constructive and positive way, the things they were doing in clinic and challenged them to

think in new ways for the benefit of their clients. One way of doing this was to draw together

the three strands of the curriculum, involving academic, clinical and research modules, in

such a way that students could more clearly see the link among them – and see that each was

important to the other if clinical services were to be delivered effectively. Thus was born a

module specifically devoted to the topic of EBP.

Newcastle first offered a module called *Evidence-Based Practice in Communication*

Disorders during the 2005-6 academic year. The module was taught as a final-year option to

undergraduate students as well as to students on the former M.Sc. in Human Communication

Sciences. The module was offered as a final-year option for two reasons. It was considered to

be the fastest way of introducing new course material without investing large amounts of staff

time changing other parts of the curriculum in order to accommodate the new subject matter;

but more importantly, it was felt at the time that having a single, coherent and focussed

module would be the best way of ensuring that the material was learned.

When the module was first proposed at a staff teaching away-day, not only did

someone volunteer to teach it, but three people did. With two people having an interest in

developmental disorders and the third in adult disorders, we decided to collaborate in

planning and teaching the module. The interest and enthusiasm for the new module was so

high that all three staff participated in each and every class session – a situation that could

have been overwhelming for the students, but fortunately did not appear to be.

Because the module was offered to students as an option, they had a choice of

whether to enrol or not. We feared that some might perceive the module as being another

research methods course and indeed, some who chose other options did voice this concern.

So, to set the right tone and entice students to sign up, we suggested they read Goldacre's

(2008) entertaining book about health research and how its findings are reported in the press[1].

And, so that the module would appear inviting and non-threatening, the opening paragraph of

the syllabus read:

> "Evidence-based practice is the conscientious, explicit and judicious use of current
>
> best evidence in making decisions about the care of individual patients" (Centre for
>
> Evidence Based Medicine, Oxford University, http://www.cebm.net). Having its
>
> origins in the fields of medicine and clinical epidemiology, EBP is now a growing
>
> part of speech and language sciences. Since 2003, speech and language therapists
>
> practicing in the UK have been required to "be able to conduct evidence-based
>
> practice" (*Health Professions Council, 2007*). As Greenhalgh (2001) expressed in her
>
> book, *How to Read a Paper*, we hope this module will "demystify the important but
>
> often inaccessible subject of evidence-based medicine" (p. xii) and build on your
>
> previous knowledge in this area by introducing you to ways of judging the value of
>
> assessment procedures and intervention practices in speech and language sciences.

The purpose of the module is to develop students' knowledge of the principles and

methods of evidence-based clinical practice so that they can apply those methods to assessing

and treating communication disorders in children and adults. The learning outcomes of the

module are expressed to students in the form of knowledge outcomes and skills outcomes.

The intended knowledge outcomes are that students should be able to: (1) formulate

answerable clinical questions; (2) search the literature for evidence-based research that

addresses those questions; (3) assess the methodological quality of the research; and (4) apply

the conclusions of evidence-based findings to clinical practice. The intended skills outcomes

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[1] The book's title, *Bad Science*, is also the name of the author's column that appears each

Saturday in *The Guardian* newspaper and on the web

(http://www.guardian.co.uk/science/series/badscience).

are that students should be able to: (1) develop information skills needed for EBP, including

searching for relevant and high quality literature using specialised bibliographic databases

(e.g., Medline); (2) critically evaluate research evidence using the principles and methods of

EBP; and (3) present a critical review of evidence relating to a specific area of clinical

interest.

The final-year option modules at Newcastle are typically taught over a period of six

weeks, with the EBP module meeting once a week for three hours. A short lecture is

presented at the beginning of each class, followed by small group seminar discussions

facilitated by each of the course instructors. Students are assigned a set of readings that they

are to have read in advance of each week's class. The readings each week include one or

more chapters from Greenhalgh (2006), which is the module's core text. This text presents

the main elements of EBP in a readable format[2]. In addition, students read a set of research

articles relating to intervention or assessment. These are updated each time the module is

taught and are selected to reflect various study types (e.g., systematic reviews, RCTs,

diagnostic accuracy studies) and subject matter (e.g., stuttering, child language disorders,

aphasia). The coverage is intentionally broad so that students are exposed to a wide range of

clinical research across sub-disciplines. Lectures typically focus on summarizing and

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[2] Students have been uniformly positive about Greenhalgh's book and because of that we

continue to use it as the main course text. Since we began offering the course, Dollaghan's

(2007) discipline-specific introduction to EBP in communication disorders has appeared and

we include it on the syllabus as a supplemental reading. We also suggest several other

resources (e.g., Ajetunmobi, 2002; Haynes, Sackett, Guyatt, & Tugwell, 2006; Straus,

Richardson, Glasziou, & Haynes, 2005) for future reference or for students wanting more

advanced discussion of topics in Greenhalgh's book. In addition, students are made aware of

resources such as the journal, *Evidence-Based Communication Assessment and Intervention.*

elaborating general principles outlined in the textbook, while seminar discussions engage students in critically appraising research studies and drawing conclusions about their clinical practice. The following section briefly describes each of the weekly sessions.

The Syllabus

      Week 1. The first class begins with a brief lecture covering several topics. The first addresses the question: *What is evidence-based practice?* Several definitions, from an historical perspective and arising from EBP's origin in evidence-based medicine, are given as well as newer ones offered by Greenhalgh (2006) and Dollaghan (2007) (see Table 1). This is followed by an introduction to how to construct answerable clinical questions using the standard PICO format (patients, intervention, comparison group, outcomes) and having done that, how to search for high quality evidence that addresses the question.

      Students are then given a short written text about a young child who has been referred to an SLT as a result of failing a language screening. It represents the kind of information they might encounter in reading referral notes or a case history prior to conducting a clinical assessment. They then break up into small groups to discuss the text, identifying what they know and what they do not know about the information presented. This discussion requires 10-15 minutes when the students have had previous experience of case-based learning. The point of the exercise is to get students to discuss their knowledge of terminology (e.g., *screening*), assumptions made (e.g., about the accuracy of the screening), and the relation between factual statements and possible outcomes (e.g., whether there is an association between apparent risk factors and speech and language outcomes). Students are then asked to reflect on how they know what they know. This in turn leads to a discussion of different kinds of evidence, where to go to find it, and how to evaluate the quality of the evidence found.

This past year, we added a practical session to the course involving one of the University's medical librarians[3], who demonstrated the use of specialist web-based research databases such as the Cochrane Library and Medline and how to search Medline using standard interfaces such as Ovid and PubMed. Students then worked through on-line exercises designed to give them first-hand experience of formulating PICO questions and using Medical Subject Headings (MeSH terms) to search for high quality evidence.

Week 2. The second class begins with a discussion of how different types of study design have been organised into hierarchies of evidence depending on the nature of the clinical question being asked (e.g., intervention, diagnosis) and illustrates one such hierarchy using the Oxford Centre for Evidence-Based Medicine's Levels of Evidence (http://www.cebm.net/index.aspx?o=1025). Students are then introduced to how the methodological quality of studies can be evaluated using critical appraisal checklists such as those compiled by the Scottish Intercollegiate Guidelines Network (SIGN) (http://www.sign.ac.uk/methodology/checklists.html). The lecture ends by introducing students to the first of several study designs: the randomized controlled trial (RCT). Students then break up into small groups to critically appraise one or more RCTs that they read in preparation for the seminar (e.g., Jones et al., 2005).

Week 3. The third week focuses on critically evaluating evidence relating to clinical assessment (i.e., screening and diagnosis). The lecture illustrates some of the key concepts introduced in Chapter 7 of Greenhalgh (2006), which relate to how a clinical assessment (index test) can be validated against a reference standard. Key measures, such as test sensitivity, specificity, and likelihood ratios are discussed using an example from the

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[3] In the second and third years of the undergraduate program, students receive practical tutorials on the use of more general search tools such as the Web of Science, Scopus and Google Scholar from the Speech and Language Sciences liaison librarian.

literature. Students are shown how to calculate such measures, and their confidence intervals, using the Stats Calculator on the Toronto Centre for Evidence-Based Medicine's website (http://cebm.utoronto.ca/practise/ca/statscal/). From this, students are then shown how to determine the likelihood, or post-test probability, of a clinical condition using the nomogram on the Oxford CEBM's website (http://www.cebm.net/index.aspx?o=1161#). Reporting standards and critical appraisal checklists for diagnostic accuracy studies are also covered (see Klee, 2008). One or more diagnostic accuracy studies are then critically appraised by the students in the seminar that follows.

Week 4. Systematic reviews and meta-analyses are discussed in this class and, as is done each week, the relevant SIGN critical appraisal checklist is introduced for evaluating them. The seminar discussion that follows revolves around critically appraising one such systematic review (e.g., Law, Garrett, & Nye, 2004).

Week 5. The topic of the penultimate class is applying EBP in clinical practice. One of the authors, a former manager of a large paediatric speech and language service within the National Health Service, speaks to the students of her experience of introducing and encouraging the use of EBP among practising clinicians. Students are presented with clinical scenarios which are then discussed.

Week 6. Students are assessed during the final class meeting. Each student presents a 20-minute talk on a topic of their choosing, followed by 10 minutes of questions from the course instructors. To give students an idea of the kind of questions that could be asked, the assessment brief contains examples of questions that might arise in clinical practice along with brief rationales (see Table 2). Students are asked to generate their own clinical question and include the following in their presentations: (1) Your question in PICO format and a brief rationale for why you are asking that question; (2) How you went about searching for evidence to answer your question (e.g., search engines and key words used); (3) How you

decided which studies to include and exclude in your review; (4) List of the studies included in your review, summarized in a table based on the Cochrane reporting framework (7 columns: Author + Date, Methods, Participants, Interventions, Outcomes, Notes, Allocation Concealment); (5) A critical appraisal of this evidence followed by your conclusion(s); and (6) Suggestions for future research that would address your question. Each student submits a copy of their PowerPoint presentation, along with a list of references and the summary table outlined in (4) above.

The Course Website

In addition to lectures, seminar discussions and assigned readings, student learning is supported by electronic resources placed on Blackboard. The Blackboard website contains many EBP resources, including links to electronic databases (e.g., PubMed, National Library for Health, Cochrane Collaboration, Campbell Collaboration, What Works Clearinghouse, speechBITE). Blackboard also contains links to recent studies in communication disorders arranged by subject area and by study design (e.g., systematic reviews, RCTs, case-control studies, cohort studies, single case designs), copies of lecture notes and handouts, links to reporting standards and critical appraisal checklists, EBM websites and other resources.

The success of the EBP module is in part dependent on the groundwork laid by other staff prior to students enrolling in this module. As indicated earlier, students at Newcastle take modules in research methods in each of their first three years and so arrive in the EBP module with a foundation in research design and statistics. They also have completed most of their formal coursework and clinical placements and are well on the way to completing their undergraduate dissertations. That said, if there is one criticism of the EBP module, it is that many students have told us that they wished the module had been offered earlier in their degree program and that it should be compulsory. The next step, then, in introducing EBP

into the curriculum at Newcastle involved changing a clinic placement in the third year of the

program and this is described next.

<div align="center">The Undergraduate EBP Clinical Placement</div>

The motivation for the more explicit inclusion of EBP principles into clinical

placements on the undergraduate program came from three sources: the use of case-based

problem solving (CBPS) as a method of curriculum delivery, the outcome of training in the

principles of EBP for those Clinical Educators and the collaborative relationship between the

University and practicing SLTs in the region.

Since 1999, a substantial amount of the learning and teaching on the pre-registration

SLT degree programs at Newcastle has been in the form of CBPS (Whitworth et al., 2004).

Students are required to read and evaluate literature related to a clinical case presented in

class and, in small groups, develop a management plan over the course of several weeks. The

critical use of the evidence base is therefore integral to this form of curriculum delivery.

However, it became apparent that this was implicit, rather than explicit, and students did not

view these as transferable skills to use as part of the EBP palette, but narrowly applied them

within the CBPS modules. This observation is supported by the fact that when EBP principles

and skills were explicitly taught in the final year EBP module of the undergraduate program,

where they were often greeted as novel.

One of the authors provides training in the principles of EBP to practicing SLTs

through a regional research Special Interest Group. A common complaint from SLTs is that

the working week does not allow adequate time for the formulation of questions about their

practice and the subsequent investigation and analysis to answer those questions, despite the

obvious benefits to clients. Some SLTs already required students on placement to investigate

literature related to their clients and to evaluate the available evidence; this was clearly a

resource that could be tapped further. In addition, there is no repository of previously asked

questions and SLTs were aware that they could be replicating work that had already been done by a colleague in a neighbouring service. The need to share questions and outcomes was identified as a priority in the clinical community.

In the United Kingdom, as in most countries where pre-registration training for SLTs is regulated by a professional or statutory body, there are a minimum number of hours of clinical practice required of students. There is a requirement for these to be in a variety of settings and cover a broad range of client groups. At Newcastle, the first two placements for undergraduate students take place in the campus clinics where students deliver interventions to clients with acquired or developmental speech, language, and/or literacy disorders. Subsequent placements take place outside the University across the North East of England with locally employed SLTs serving as Clinical Educators. The University has developed and nurtured a close working relationship with SLT services in the National Health Service and Local Authorities across the North East. In addition to personal contacts between University staff and individual SLTs, there is a wide range of professional activities that include supporting Special Interest Groups; research collaborations including specialist clinicians as teachers and examiners on the degree programs; being responsive to the needs of the services in a professional context; and, regular meetings to plan and to oversee student placements. Some of the students' assignments are designed to be of direct benefit to the SLT and their Service. For example, the first of two final year undergraduate placements involves the student undertaking a piece of work for the SLT, such as an audit, a small scale service evaluation, or the development of therapy materials. It is clear that they are not research projects but they may be precursors to pilot research projects. Some of these have lead to publications and external funding. It is in this context of collaboration that EBP was integrated into the third year undergraduate clinical placement.

In the second semester of the third year, undergraduate students have a 6-week full-time block placement which is partially assessed through a 3000-word written case report about a selected client. In the 2007-8 academic year the EBP element was added to this assessment in the form of an investigation of a PICO question related to the client or client group concerned, the results of which were to be presented in an appendix to the case report. The appendices would then be made available to SLTs in the region through the University's secure SLT extranet.

Clinical Educators that were to supervise students on the first placement were introduced to the principles of EBP and requirements of the placement in a half-day workshop. The workshop covered how to formulate a PICO question relating to an aspect of the intervention process, levels of evidence and the use of critical appraisal checklists. The role of Clinical Educators was to guide the students so that questions were appropriate and also fulfilled the needs of the SLT. Preparation for students took place during induction week at the beginning of the academic year. This was planned to give students opportunity to practice critical appraisal during the CBPS modules in the first semester. The students were given a half-day workshop introducing the principles of EBP and levels of evidence, a recap on searching for evidence (which they were all familiar with from library skills training), and evaluation of the literature using a simple critical appraisal checklist (Bury & Mead, 1998). At this stage the more detailed and specific checklists such as SIGN (http://www.sign.ac.uk) or CASP (http://www.phru.nhs.uk/Pages/PHD/CASP.htm) were not used because there was no opportunity for staff to check that the students had chosen the correct checklist for the type of paper they were appraising. The relationship between the EBP section and the case report was made explicit, so that the intrinsic value of investigating the evidence was clear to students. During the workshop they practiced critical appraisal in small groups of 3-4 students on a paper which had been read before class, then, as a class group, they reflected on

the difference between reading a paper and critically appraising a paper. Integrating knowledge from modules such as Research Methods with theoretical and clinical knowledge, the students were able to accurately and fairly appraise literature within that session. During the reflective discussion they commented on how the critical appraisal process and the checklist supported them to question material they would have previously taken at face value.

A standard method of recording the outcome of the question was devised to enable students and clinicians to easily access the outcomes and update them in the future. The students were asked to record the following: (1) Question (in PICO format); (2) Keywords used and databases searched; (3) Relevant papers found and rationale for choosing and rejecting papers; (4) Summary of relevant findings and level of evidence; (5) Statement of findings (i.e., the answer to the question).

This has resulted in a web resource for the North East SLT community of nearly 60 EBP questions to date. The topics chosen are diverse, reflecting the focus of the students' clinical placements and the range of client groups that SLTs work with, as seen in the examples below:

- Is the use of an oral communication approach (no sign language used) more beneficial than a total communication approach (sign and spoken language used) in the development of speech and language in adolescents with hearing impairments?

- Is narrative therapy an effective intervention for young children with specific language impairment/language delay for improving the quality of their oral narratives and performance in the classroom?

- In school age children with developmental delay unable to meet their communication needs through natural speech, using therapist delivered augmentative and alternative communication (AAC) intervention, are aided or unaided forms of AAC best to improve functional communication?

- In people with aphasia who have marked verb impairment, should verbs be treated within

  sentences or as single words to achieve the greatest generalisation to functional use?

The MSc in Evidence-Based Practice in Communication Disorders

As we stated earlier, speech and language therapists in the United Kingdom are expected to deliver evidence-based treatment, and experience problems in doing so. Taken seriously, doing evidence-based practice means that every clinical choice should be based on the best available evidence. In practice there are a number of obstacles that any practitioner faces. First, any clinician makes many clinical decisions every day, facing questions such as: (1) What is the best way to assess this client? (2) Given their assessment results, what conclusions can be drawn about the nature of their underlying disorder(s)? (3) Given a conclusion about the underlying disorder(s), what approach to treatment is likely to be most effective? (4) And, is there evidence on how it is best to deliver the therapy?

Managers of services are usually working with limited resources when compared to the potential demand, and have to make decisions about the prioritization of services and how they can be most effectively and economically delivered. The questions that clinicians and managers face are subtly different. The clinician is faced with decisions about an individual client, whereas the manager has to make much broader strategic decisions about the allocation of resources to client groups (that is, populations).

Second, there is the problem of time; many of the clinician's decisions have to be made 'on the fly' during a face-to-face session with a client (O'Connor & Pettigrew, 2009; Zipoli & Kennedy, 2005). There is often little time to investigate the existing evidence from the literature, and develop a proper evidence-based decision. Perhaps as a result, some clinicians may revert to established customs of clinical practice, while being uncomfortably aware that these may not be based on good evidence (but usually unsure whether that is the case). Moreover, decisions about the treatment or assessment of any individual client are very

specific. The question might be, for this client with this particular profile of strengths and weaknesses, is there evidence that one particular treatment might be more effective than another? It could be argued that restricting the available assessments and treatments to those that can be justified on the basis of a critical appraisal of the evidence would free the time necessary for further evaluations; unfortunately there is no evidence that this is the case.

The third problem is how to access the available evidence. Clinicians often, with justification, point out that much of the available evidence can be hard to retrieve, and their employers may not be able to give them access to all of the relevant journals. This is probably a problem that is more acute for SLTs compared to doctors; given decisions about journal subscriptions, employers often (reasonably) consider speech pathology-oriented journals a minority interest.

Fourth, clinicians and managers have to think about how to assess – how to weight – the available evidence. Speech and language pathology is a field where, for good reasons (Hegde, 2007) there is rarely relevant evidence from well-conducted RCTs. And, it has been argued, RCTs do not necessarily yield the best evidence for making decisions about individual clients drawn from heterogeneous populations (Hegde, 2007; Howard, 1986; Pring, 2004). Practitioners are then faced with complex decisions in evaluating the evidence from other sources of evidence such as small group designs and single subject experimental designs (SSED; but see the special issue of *Evidence-Based Communication Assessment and Intervention* on meta-analysis of SSEDs; Schlosser & Sigafoos, 2008). While there are clear and well-accepted methods for combining RCTs into a meta-analysis, it is still very unclear how one might combine or weight other sources of evidence[4]. All the evidence needs to be

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[4] We are not aware of any consensus for how information from well-conducted experimental group designs could be combined with information from well-conducted SSDs. More problematic is how evidence from different kinds of studies (e.g., RCTs, small-group cross-

assessed and weighed: as Guyatt et al. (2000) pointed out, "any statement to the effect that there is no evidence addressing the effect of a particular treatment is a non sequitur. The evidence may be extremely weak—the unsystematic observation of a single clinician, or generalization from only indirectly related physiologic studies—but there is always evidence" (p. 1293).

Service managers will be making decisions prioritizing services across a population, with a view to both the relative costs and the size of the benefits to the client groups. Here, RCTs that document the mean change from an intervention across a population are more relevant. But there are problems: RCTs for the relevant population often do not exist. When they do, the populations from which the clients are drawn may not be strictly comparable to the client group the manager is considering. The question then is how to weight such evidence. When they do not, clinicians will have to rely on other sources of evidence (e.g., SSEDs, small group studies).

The other issue in weighting evidence is methodological quality. Does a study, of whatever kind, yield convincing evidence that supports the conclusions? While existing checklists can be helpful, assessing this with any reliability requires skills in understanding both experimental design and statistics. Critical evaluation at this level requires skills in a domain where few clinicians feel confident.

These constitute serious practical problems for any clinician or service manager trying to meet their responsibility to deliver services that are evidence-based. One option – and

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over designs, SSDs) could be combined into a single meta-analysis. Combining studies of different designs requires the evaluator to make a number of assumptions, many of which cannot easily be justified. Arguably, the weight that should be given to different kinds of studies varies depending on the issues addressed and there is as yet no consensus on how this should be done.

probably one that is widely adopted – is to rely on practice guidelines that are (or claim to be) evidence-based in making decisions. Such practice guidelines are widely available and are produced by a number of different professional organisations and other sources. There are also systematic reviews of the evidence on particular issues published in various journals (including this one). The problem in following such guidelines is that, although they may all claim to be evidence-based, they do not necessarily reach the same conclusions. This is often because they place different amounts of weight on different sources of evidence. Cochrane reviews, for example, can only consider RCTs as evidence; in contrast, for example, Cicerone et al. (2000, 2005) in their review for the American Congress of Rehabilitation Medicine are willing to entertain a much wider range of evidence including case series and single case studies.

The effect of contradictory or inconsistent guidelines means that the individual clinician or manager needs to come to a view of how well-founded the guidelines are in relation to their individual decisions. The result is that, even with evidence-based guidelines, clinicians need the skills of critical appraisal to be able to deliver evidence-based practice.

Our experience of delivering training in EBP to practising clinicians is that it tends to expose their lack of expertise in the domains necessary for assembling and evaluating the evidence. A one or two day course does little more than reinforce the participants' view of the difficulty of really doing EBP. This is not surprising, because, as we have argued, there are real and substantial problems in implementing the approach.

The Program

In September 2009, we started an M.Sc. in Evidence-based Practice in Communication Disorders at Newcastle University. The aims are to provide clinicians and managers with the skills needed to implement evidence-based treatment and assessment in their clinical practice.

The skills we will seek to develop are those needed to address (some of) the problems[5] we have just described, but also, simply, the skills needed for EBP: (1) Understanding how to pose questions that are both answerable and address issues that address questions in clinical practice. (2) The ability to search systematically for all of the relevant evidence. (3) The skills needed to evaluate critically the existing evidence, using all the relevant sources. This depends on: Critical knowledge of research methods and statistics. This is essential for moving on from relatively primitive check-list-based evaluations of evidence so that students can bring more penetrating and critical understanding to the evidence available.

The point is made to our students that if we depended only on evaluation of pre-existing therapies and assessments there would be stagnation. British Master's courses almost always require a research component; in Newcastle's new M.Sc., this involves training in research methods and, in addition, conducting a research project that evaluates an assessment or a therapy method. This involves developing many relevant research skills, that, beyond the theoretical skills in experimental design and analysis, involve more practical/administrative issues such as confronting ethical approval procedures, identifying appropriate statistical support (where necessary) and participant recruitment and consent. This confrontation with the practicalities of empirical research will also inform evaluation of others' research.

EBP can encourage a rather rigid approach to the evaluation of evidence, with unblinking adherence to some received 'hierarchy of evidence' (that is often reinforced by

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[5] There are some problems an educational course cannot address. The most obvious are lack of time and access to the relevant literature. Clinicians and managers, if they are enjoined to deliver EBP, necessarily require the time to assess the available evidence and access to the necessary sources. Those are employers' responsibilities.

using check-lists). Recognizing that different kinds of evidence have different impacts on different issues, we hope to develop in students a more sophisticated appreciation of the strengths and weaknesses of different sources of evidence that should inform a critical synthesis of the evidence on any specific issue. This is done, in part, by helping students gain an appreciation for the wide-range of research designs employed (e.g., RCTs, cohort studies, case-control studies, SSEDs, diagnostic accuracy studies) and the ways in which these can be critically appraised.

We are aware that for a course to have any impact on the use of EBP in speech-language pathology it has to be accessible to clinicians and managers who are in full-time posts. To make appropriate study leave more feasible, the program is delivered as a set of six very intensive three day modules with the expectation that students carry out a great deal of independent work in the periods in between. The first cohort of students has just begun the M.Sc. program and we look forward both to their progress and to reporting on how the program evolves in the years ahead.

Declaration of interest: The authors were employed by Newcastle University during the time the curriculum developments discussed in this paper were implemented and they alone are responsible for the content and writing of this paper.

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Table 1

Some definitions of evidence-based medicine and evidence-based practice

Definition	Source
"…the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research." (p. 71)	Sackett, Rosenberg, Gray, Haynes, and Richardson (1996)
"...the integration of the best research evidence with clinical expertise and patient values" (p. 1)	Sackett, Straus, Richardson, Rosenberg, and Haynes (2000)
"…the integration of the best research evidence with our clinical expertise and our patient's unique values and circumstances" (p. 1)	Straus, Richardson, Glasziou, and Haynes (2005)
"…the use of mathematical estimates of the risk of benefit and harm, derived from high-quality research on population samples, to inform clinical decision making in the diagnosis, investigation or management of individual patients." (p. 1)	Greenhalgh (2006)
"…the conscientious, explicit, and judicious integration of	Dollaghan (2007)

1. best available *external* evidence from systematic

    research,

2. best available evidence *internal* to clinical practice, and

3. best available evidence concerning the preferences of a

    fully informed patient." (p. 2)

Table 2

Examples given to students, in 2008-9, for student presentations (not in PICO format)

Questions and rationale
1. Does using sign language with normal-hearing babies and toddlers accelerate their language development?   • Why ask this question? 'Baby Signs' programs are offered to parents of young children all over the world. The notice board in my GP's waiting room advertises such a group and at least one local SLT practice offers this as a form of intervention.   • The claim on one website is that "Ten years of research have proved conclusively using Baby Signs not only leads to better communication; it also speeds up the process of learning to talk, stimulates intellectual development, enhances self esteem, and strengthens the bond between parent and infant."   2. Is the Fast ForWord computer program an effective intervention in treating children with language impairment?   • Why ask this question? The children I work with love computer games and this seems like an ideal way of getting them to attend to intervention tasks while having fun.   3. How effective is the McGuire Program for treating adults who stammer?   • Why ask this question? One of my clients asked me what I thought of this approach to intervention after reading what Gareth Gates had to say about it in the *Metro* newspaper.