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Effectiveness, costing and cost effectiveness of interventions for children and young people with speech, language and communication needs (SLCN)

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This research report was commissioned before the new UK Government took office on 11 May 2010. As a result the content may not reflect current Government policy and may make reference to the Department for Children, Schools and Families (DCSF) which has now been replaced by the Department for Education (DfE).

The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education.

EXECUTIVE SUMMARY

The Better Communication Research Programme (BCRP) was commissioned as part of the Better Communication Action Plan[1], the government's response to the Bercow review of services for children and young people with speech, language and communication needs (SLCN). This had recommended a programme of research 'to enhance the evidence base and inform delivery of better outcomes for children and young people' (p.50)[2]. This is one of four thematic reports which synthesize findings from the 10 technical reports that report results from individual BCRP projects; there are also two interim reports and a report of the BCRP as a whole (see Appendix 1 for full details). In this report we identify key issues associated with the evaluation of interventions, summarise some of the key findings before going on to examine issues associated with the costs and cost effectiveness of interventions for children with SLCN.

Key findings

- Specific evaluated interventions should be a key feature of the services offered to children and young people with SLCN;
- Understanding how such provision should best be delivered, what works and for which children, in terms of their age and the difficulties with which they present, is central to improving services for children with SLCN;
- The benefits of such intervention should always be linked to the costs of the provision.
- We need more good quality effectiveness and cost-effectiveness studies which speak directly to the needs of those receiving, providing and commissioning services for children with SLCN. To provide data which will develop and inform practice it is important to combine the expertise of practitioners, parents, service providers, and researchers.

[1] https://www.education.gov.uk/publications/eOrderingDownload/Better_Communication.pdf

[2] Bercow, J. (2008) The Bercow Report: *A review of services for children and young people (0-19) with speech, language and communication needs*. Nottingham: DCSF. https://www.education.gov.uk/publications/eOrderingDownload/Bercow-Report.pdf

Detailed findings

- There are agreed criteria for judging the effectiveness of interventions and the value of measures used to assess the children and the environment in which they learn. We have explicitly adopted such criteria throughout the BCRP.
- This evidence base is expanding relatively rapidly. For example, the 33 randomised controlled studies in the first version of the Cochrane Review of speech and language therapy interventions in 2003 had doubled to 64 by the time the review was repeated in 2012.
- We have combined the evidence base with practitioner experience in producing the *What Works for children with SLCN resource* as a part of the BCRP. This report will be developed into an on-line resource for practitioners during 2012.
- The focus in the reported evidence is on targeted (Wave 2) interventions. We know less about universal interventions, often known as Wave 1 (that is quality first teaching and learning environments) and specialist interventions (Wave 3).
- There are now many intervention studies which demonstrate positive outcomes, quite a number of which show equivocal results and only a handful which suggest that specific types of intervention are not warranted. For many interventions in use there is simply insufficient evidence to make a judgement.
- The length and intensity of interventions vary considerably and, although attempts have been made to suggest an optimal level of intervention (referred to in this report as 'dosage'), this is not yet supported by the literature; however, more intervention does not necessarily lead to better results
- We have highlighted the relative paucity of information about the cost effectiveness of interventions for SLCN and shown how we are able to map unit cost data onto existing studies. We introduce cost-effectiveness, cost-utility and cost benefit analysis and provide the data requirements for estimating the cost of an intervention and how this could be used in relation to SLCN in the future.

Recommendations

For service providers and the commissioners of services

- Evidence should underpin all interventions adopted at a service level. This should be coupled with an awareness that that such an evidence base is evolving and gaps should be addressed as they arise.

- Greater awareness of the evidence base amongst practitioners is key to the embedding of an evidence based culture in schools and clinical services such as speech and language therapy.
- Many techniques have been developed over recent years for costing public services and it is important that these are used more routinely in evaluating the effectiveness of SLCN interventions.
- This relates not only to the interventions themselves but also to the way that the services are delivered, i.e. by specialists or generalists (teaching assistants) and how much intervention is being offered.
- Child and parent outcomes, not just process variables, should be monitored;
- Service providers have a critical role to play in interpreting and translating the evidence base into practice.

For the practitioner researcher

- We need greater synergy between practice and research in developing the most relevant intervention related research questions;
- Studies should:-
    - Be well designed.
    - Include samples appropriate for the target population, for example those at social risk, those from different ethnic/language groups and those at the most appropriate age for delivering a specific service.
    - Include, where possible, manuals to facilitate training, maintain treatment fidelity and enable replication.
    - Include collection of the most relevant cost data and assume that cost effectiveness should be an integral part of any intervention evaluation.

1. INTRODUCTION

The Better Communication Research Programme (BCRP) was commissioned as part of the Better Communication Action Plan[3], the government's response to the Bercow review of services for children and young people with speech, language and communication needs (SLCN). This had recommended a programme of research 'to enhance the evidence base and inform delivery of better outcomes for children and young people' (p.50)[4]. This is one of four thematic reports which synthesize the findings from the 10 technical reports that report the results from individual BCRP projects; there are also two interim reports and a report of the BCRP as a whole (see Appendix 1 for full details).

Assessing the effectiveness and cost effectiveness of interventions for children with SLCN is important because we know that SLCN can lead to a variety of negative consequences for the children concerned through into adulthood and into the world of employment (Law et al. 2009; Law 2011). Intervention has the potential to help the children concerned communicate more effectively. In the short to medium term this is most likely to affect the child, their family and their teachers but this could have societal implications in the longer term (Allen 2011). While practitioners may be able to point to individuals who have responded very well to intervention we need evidence that the available intervention can have an effect in a predictable manner for most children who receive them and this is where we need to turn to the emerging evidence base.

The report has four aims:

- To review some of the key issues related to the evaluation of interventions[5] and services for children with SLCN.
- To draw together evidence from the two BCRP interim reports and the nine technical reports.
- To explore the key economic issues related to the evaluation of services for children with SLCN.
- To make recommendations as to how some of the issues described could be addressed in the future.

[3] https://www.education.gov.uk/publications/eOrderingDownload/Better_Communication.pdf

[4] Bercow, J. (2008) The Bercow Report: *A review of services for children and young people (0-19) with speech, language and communication needs*. Nottingham: DCSF. https://www.education.gov.uk/publications/eOrderingDownload/Bercow-Report.pdf

[5] We use the term" intervention" throughout the document to refer to any specific set of procedures that are introduced to meet the needs of a particular child which are above and beyond what the child would otherwise receive.

The first section of the report looks at what we mean by evidence for the effectiveness of SLCN interventions as it is understood across health and education sectors (Section 2.1), highlights the complex nature of the interventions concerned (Section 2.2) and describes a commonly used hierarchy of evidence (Section 2.3) and how such hierarchies have been used in the BCRP (Section 2.4). We then pick out ten key factors to look for when examining any SLCN intervention (Section 2.5). We then go on to summarise some key features of the available literature (Section 3.1) and pick out some specific issues about the target population (Section 3.2) and dosage (Section 3.3). In Section 4 we turn to the measurement of cost effectiveness. References to other BCRP reports are given as footnotes.

2. WHAT DO WE MEAN BY EVIDENCE?

> "Evidence based *practice*[6] is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual *children*."

In order to develop evidence based practice we need to integrate the experience and expertise of the practitioner with the best available evidence from "relevant systematic research". Neither expertise nor evidence is sufficient on its own. In some areas, for example parenting programmes or reading instruction, there is already a wealth of evidence to which to make reference, for example Lindsay et al. (2011); and see also www.whatworks.ed.gov/ncee/wwc. In others, such as intervention and the provision of services to children with speech language and communication needs (SLCN) the evidence is often less clear and making judgements about the best evidence can be difficult. In the BCRP we have drawn together what practitioners say that they do to support children with SLCN[7], with the best published evidence[8] but have also described the services received by a specific group of children with SLCN in schools[9].

2.1 Evidence based practice in health and education

Although one might assume that evidence based practice has always been taken for granted, this is not so (Greenhalgh, 1997). One of the key starting points in the process of collecting together all the relevant evidence is the "systematic review" in which all the relevant evidence for a particular intervention or interventions is drawn together into a single document to help practitioners see the best evidence that is available. Although a number of such reviews have been published, they do not cover all the available interventions and there have been arguments as to whether we can ever hope to carry out such reviews unless we really know what is going on in the intervention (Garrett & Thomas, 2006; Pring,

[6] This definition is taken from Sackett et al. (1996). Here we replace the word "medicine" with *practice* to extend the reference to all practitioners whether in education or health. We also replace the word "patient" with *child* to make the reference more appropriate to the child with SLCN.

[7] Roulstone, S., Wren, Y., Bakopoulou, I., & Lindsay, G. (2012). *Exploring interventions for children and young people with speech, language and communication needs: A study of practice.* London: DfE.

[8] Law, J., Lee, W., Roulstone, S., Wren, Y., Zeng, B., & Lindsay, G. (2012). *"What works": Interventions for children and young people with speech, language and communication needs.* London: DfE.

[9] Dockrell, J., Ricketts, J., Palikara, O., Charman, T., & Lindsay, G. (2012). *Profiles of need and provision for children with language impairment and autism spectrum disorders in mainstream schools: A prospective study.* London: DfE.

2004, 2006). Systematic reviews are part of the solution but they need to be seen within the context of practitioner experience (Centre for Community Child Health, 2011) and also what parents want[10] – see also Marshall et al., 2011.

Finally, it is important that, while it may be appropriate to report and indeed review the results of specific interventions, we may need different criteria for the evaluation of the complexities of service delivery. Individual intervention studies may be important in themselves but are probably not sufficient if we want to speak to the wider policy making agenda. For this it has been suggested there is merit in turning to a broader review process known as "realist review". As Pawson et al. (2005) say:-

> **"**Traditional methods of review focus on measuring and reporting on programme effectiveness, often find that the evidence is mixed or conflicting, and provide little or no clue as to why the intervention worked or did not work when applied in different contexts or circumstances, deployed by different stakeholders, or used for different purposes." (p.21)

This process has not been applied to the field of SLCN but does suggest that we make sure we are asking the right questions and matching those to the most appropriate evidence. If the question is relatively narrow the traditional approach to evidence may be appropriate. If we are trying to evaluate the whole system of provision for children with SLCN the realist review approach could well be more appropriate.

2.2 Complex interventions

Interventions for children with SLCN tend to be "complex" in the sense that there are a great many different approaches to intervention, the way that an intervention is delivered varies and the causal mechanism that the intervention is trying to affect is often untested. Similarly the child's response to intervention is likely to be affected by factors such as the parental and child commitment to the intervention, and whether the intervention is provided in school or the home. This is different from traditional drug trials where the treatment is highly controlled and the drug is acting on underlying biological mechanisms in a predictable.

What would be considered "complex" is defined in the UK's Medical Research Council framework for complex interventions (Craig et al., 2008). This takes us through the different

[10] Roulstone, S., Coad, J., Ayre, A., Hambley, H., & Lindsay, G. (2012). *The preferred outcomes of children with speech, language and communication needs and their parents.* London: DfE.

stages of evidence collecting, acknowledging the difficulties of capturing all the different aspects of the intervention process and showing us where a given type of evidence fits in. So, for example, a group of children with SLCN may be identified because they are slow talkers at three years but they may differ: for example, while they all use relatively few words, some are putting words together but others are not, some do not seem to understand what others are saying but others do. Interventions can be targeted at a range of different organisational levels: these might be at the level of the individual, the small group, the class, the school and even, in the case of universal interventions, society more widely.

Finally, when we talk about interventions we often refer to programme x or y of the type described in some detail in the BCRP "What works"[11] resource and practitioners will do their best to ensure that the child receives the same elements in the intervention in the right order. In fact, as anyone working with children will know well, the child often determines what is acceptable at a given time and the most effective practitioners work with what the child brings rather than being over-prescriptive at any given point in time. While such an approach is eminently sensible, and is likely to improve the child's engagement, it can result in differences in the way that a given intervention is delivered across a group of children. This can prove difficult for those trying to establish "treatment fidelity" [12] in an intervention study. Thus customisation, which can enhance effective implementation, can add to the challenges of evaluation.

2.3 A hierarchy of evidence

A "hierarchy of evidence" indicates the weight we should attach to the result of a study evaluation. Better study designs increase our confidence in the results. Most follow a similar pattern (Polit & Beck 2008):

[11] Law, et al. (2012) ibid.
[12] "Treatment fidelity" refers to the match between the implementation by the practitioner compared with that which was originally evaluated.

Level 1: Systematic reviews of randomized and nonrandomized clinical trials

Level 2: Single randomized and nonrandomized clinical trials

Level 3: Systematic reviews of correlational and observational studies

Level 4: Single correlational and observational studies

Level 5: Systematic reviews of descriptive or qualitative studies

Level 6: Single descriptive or qualitative studies

Level 7: Opinions from authorities and expert committees

Such a hierarchy can be used for SLCN, although it does not identify a substantial body of intervention research which is used in SLCN, namely studies employing a single subject experimental design. Practitioner researchers disagree about the relative value of these interventions but they are certainly able to contribute to the development of the theoretical basis, as discussed in the section above on complex interventions.

2.4 What sort of criteria should we adopt for the evidence we use?

We have examined the evidence of effectiveness in a number of BCRP reports. We have looked for evidence from systematic reviews at the top of the hierarchy[13] and we have looked for evidence supporting the interventions that practitioners[14] say they use and graded named interventions as to whether the evidence was **Strong,** in that they included at least one positive systematic review plus subsequent trials as available; **Moderate,** which would include single randomised controlled studies or quasi-experimental studies; or **Indicative,** in which case the interventions had good face validity but limited research evidence i.e. case studies or 'before and after' studies[15].

We have used a similar set of criteria in developing the Communication Supporting Classrooms Observation Tool[16] but changed the nature of evidence supporting the criteria to reflect the available literature: **Strong** evidence comprised randomised intervention studies,

[13] Lindsay, G., Dockrell, J.E., Law, J., Roulstone, S., & Vignoles, A. (2010) *Better communication research programme 1st interim report DfE-RR070. London: DfE*. (70pp). http://publications.education.gov.uk/eOrderingDownload/DFE-RR070.pdf

[14] Roulstone, S., Wren, Y., Bakopoulou, I., & Lindsay, G. (2012). *Exploring interventions for children and young people with speech, language and communication needs: A study of practice.* London: DfE

[15] Law, J., Lee, W., Roulstone, S., Wren, Y., Zeng, B., & Lindsay, G. (2012). *"What works": Interventions for children and young people with speech, language and communication needs.* London: DfE.

[16] Dockrell, J. E., Bakopoulou, I., Law, J., Spencer, S., & Lindsay, G. (2012). *Developing a communication supporting classrooms observation tool.* London: DfE.

quasi-experimental intervention studies measuring targeted and non-targeted variables and population studies monitoring progress and identifying factors which predict progress; **Moderate** evidence included quasi-experimental intervention studies where only targeted language variables have been measured; **Indicative** evidence included single poorly controlled studies without matched comparisons or non-targeted measures. Finally, we included an **Other** category comprising Government documentation or policies and frameworks related to SLCN.

We have used criteria known as the "Referee's Checklist" (Law et al., 2011)[17] when reviewing economic effectiveness studies and finally we reviewed evidence of the validity of quality of life measures in the Preferred Outcomes study[18] using conventional psychometric criteria rather than the type of hierarchy of evidence used in intervention studies.

2.5 Ten features to look for in any SLCN intervention

We have distilled ten critical features for commissioners and practitioners to consider when looking at new interventions or when developing their own (Box 1). They are not a hierarchy as such because services will decide what weight to attach to each factor, but it is critical that they are all considered before a new intervention is introduced.[19]

[17] Lindsay, G., Dockrell, J.E., Law, J., & Roulstone, S. (2011) *Better communication research programme 2nd interim report. DFE-RR 172*. London: DfE. (131pp). https://www.education.gov.uk/publications/eOrderingDownload/DFE-RR172.pdf
[18] Roulstone, Coad, et al. (2012) ibid.
[19] Law et al.(2012) ibid

Box 1 Ten features to look for in any SLCN intervention

- Does the intervention have a theoretical underpinning given the current state of knowledge in the relevant area?
- Does the intervention have good face validity – does it make sense, is it easy to follow ?
- Is the intervention “manualised” or presented in such a way that it would be possible for a service to adopt it without adaptation?
- Is the intervention feasible in the sense that it could be introduced within budget, given available resources, materials and time available?
- Is there formal training involved and a procedure to be followed or is it principally a set of materials to be freely used?
- Has the intervention been formally evaluated and if so how? Who developed the intervention and is it commercially available?
- Has it been shown that it is possible to assess “treatment fidelity” – that is, the capacity of those who use the programme to stick to what is expected in the manual?
- Do we know how children were allocated to the intervention and control groups?
- Do we know what happened to all the children who started in a study?
- Did those who start all complete the intervention? Who dropped out and why?

3. WHAT DOES THE EVIDENCE TELL US?

We have looked at the available evidence for the effectiveness of interventions, both in the literature and in current use[20], and in another BCRP project have compared the experience of school services received by children with language learning difficulties and autism spectrum disorders[21]. In some of the reports for the BCRP we trace children across time at a local[22] and at a national level [23] [24] and although these data do not concern intervention as such they do relate to how much we can expect children to change and how services should engage with that change.

One of the defining features of evidence based practice is that we combine what the evidence tells us with what the practitioner judges to be appropriate and what the parent and child determine to be feasible and acceptable. Our review of the different types of interventions and programmes described by the speech and language therapists (SLTs) responding to our questionnaire[25] shows clearly the wide range of interventions that are available and the flexibility being employed by SLTs and others in their use. There is clearly a substantial array of materials already available which can be tailored to the needs of the child.

Having identified the names of the many programmes that speech and language therapists use, we then looked for evidence to support those programmes. In a number of cases we found such evidence[26] but in many others we found little beyond a set of materials or a theoretical rationale for an intervention without any evidence for its successful implementation. The development of such materials, and the use of small scale evaluation to check if there is indicative positive evidence, is the first stage to be followed by systematic evaluation of efficacy and effectiveness.

[20] Law et al. (2012) ibid
[21] Dockrell, Ricketts et al. (2012) ibid
[22] Dockrell, Bakopoulou et al. (2012) ibid
[23] Meschi, E., Mickelwright, J., Vignoles, A., & Lindsay, G. (2012). *The transition between categories of special educational needs of pupils with speech, language and communication needs (SLCN) and autism spectrum disorder (ASD) as they progress through the education system*. London: DfE.
[24] Strand, S. & Lindsay, G. (2012). *Ethnic disproportionality in the identification of speech, language and communication needs (SLCN) and autism spectrum disorders* (ASD). London: DfE.
[25] Roulstone, Wren et al. (2012) ibid
[26] Law, et al. (2012) ibid.

3.1 Overview of the reviews of evidence for SLCN interventions

There is considerable evidence for the effectiveness of interventions for children with SLCN as can be seen by the 42 peer reviewed systematic reviews or protocols for reviews which we identified[27] covering the full range children with SLCN and drawing on a little under a thousand individual papers. Most of these reviews are specifically related to different types of SLCN while others report data which are relevant but which is not necessarily the focus of the review. For example, reviews could have a primary aim of addressing core autism, fetal alcohol syndrome or hearing impairment but include a focus on communication (Ospina et al., 2008). They are, by definition, summaries themselves and stand in their own right. Consequently we do not summarise them again but the reader is invited to follow up specific reviews that relate to their practice. We have listed what we would consider to be some key messages arising from this literature in Box 2.

However it is possible to conclude both from the systematic reviews and the *What Works for SLCN* resource [28] that the majority of the interventions are targeted interventions (often known as Wave 2 interventions) provided by specialists. There are a number of randomised trials of interventions for primary speech and language difficulties, many showing moderate to high effect sizes (Cirrin & Gillam, 2008; Law et al., 2003) and this number is increasing relatively rapidly. In the 2003 edition of the Law et al. review there were some 36 trials; in the current revision there are 64. We know much less about universal interventions (often known as Wave 1) although the issue of early screening for SLCN has been addressed in two major reviews (Law et al., 1998; Nelson et al., 2008).

The closest example of a review that has specifically attempted to address intervention within a wider social context, which might be more relevant to the universal approach, is the Pickstone et al. (2009) review of environmental modifications designed to improve children's speech and language skills. There are no reviews of the evidence of interventions for children with SLCN carried out in the classroom. Similarly we know less specialist interventions (Wave 3) primarily because it is difficult, for ethical reasons, to ask the question of whether an intervention works relative to nothing because, almost by definition, these children are in receipt of services in the UK and other developed countries at least. It is possible to compare different interventions but again it is often difficult to identify groups of children with SLCN that are either large enough or sufficiently comparable to draw

[27] Lindsay, G., Dockrell, J.E., Law, J., Roulstone, S., & Vignoles, A. (2010) *Better communication research programme 1st interim report DfE-RR070. London: DfE*. (70pp). http://publications.education.gov.uk/eOrderingDownload/DFE-RR070.pdf

[28] Law et al., (2012) ibid

conclusions. The exception to this are interventions focussing on Augmentative and Alternative Communication (AAC) approaches to working with children who find any verbal communication very difficult (Millar et al. 2006), and specifically the Picture Exchange Communication System (PECS) (Schosser & Lee, 2000) used with children with severe and pervasive disorders, but even these tend to be measured over the short term - i.e. *as if* they were targeted. Unsurprisingly we have concluded that there are many gaps in the evidence available to practitioners and we list a number of these in Appendix 2.

Box 2 Key messages from the identified interventions

Speech:

- Techniques for intervention vary but behavioural techniques for improving phonological awareness, supplemented in many cases by parent support, have provided relatively consistent positive results.

Expressive language

- Modelling techniques targeted at the child's emerging skills have proved most effective with some promising indicators for psycholinguistic interventions. Intervention can be provided equally by properly trained assistants and parents. Again parental support especially for younger children has been shown to provide useful support for intervention. There is less evidence for this with older children.
- None of the computer based interventions designed to promote oral language skills has been found to be efficacious.

Receptive language

- With one or two exceptions, interventions for receptive language difficulties have not provided positive results.
- There is insufficient evidence to comment on the results of intervention studies focusing on pragmatic language skills.

Other areas of SLCN

- There is now a relatively strong emerging evidence base in the field of stammering. However, in many areas, for example learning disability (Millar et al.2006; Schlosser et al. 2000) and autism the focus has often been on single subject experimental designs which are useful from theoretical and practice perspectives but do not readily translate into policy recommendations.
- There are also a number of reviews where the stringency of the review process meant that the reviews were empty, no studies being included in the final review. This was true for childhood apraxia and dysarthria.
- If we return to the appraisal of complex interventions or indeed the hierarchy of evidence identified above we would anticipate seeing single subject experimental studies exploring different intervention techniques and this is indeed what we find.

3.2 Key outcomes and their importance

One of the key features of SLCN is the level of *comorbidity* associated with it. By comorbidity we mean significant factors which exist together but are independent of the primary difficulty itself – in this case SLCN. Although delays in the development of oral language commonly predate identifiable literacy difficulties they continue to interact one with another across time, the child with SLCN coping better in school if they are able to develop reading skills, although patterns vary considerably as illustrated in the BCRP prospective study[29].

Although oral language and literacy skills may be seen as more salient by parents and teachers at different stages of the child's educational career, they both play a part in contributing to the child's capacity to access the curriculum and move successfully into adulthood, where they play such a central role in determining employability. In the shorter term it seems likely that those with better literacy skills may be able to respond better to classroom interventions and even targeted speech and language therapy interventions, where materials are more likely be presented in written form as the child gets older.

Another aspect of the profile of many children with SLCN is their relatively immature behaviour. Children with SLCN are more likely to have associated behavioural, emotional, social difficulties[30] (Im-Bolterm & Cohen, 2007). The important point is that behaviour and emotional behavioural difficulties are likely to have a bearing on both the way that intervention is provided and ultimately its effectiveness. Despite this, the available intervention studies rarely, if ever, take this into consideration. We simply do not know if communication interventions can have a positive effect on behavioural outcomes and we do not know if those who have behaviour difficulties are more or less likely to respond to such interventions.

It is also important to consider the type of preferred outcomes identified by the parents in the BCRP[31] most notably what has become known as well-being or quality of life. A conceptual framework which has the potential to influence our understanding of outcomes for this group is the International Classification of Functioning, Disability and Health (ICF) (World Health Organisation, 2001; Estrella et al., 2008). The 2001 version of the ICF attempted to separate *body function and structures* from *activity* and, in turn, from *participation.* These aspects

[29] Dockrell et al. (2012) ibid
[30] Lindsay, G. & Dockrell, J. (2012). *The relationship between speech, language and communication needs (SLCN) and behavioural, emotional and social difficulties (BESD).* London: DfE.
[31] Roulstone, S., Coad, J., Ayre, A., Hambley, H., & Lindsay, G. (2012). *The preferred outcomes of children with speech, language and communication needs and their parents.* London: DfE.

interact with environmental and personal factors. Of particular significance here, the WHO framework discriminates between the type of within-child characteristics described above and the implications that these may or may not have for the day to day activities of the child. Thus the child may not perform well on a particular standardised measure of language but this may not really interfere with their ability to express themselves or have their needs met.

The ICF emphasizes the impact that these skill assessments have on the child's capacity to participate into relevant structures: in particular, the family, the classroom, the peer group. Clearly educational attainment is both important and necessary but as the BCRP report on parent and child preferred outcomes[32] indicates these may be necessary but not sufficient. Parents are often most concerned about their children's happiness and their potential for integration with their peers, and ultimately to have a job and become independent.

3.3 Dosage

The evidence about dosage remains somewhat equivocal. One systematic review has suggested that the treatment effects start dropping after twelve weeks (Nye et al., 1987), while a more recent review reported that interventions longer than 8 weeks are more effective than those of fewer than 8 weeks (Law et al, 2003). Similarly two broadly comparable, well powered UK studies have shown apparently contradictory findings specifically about what could be achieved with six hours of therapy; one suggesting that six hours over the course of a year is unlikely to be very beneficial (Glogowska et al., 2000), while a second, more recent, study has suggested that a similar treatment length over six months could be very effective (Broomfield & Dodd 2011). Intervention lengths vary considerably suggesting a lack of broad consensus as to how much intervention children need. For example, in our recent analysis the length per session varied between 10 and 240 minutes, and the overall length of the intervention between 3 and 34 weeks (Zeng et al., in press).

The question of how best to measure dosage has only recently received attention Warren and colleagues, proposed five components *(dose, dose form, dose frequency, total intervention duration* and *cumulative intervention intensity)* (Warren et al., 2007). Of these, *dose* form is a description of therapy techniques in a specific intervention programme and *dose* has two specific subcomponents: the session length and the average rate of teaching episodes per unit. The cumulative intervention intensity represents an overall intervention during an intervention programme. It is defined as the sum of teaching episodes in one

[32] Roulstone et al., (2012) ibid

intervention programme which happens in a certain period. This can be expressed in the equation:

Cumulative Intervention intensity	**=**	**dose × dose frequency × total intervention duration**

We found that the majority of studies that report dosage did not provide the information needed to make such a calculation. In part this is because we have too few comparable interventions with dosage systematically modified but, from our examination of this issue for the BCRP, it seems that the relationship between amount and dosage is far from clear. This is an emerging issue in the field of SLCN and has been the subject, in recent years, of two special issues of journals in the field, *Topics of Language Disorders* (2009) and the *International Journal of Speech-Language Pathology* (2012).

4. COSTS AND COST EFFECTIVENESS

4.1 Introduction and aims

In this work stream we had three broad objectives:

- To ensure that a baseline of information on methods and approaches was in place to inform future cost and cost-effectiveness evaluations of SLCN interventions.
- To provide some early indications of the associations between costs, inputs and outputs, including exploring the potential of national datasets.
- To help ensure that studies commissioned or undertaken within the Better Communications Research Programme would be designed and implemented in such a way that facilitated good quality cost and cost-effectiveness evaluations.

Our work has focused on topics that will help commissioners, service managers and clinicians better support children with SLCN. We have looked at the extent to which cost-effectiveness evaluation techniques have already been incorporated in SLCN intervention studies (Section 4.1). An estimation of the cost of the intervention is central to a good quality cost-effectiveness evaluation so our second piece of work has been to identify how this can be done (Section 4.2). Section 4.3 complements this by exploring the economic implications of the link between the intervention 'dose' and outcomes. Our fourth piece of work takes a slightly different tack and looks at the extent to which data collected routinely by health and education authorities can be brought together to look at the links between SLCN, deprivation and resources (Section 4.4).

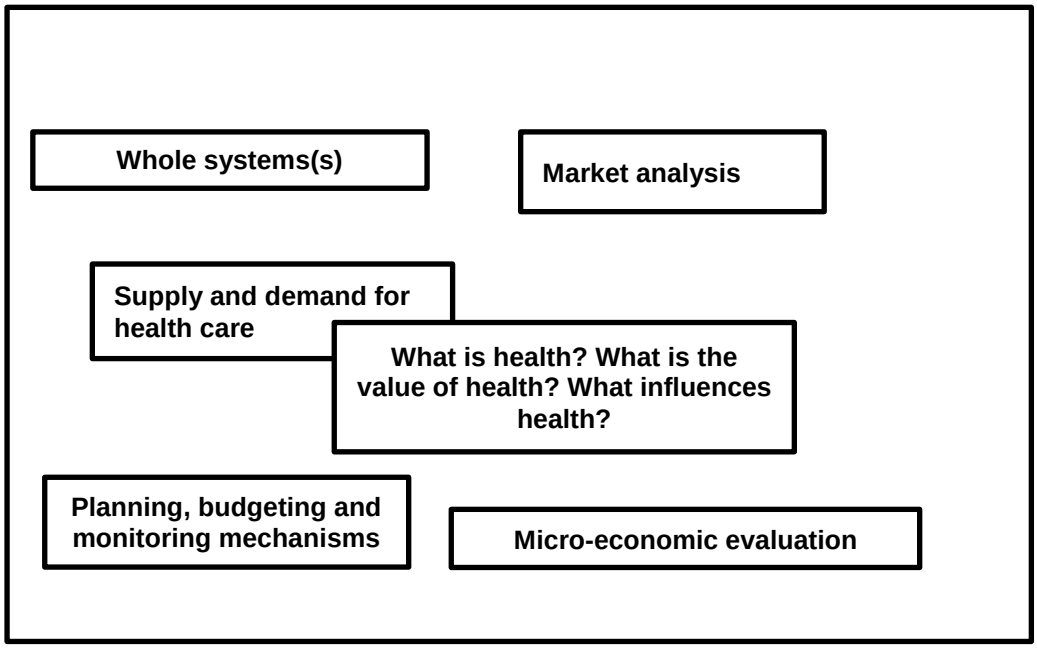
While resources were not sufficient to allow us to integrate an economic component into each BCRP project, we can demonstrate the extent to which an economic component could complement each project to help inform future studies in the economics of SLCN. We discuss these contributions in Section 4.4. In all these activities, we have been careful to draw on relevant tools and approaches used in other fields. The next section reports on this evidence and considers the ways in which it can be applicable to SLCN. In Section 4.2 we explain some of the background to health economics and cost-effectiveness analysis.

4.2 What is cost-effectiveness analysis?

Although cost-effectiveness analysis is the most commonly known economic evaluation activity in health services research, it is just one small part of the health economics agenda.

Some 25 years ago, this was set out diagrammatically (Culyer, (1987) and Box 3 shows an abbreviated version, identifying the core issues of interest where the *discipline* of economics is applied to the *topic* of health.

Box 3 Linked Domains of Health Economics



Micro-economic evaluation can be found at the bottom right of the diagram and it is in this block that cost-effectiveness analysis is placed, with findings helping to inform the central questions about health and health care. Economic evaluation starts from a recognition that *resources are scarce*. This is not just a problem of today's economic climate but also an underlying basic fact that there are not enough resources to respond to all human needs and wants. This shortfall – the gap between resources and needs – means that choices have to be made.

On what basis can such choices be made? Practitioners, other front-line staff and, of course, parents, would want to implement the very best treatment for their children. They are more likely to be interested in the option that generates the best outcomes for children, using *effectiveness* as their criterion for choice rather than *economy*, for example.

Micro-economics suggests we should combine both the economy and effectiveness criteria into a search for *efficiency*. This option gives the best *value for money*; given the resources available, which is the option that generates the best outcome? Thus economics provides the theory from which relative costs and benefits can be examined. Of course, there is a

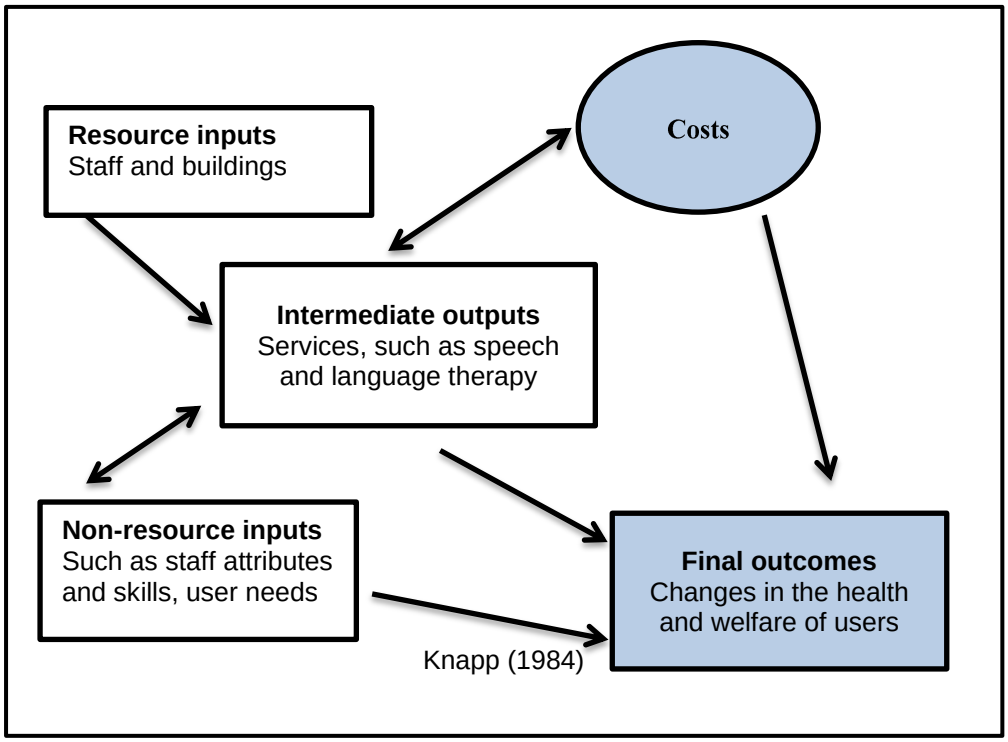
fourth criterion. Policy-makers and commissioners of services might be more interested in *equity*; which option appears to be the fairest for the population?[33]

How can this criterion of *efficiency* be tested? There are three techniques used in economic evaluation.

- Cost-effectiveness analysis
- Cost-utility analysis
- Cost benefit analysis

Each of these uses a measure of the costs of support received by participants in the study but it is the approach to outcomes that distinguishes the techniques from each other. In a cost-effectiveness analysis (CEA), the outcome of interest is commonly a 'natural unit', perhaps using a change score from the clinical scale measuring of speech, language and communication skills that is employed in the analysis of outcomes – this is a measure of *final* outcome. In some cases an *intermediate* outcome is used, although some care must be taken here for, as Box 4 suggests, the relationship between costs and *intermediate outputs* can be very close.

Box 4 Production of welfare



[33] For a comprehensive discussion of economics and equity see Sassi et al. (2001).

The Production of Welfare diagram in Box 4 shows how 'health and welfare' are produced, although in somewhat simplified form. Importantly, this diagram clarifies some of the factors we should consider when evaluating health and social care services and the links that can sensibly be made between them in a micro-economic evaluation (Knapp, 1984 p.26). We use staff and buildings (*resource inputs*) to create health and social care services (*intermediate outputs*) to improve people's welfare (*final outcomes*). There are some similarities with processes undertaken to produce, say, cars or bottles, but the differences become obvious when one considers the person-to-person nature of many of the interventions and services that come into the purview of health and social care, and that the users of such services themselves will have an impact on the services and on their outcomes. These are summarised as *non-resource inputs* in the diagram.

Many people today are familiar with the QALY or Quality Adjusted Life Year, the outcome of interest in a *cost-utility analysis* (CUA). In economic terms 'utility' is the satisfaction of need-fulfilment derived from 'consuming' goods or services. Such analyses require people to rate their own health status, for example using the EQ-5D[34] and this rating is then converted into a utility score which reflects population preferences for any health state and life expectancy. As with a clinical scale, the final outcome is calculated as the difference in rating before and after an intervention; in this case giving the health status or QALY 'gain'. This broad view brings with it the opportunity to compare the resulting cost-per QALY across different conditions and interventions. So, although the data are collected at the micro-level, this measure has enormous potential to inform decisions at the macro- or central government level. Although the EQ-5Dhas been adapted for use with young people, (Wille et al., 2010) its relevance for SLCN has yet to be tested.

The central tenet of the third type of economic evaluation, *cost benefit analysis (CBA*), is that 'benefits' and 'costs' are valued in the same (commonly monetary) unit. These studies are rarely used in health care evaluations because it is difficult to imagine how to put a monetary value on a change in score on the outcome schedule. For example, how much money would an additional two points on a measure of language ability such as the CELF-4 (Semel et al., 2006) scale be worth? There has been some progress in willingness-to-pay techniques. These ask participants how much they would be prepared to pay for a given outcome (for example, an improvement in depression, or to reduce the risk of getting 'flu) and compare

[34] The EQ-5D is a short generic questionnaire asking study participants to rate their health status on five dimensions; pain, mobility, self-care, usual activities, anxiety/depression. Each is rated on a three-point scale: no problems, some problems, severe problems. www.euroqol.org

this sum to the cost of the services/drug/etc. that are required to generate the same level of improvement. Again these have not been developed with relation to SLCN.

Some studies cross the boundary between CBA and cost-savings analysis: the recent work on the longer term costs and benefits of enhanced speech and language therapy is an example (Marsh et al., 2010). In this study, the benefits are identified as (the present value of) lifetime earnings; an *intermediate* outcome, rather than a *final* outcome which would reflect changes in health and welfare. Such studies are often based on models in which data from a number of studies are fitted together to identify future impacts. In the absence of good quality comparative research evidence, assumptions are sometimes used for some parameters. The lower the availability of good quality comparative evidence for these models, the less sure one can be that the savings or monetary benefits identified by the model will actually appear. This 'uncertainty' is explicitly described in a report on the long-term costs of literacy difficulties (Every Child a Chance Trust, 2009). and can also be addressed with sensitivity analysis (Bonin et al., 2011)

Our aim in this section has not been to provide a step-by-step guide to undertaking economic evaluation in SLCN studies but to outline the areas where methods and approaches already developed in health and social care economics can inform their application to SLCN research. In the next sections we identify where we have already taken some of this work forward in the BCRP, and how other studies could be developed.

4.3 Informing the use of cost-effectiveness analysis in SLCN research

4.3.1 Cost effectiveness evaluation and SLCN research

We carried out a formal review of available cost effectiveness studies using high quality methodological standards, specifically a checklist more commonly applied in adult health care economic evaluations (Drummond & Jefferson, 1996). One of the key issues we identified in the five studies we looked at was the importance of the 'perspective' adopted. Some studies included the costs of providing the intervention to health or education agencies, other papers considered the parental costs for transport or loss of earnings etc. Only one took a 'societal' perspective, aiming to capture costs to all sectors of society. The studies provided varying levels of detail on the key elements that the 'checklist' recommends. Few provided sufficient details about their cost estimations to allow us to draw comparisons across interventions.

There is a need for intervention studies to include a cost dimension using methods based in economic theory (Beecham, 2000). Only two papers attempted to bring together costs and effectiveness data. The studies point to the importance of home-based and indirect intervention, although the emphasis on the valuable role parents can play in their children's development of speech, language and communication was less well supported by a discussion of how best to include the impacts on parents in the cost calculation. Predictably, the narrower the cost perspective the more likely that interventions were to appear less costly and/or more cost-effective.

4.3.2 Estimating the unit cost of SLCN interventions

Unit costs underpin any economic evaluation yet they are commonly underestimated, perhaps considering only salaries rather than the full cost of providing a particular intervention. We reviewed journal articles in which a cost for an intervention to address SLCN had been reported and identified four challenges to accuracy. These related to the level of detail about input from therapists, the participants' attendance, the scope of SLT activities, and parents' time and activities. We illustrated with existing studies how different assumptions about these elements could have a marked effect on the unit cost. We showed how nationally-applicable unit cost data for SLTs can be used as a reference point, but without sufficient descriptive data about delivery and receipt of the intervention, accuracy is compromised. Building on economic theory and the long-running programme of unit cost calculation at the PSSRU,[35] we developed the 'checklist' shown at Box 5 that would identify the information needed for more accurate estimation of the intervention cost (Beecham et al, in press).

4.3.3 How much intervention?

Our third piece of work explored whether there is a 'dosage effect' in SLCN interventions (see Section 3.3). The issue of 'dosage' has important cost implications as well as for how SLT services are organised. For example, too many SLT sessions – more sessions than are required to generate the optimum positive change in targeted speech, language and communication abilities – will waste scarce resources. However, too few sessions might mean that a child's skills and abilities are not fully developed, or that positive benefits from the intervention may not be maintained as the child grows up.

[35] *Unit costs of health and social care research programme*, www.pssru.ac.uk/project-information.php?id=354

Box 5 Data requirements for estimating the cost of an intervention

Inputs	
Number of staff	Profession and grade for each member of staff
Staff time	Hours spent on the intervention by each member of staff on preparation, travel, delivering intervention, reviewing notes, etc.
Other resources used	Special equipment, clinical supplies, other materials
Venue	For example, clinic or family home
Parents' time	Travelling and attending the intervention. Also consider any additional time spent delivering the intervention at home.
Outputs	
Duration of session	Hour(s) received by participants
Number of sessions	Preferably the number each child attended, although for some purposes, the typical (or mean) number might be sufficient
Number of attendees	Either one-to-one, or number of children in each group
Costs	
Staff	Salaries and on-costs (such as employer pension contributions), travel allowances, subsistence payments
Direct overheads	For items that can be linked to the level of service activity: (clinical) supervision, administrative support, office costs, etc.
Indirect overheads	Often a proportion allocated to each service to cover overarching functions which allow the organisation to operate: Finance or HR Departments, senior management, maintenance, communications, etc. May be identified locally as overhead charges, recharges, service level agreements, etc.

4.3.4 Exploring SLCN with national data sets

To supplement the analyses reported above we pulled together routinely-collected national level data from both education and health systems extending analysis of national datasets carried out elsewhere in the BCRP (Meschi et al.[36]). To give a sense of service usage we were also interested in the extent to which reported rates of SLCN vary across the country, the extent to which they can be predicted by socio-economic indicators, and whether these factors are associated with the provision of an SLT service. Such data can feed into NHS resource allocation formulas to help boost funding for services which in turn will help ensure local agencies can deliver the services needed. We collated NHS and educational data for England at the local authority level[37]. For each area we could describe: the number of pupils; the number of pupils with SLCN receiving additional support through a statement of educational needs or at the School Action Plus level; the number of initial speech and

[36] Meschi, E., Mickelwright, J., Vignoles, A., & Lindsay, G. (2012). *The transition between categories of special educational needs of pupils with speech, language and communication needs (SLCN) and autism spectrum disorder (ASD) as they progress through the education system.* London: DfE.
[37] *www.education.gov.uk/rsgateway/DB/SFR/s001007/index.shtml*; www.ic.nhs.uk/statistics-and-data-collections; *www.communities.gov.uk/publications/corporate/statistics/indices2010*; www.childrensmapping.org.uk;

language therapy contacts; the number of SLTs in post, and the NHS spend per child. Unfortunately, data on the number of SLTs working specifically with children, or on SLT spend for children are not reported. To link data from the different sources to the same geographic zones, we used GeoConvert.[38]

4.4 Integrating economics: examples from other BCRP work-streams

4.4.1 What works for SLCN

The *What works for SLCN*[39] stream of the BCRP aimed to identify best practice in SLCN interventions from the published literature and a survey of professionals. Fifty-seven interventions were identified, about a third of which each targeted either speech or language, or a combination of speech, language, communication and complex needs. Just 5% of the interventions had a strong level of evidence but we conclude that there is a sound emerging evidence base (though the studies tend to have quite small samples). Thus there is an urgent need to carry out both well-designed studies of the effectiveness of interventions and comparisons of existing interventions. These must be rigorous studies and include sufficient numbers of children to have confidence that the results will be valid for other populations. Such studies are vital if we are to extend our knowledge about the effectiveness of SLCN interventions. They can also provide an important platform for cost and cost-effectiveness studies, again to provide better information to support decisions to be made by policy-makers, commissioners and providers.

Most intervention studies provide the ideal design for integrating a cost-effectiveness component. Taking the 'checklist' used in our review paper as our evaluation desiderata, many of the ten broad categories of questions are fulfilled by such studies (see Box 1). Data collection (measuring use of services and supports) is easily undertaken alongside outcomes assessment using, for example, the *Client Service Receipt Inventory* (Beecham & Knapp, 2001) used in more than 300 evaluations of health and social care. Costs for the various components of the resulting individual 'support packages' can be calculated using unit costs from sources such as the NHS Reference Costs or an annual compendium of unit costs (e.g. Curtis, 2011) and should include the costs of the intervention. We outline the basic decision rules for identifying whether one option is more cost-effective than another (see Box 6).

[38] http://geoconvert.mimas.ac.uk/

[39] Law, J., Lee, W., Roulstone, S., Wren, Y., Zeng, B., & Lindsay, G. (2012). *"What works": Interventions for children and young people with speech, language and communication needs.* London: DfE

Box 6 Cost-effectiveness decision rules[40]

Intervention group compared to control group is…	Less effective	Equally effective	More effective
More expensive	Less cost-effective	Less cost-effective	Trade off
Equally expensive	Less cost-effective	-- --	More cost-effective
Less expensive	Trade off	More cost-effective	More cost-effective

Box 6 shows that if the intervention group has lower outcomes (less effective; first column) and is more expensive (uses a more costly set of services and supports, top row) than the control group, the intervention provides a poorer case for investment than the control: the top left-hand data cell. Conversely, if the intervention group was found to be less costly and more effective it would seem be the better prospect for investment (bottom right-hand cell). However it is also possible that the intervention group will have both higher costs *and* better outcomes (more effective) than the control group; the top-right-hand data cell notes that a 'trade off' has to be made. Improving outcomes is a core aim of children's policy and in this situation it would be for commissioners to decide whether to spend additional scarce resources on this Intervention to generate the improved outcomes. Findings from some of the more complex analyses mentioned above can provide additional information to support such decisions[41].

4.4.2 Analysing national data sets[42]

We have shown that the national rates of identification of pupils with SLCN as their primary special educational need have increased by nearly two-thirds between 2005 and 2011; from 0.94% to 1.6%.[43] If the figures continue to increase and additional support is required it is essential that this is provided in the most cost-effective way. Longer-term costs or cost savings can be estimated if we know whether children with SEN-SLCN have lower educational attainment compared to their peers and how these deficits feed through to activities in the workplace. We have shown that those with SLCN (or ASD) have lower scores in their General Certificate of Secondary Education examinations (GCSEs) and equivalent qualifications than their peers without SEN at age 16, although not surprisingly

[40] Developed from Wimo, et al (1994).
[41] For more information see, Drummond, M., Sculpher, M., Torrance, G. et al. (2005) *Methods for the economic evaluation of health care programmes*, 3rd edition, *Oxford University Press*, Oxford; Fenwick, E. & Byford, S. (2005) A guide to cost-effectiveness acceptability curves, *British Journal of Psychiatry, 187*, 106-108; Knapp, M. (1997) Economic evaluation and interventions for children and adolescents with mental health problems, *Journal of Child Psychology and Psychiatry, 38*, 3-26
[42] See Meschi et al., (2012) ibid and Strand & Lindsay (2012) ibid
[43] Strand & Lindsay (2012) ibid

those at School Action Plus do better than those with Statements. One estimate of the longer-term cost savings following implementation of an enhanced intervention (here from SLTs or SLT assistants) links Key Stage 2 scores through attainment at later Key Stages to improved GCSE grades. Subsequent 'economic benefits' are identified as the difference between (the present value of) lifetime earnings for someone with five GCSEs at A* to C compared with having five GCSEs at A* to G (Marsh et al., 2010).

If participation and engagement in the labour market is predicted (to a certain extent) by educational attainment, and language skills are a good predictor of educational success[44], then predicting who may need help in the early years of the school curriculum is key to improving matters down-stream. Interventions for these children early on, typically led by or involving SLTs, may well reap benefits in their adult years, but without good quality longitudinal follow-up studies of those who have and have not received an intervention, the magnitude of the economic benefits can only be estimated not accurately assessed.

4.4.3 Profiles of need and provision: a prospective study[45]

One of the central questions in the BCRP's prospective study of children with language impairments (LI) or autism spectrum disorders (ASD) was how children use extra resources within the school (classroom support, SLTs, etc.). Special educational needs coordinators (SENCOs) completed questionnaires on two separate occasions specifying the professional time received for each child from learning support assistants (LSAs), speech and language therapists (SLTs) and the SENCO. Data for provision over a school term were also collected for other professionals, including educational psychologists, education welfare officers and community paediatricians; for additional administrative support; and for additional specialist programmes to address the children's specific needs.

This prospective study demonstrated, for example, that children with ASD received three times more teaching assistant support compared with children with LI; children in primary schools received more support than those in secondary schools; and that only a minority of schools reported expenditure on specialist programme resources. Notably, the study found

[44] Snowling, M. J., Hulme, C., Bailey, A. M., Stothard, S. E., & Lindsay (2011). *Better communication research project: Language and literacy attainment of pupils during early years and through KS2: Does teacher assessment at five provide a valid measure of children's current and future educational attainments? DFE-RR172a.* London: DfE.
https://www.education.gov.uk/publications/eOrderingDownload/DFE-RR172a.pdf
[45] Dockrell, Ricketts et al. (2012) ibid

that of the services considered, most support was provided in-school; very little was provided by educational psychologists and community paediatricians so these costs will be low.

These detailed data on how additional support is provided to children in schools are an ideal vehicle for cost estimation. Unit costs can be estimated for each professional using the approach outlined in work undertaken for the BCRP and then multiplied by the number of hours received by each child. It would also be possible to take a wider perspective, taking into account all possible resources that a children may use that may have an impact on their speech, language and communication needs, for example: occupational or behaviour therapists, audiology appointments, help to improve their home environment, etc. Whereas parents using a version of the *Client Service Receipt Inventory* found it difficult to identify any additional supports, other studies have found a wide range of services reported by parents across groups of children; GPs, paediatricians, social workers, occupational therapists and voluntary sector organisations (Barratt et al., 2012). However, unless the child had complex problems, only a few services are used by each child. The approach taken here, collecting service use from within school and from parents (who have a wide view across many services) could provide the most comprehensive picture (see Section 4.4.4).

Considering the prospective study's results, the key actions and policy are indicated by the disparity of provision of both teaching assistant and SLT support in favour of children with ASD compared with those with LI. Additional analyses, once the support costs have been estimated, could include a cost function analysis to tease out the complex links between the variables describing the children and costs. This could help identify the extent to which resources are allocated according to need. For example, in the prospective study children were recruited from 74 schools in five local authorities and a range of data were collected on their skills in language, cognition, memory, literacy etc., as well as age, autism features, quality of life and behaviour. It would be perfectly reasonable to expect, for example, that those pupils with poorer language skills or with behavioural difficulties would receive more support (higher costs).

4.4.4 Preferred outcomes: children's and parents' perspectives[46]

Our study of the outcomes that are preferred by children and parents sheds light on a question of interest to economists as well as effectiveness researchers: what measure should we use to find out whether the intervention has worked? Typically, outcomes are

[46] Roulstone, S., Coad, J., Ayre, A., Hambley, H., & Lindsay, G. (2012). *The preferred outcomes of children with speech, language and communication needs and their parents.* London: DfE.

estimated through objective measurement or parental perception of the child's progress with speech, language and communication. For the children and young people taking part in this study, different themes emerged, more closely linked to quality of life domains than specific skills with speech, language and communication: having time for fun with teachers and family members; feeling supported and listened to; dealing with their emotions; improving other people's behaviour towards them. Parents raised longer-term concerns, for example, they rated improved communication and future independence very highly (around 95% of those surveyed).

Practitioners and researchers very rarely use Quality of Life (QoL) measures in assessing the outcomes of interventions for children with SLCN and we found only two that were designed for children. For policy-makers there is a strong argument for supporting the development of such a tool. It fits with current policy initiatives to incorporate self-reported outcomes in the Quality Assessment Frameworks, and we can make links with the wider health services' evaluation field. The increasing use of quality adjusted life year measures in the evaluation of many different types of interventions and the central role the cost-per-QALY has in the evidence-based guidelines produced by the National Institute for Health and Clinical Excellent (NICE) make it a crucial part of the information for decision-makers at both policy- and practice-level. Cost-effectiveness comparisons using a QoL measure could be made across different interventions and client groups, but understood and interpreted in the knowledge of the differences in client groups and types of primary and secondary needs.

5. CONCLUSIONS

The fact that children and young people with SLCN are at risk of a range of difficulties in adulthood (Law 2011) emphasises the need to look carefully at the way we identify these children and intervene to meet their needs. The evidence base on targeted intervention studies is of relatively good quality. It has broadened and deepened over recent years and there are some specific examples of interventions which show promise although we are not yet in a place where any one intervention could be scaled up and rolled out across a population. Perhaps more concerning, given the emphasis on classroom support for these children and young people, is that there is relatively little good quality information about the effects of interventions in the classroom[47].

There is a great deal of interest in the emerging evidence base related to interventions for children with SLCN. This will only be taken forward effectively if those specialising in the development of interventions and those with skills in designing studies work in tandem with service managers, who are probably the most important people in translating research into practice. No one group can do it on their own. We suggest that we need:-

More intervention studies

Obviously the uptake of evidence depends on studies addressing questions to which practitioners in health and education want an answer. We need to know:-

- More about population level, universal or Wave 1 interventions in the preschool and early in primary school and the potential that they have to prevent children from needing subsequent targeted interventions. Specifically it would be helpful to know more about communication environments and their implications in the home and in school;
- More about how the different aspects of intervention from Waves 1-3 fit together and whether it is possible to create meaningful and robust “pathways of care” through the system which can be shared with parents so that they can know what to expect;
- More about direct work carried out by specialists and the extent to which teaching assistants and paraprofessional staff can be trained to use such techniques. At the heart of this question is the extent to which it is possible to manualise interventions

[47] Dockrell, J., Ricketts, J., Palikara, O., Charman, T., & Lindsay, G. (2012). *Profiles of need and provision for children with language impairment and autism spectrum disorders in mainstream schools: A prospective study.* London: DfE.

for others to use, or is there something distinct and “special” about the role of the expert practitioner that makes a discernible difference to the child’s outcomes;

- More about the oral language interventions and their relationship to literacy in older children;
- More about the factors that influence why some children respond to intervention and others do not. For example, only very rarely do we have any sense of whether children in these studies are socially disadvantaged or whether they exhibit emotional and behavioural difficulties. Related to this it would be helpful to better understand the potential impact of improved communication skills on the child’s broader well-being and mental health.

Better Study Design

We need good quality intervention studies which allow us to be confident that the results are the result of the intervention itself rather than other factors. This is partly a question of the design of the study (blinding, randomisation etc.), but it is also a question of obtaining the right size of sample to feel confident about the results.

Better sampling

We need to know from which part of the population the groups receiving intervention are drawn. Are they a self-selecting sample who have volunteered to attend a university clinic, or a referred population in a day centre for vulnerable children?

Better coverage

All too often criteria are introduced in intervention studies that exclude children from different ethnic/language groups. This is, of course, not the reality for services providing intervention. So we need intervention studies which look at the effects of interventions in the context of different cultural and language groups. Similarly we need to know more about the effects of intervention in middle childhood and beyond. The majority of studies focus on the younger child but while numbers decrease it has become increasing clear that, for many, SLCN does not disappear as they get older.

Better reporting

We need studies to report exactly what they did so that others can replicate them.

Better integration of research and practice

Although the published studies are important we need to understand better how to translate findings to practice.

Replication

We need practitioners to replicate the findings of promising studies. As we have noted all too often the interventions are driven by highly motivated individuals but we need to see that the same results can be obtained by others. Key to this is the use of a common set of measures which practitioners across the sector agree to use which capture the child's speech and language skills, educational attainment etc.

Costs and cost estimation

We need more and clear reporting of costs associated with an intervention. This starts with the most appropriate and systematic data collection. Such costing needs to include the costs of an individual service (health, education or the voluntary and community sector in the UK) and, where appropriate, their combination; but we also need to consider carefully the costs to parents if we are to assume that they are a critical part of the intervention - as they so often are. Costing of single elements of a service that the child receives can be misleading.

The BCRP economic work-stream has made a start towards understanding allocation of SLCN resources through exploration of the national picture, and by examining local service provision through published evaluations. By pulling together existing research findings and best economic evaluation practice in health and social care we have looked at the ways SLCN research could integrate economic evaluation techniques, and begun to disseminate this knowledge to SLCN practitioners and researchers. This has included:

- Concepts and techniques already use in evaluations of health and social care, such as identifying types of economic evaluation, the 'decision rules' for cost-effectiveness evaluations, and the Production of Welfare framework. These can guide economic evaluation of SLC interventions and help interpret their findings.

- The 'Drummond check list' which identifies 35 specific criteria for an economic evaluation. Again these can help in the early stages of designing research to include an economic evaluation, but they can also help readers to assess the quality of documents that will inform policy and practice.

- Developing a check list of data items which will improve accuracy when estimating the costs of any SLCN service or intervention. It is suitable for use in many other service and research contexts.

As indicated above the research agenda remains considerable in both effectiveness and cost-effectiveness studies[48]. Most SLCN evaluations focus on the '*what'* questions: What intervention should be provided given a particular set of speech, language and communication (SLC) needs? The body of effectiveness evidence here is growing but we found little by way of cost-effectiveness evidence. There are other questions that need to be addressed. For example, currently policy-makers in children's services are considering '*when'* questions; thinking about the impacts of intervening early for a whole range of needs, conditions or circumstances to avert later problems or escalation of problems. Some studies have shown that intervening in childhood may prevent escalation of problems (and higher costs) in adulthood, but how early in childhood should one intervene given that one BCRP analysis showed that some SLCN appear to be resolved over the primary school years?

There are also outstanding questions to be addressed about *where* to provide an intervention – perhaps the child's home, in a clinic, or in school? The BCRP prospective study of school pupils found SLTs often provided the intervention, but they were located in the schools. Other questions are about *how* to provide services; perhaps directly with SLTs linking closely with the child? Or as found in another BCRP project, SLTs encouraging parents to help the child's SLC skills develop appears to be effective in many circumstances. Again, some evidence is emerging here but there is still much to be done to provide a strong evidence base. Finally, and perhaps underpinning all the above questions, we need to ask '*who'*: are there groups of children that benefit more from a particular intervention, or a particular way of intervening? Are they children who do not benefit from one intervention, and another way of intervening must be sought? Other BCRP work on teacher assessment in the early school years may point the way forward.

Evidence on effectiveness and cost-effectiveness of interventions to address each of these questions is needed. The research agenda remains long but answers to these questions will ensure that policy and practice will promote the best outcomes for children and young people with SLCN by using resources in the most efficient manner.

In summary, this report has highlighted a need for a cohesive research agenda which explores the efficacy, effectiveness and cost effectiveness of interventions both in current

[48] Adapted from Beecham, J. and Knapp, M. (1995) Mental health economics: unfinished business, in M. Knapp (ed.) *The economic evaluation of mental health care*, Aldershot: Arena, 229-242.

use and in development. This agenda can only be taken forward if those who specialise in providing the intervention work closely with those with the expertise in designing appropriate intervention studies and that together they link with those who play a significant role in translating research into practice, namely the service managers. In the end, the goal must be for better evidence informing the development of interventions and services for children and young people with SLCN and their families.

Key findings

- Specific evaluated interventions should be a key feature of the services offered to children and young people with SLCN;
- Understanding how such provision should best be delivered, what works and for which children, in terms of their age and the difficulties with which they present, is central to improving services for children with SLCN;
- The benefits of such intervention should always be linked to the costs of the provision.
- We need more good quality effectiveness and cost-effectiveness studies which speak directly to the needs of those receiving, providing and commissioning services for children with SLCN. To provide data which will develop and inform practice it is important to combine the expertise of practitioners, parents, service providers, and researchers.

Detailed findings

- There are agreed criteria for judging the effectiveness of interventions and the value of measures used to assess the children and the environment in which they learn. We have explicitly adopted such criteria throughout the BCRP.
- This evidence base is expanding relatively rapidly. For example, the 33 randomised controlled studies in the first version of the Cochrane Review of speech and language therapy interventions in 2003 had doubled to 64 by the time the review was repeated in 2012.
- We have combined the evidence base with practitioner experience in producing the *What Works for children with SLCN resource* as a part of the BCRP. This report will be developed into an on-line resource for practitioners during 2012.
- The focus in the reported evidence is on targeted (Wave 2) interventions. We know less about universal interventions, often known as Wave 1 (that is quality first teaching and learning environments) and specialist interventions (Wave 3).

- There are now many intervention studies which demonstrate positive outcomes, quite a number of which show equivocal results and only a handful which suggest that specific types of intervention are not warranted. For many interventions in use there is simply insufficient evidence to make a judgement.
- The length and intensity of interventions vary considerably and, although attempts have been made to suggest an optimal level of intervention (referred to in this report as 'dosage'), this is not yet supported by the literature; however, more intervention does not necessarily lead to better results
- We have highlighted the relative paucity of information about the cost effectiveness of interventions for SLCN and shown how we are able to map unit cost data onto existing studies. We introduce cost-effectiveness, cost-utility and cost benefit analysis and provide the data requirements for estimating the cost of an intervention and how this could be used in relation to SLCN in the future.

Recommendations

For service providers and the commissioners of services

- Evidence should underpin all interventions adopted at a service level. This should be coupled with an awareness that that such an evidence base is evolving and gaps should be addressed as they arise.
- Greater awareness of the evidence base amongst practitioners is key to the embedding of an evidence based culture in schools and clinical services such as speech and language therapy.
- Many techniques have been developed over recent years for costing public services and it is important that these are used more routinely in evaluating the effectiveness of SLCN interventions.
- This relates not only to the interventions themselves but also to the way that the services are delivered, i.e. by specialists or generalists (teaching assistants) and how much intervention is being offered.
- Child and parent outcomes, not just process variables, should be monitored;
- Service providers have a critical role to play in interpreting and translating the evidence base into practice.

For the practitioner researcher

- We need greater synergy between practice and research in developing the most relevant intervention related research questions;

- Studies should:-
    - Be well designed.
    - Include samples appropriate for the target population, for example those at social risk, those from different ethnic/language groups and those at the most appropriate age for delivering a specific service.
    - Include, where possible, manuals to facilitate training, maintain treatment fidelity and enable replication.
    - Include collection of the most relevant cost data and assume that cost effectiveness should be an integral part of any intervention evaluation.

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APPENDIX 1 – BCRP REPORTS

All the BCRP reports are available from the BCRP page on the Department for Education's website: http://www.education.gov.uk/researchandstatistics/research and also from the BCRP page in the CEDAR, University of Warwick website: http://www.warwick.ac.uk/go/bettercommunication

Main report

1. Lindsay, G., Dockrell, J., Law, J., & Roulstone, S. (2012). *Better communication research programme ¨Main report*, London: DfE.

This report presents an overview of the whole Better Communication Research Programme (BCRP). It draws primarily on the thematic reports, supported by material from the technical reports. This report also considers the overall implications for policy, practice and research, and indeed, seeks to bridge the gap between this substantial research programme and the policy and practice agenda.

Interim reports

2. Lindsay, G., Dockrell, J.E., Law, J., Roulstone, S., & Vignoles, A. (2010) *Better communication research programme 1st interim report DfE-RR070. London: DfE*. (70pp). http://publications.education.gov.uk/eOrderingDownload/DFE-RR070.pdf

This report presents interim findings from the project that had been underway between January and July 2010; best evidence on interventions; the academic progress of pupils with SLCN; economic effectiveness; the initial phase of the prospective longitudinal study of children and young people with language impairment (LI) and autism spectrum disorder (ASD); and the preferred outcomes of children and young people with SLCN, and of their parents.

3. Lindsay, G., Dockrell, J.E., Law, J., & Roulstone, S. (2011) *Better communication research programme 2nd interim report. DFE-RR 172*. London: DfE. (131pp). https://www.education.gov.uk/publications/eOrderingDownload/DFE-RR172.pdf

This report presents interim findings of the project that had been underway between July 2010 – January 2011. Further work is reported from analyses of the national pupil data sets examining development and transitions of pupils with SLCN or ASD between categories of special educational needs, the prospective study, and parents' preferred outcomes (an online survey). In addition, interim reports from new projects include: the initial phase of development of a Communication Supporting Classroom Tool; a survey of speech and language therapists' practice regarding interventions; a study of language and literacy attainment during the early years through Key Stage 2, examining whether teacher assessment provides a valid measure of children's current and future educational attainment (led by Margaret Snowling and Charles Hulme); two studies of the relationship between SLCN and behaviour, with Victoria Joffe and Gillian Baird respectively; cost effectiveness of interventions; and the setting up of a prospective cohort study of speech and language therapy services for young children who stammer.

Thematic reports

4. Dockrell, J., Ricketts, J. & Lindsay, G. (2012). *Understanding speech, language and communication needs: Profiles of need and provision.* London: DfE.

This thematic report examines the nature of speech language and communication needs and the evidence from BCRP studies that have explained both the nature and needs encompassed by the category and the provision made to meet those needs. This report draws upon six projects (8, 9, 10, 11, 14 and 15).

5. Law, J., Beecham, J. & Lindsay, G. (2012). *Effectiveness, costing and cost effectiveness of interventions for children and young people with speech, language and communication needs.* London: DfE.

This thematic report first considers the nature of evidence based practice in health and education before reviewing the evidence for the effectiveness of interventions for children and young people with SLCN. The report also considers cost effectiveness and how it might be measured before examining the evidence of the cost effectiveness of SLCN interventions. The report draws on projects, 8, 10, 11 and 12.

6. Lindsay, G. & Dockrell, J. (2012). *The relationship between speech, language and communication needs (SLCN) and behavioural, emotional and social difficulties (BESD).* London: DfE.

This thematic report explores the relationship between SLCN and behavioural, emotional and social difficulties. . We argue that there are different patterns of relationship between SLCN and ASD, and different types of behavioural, emotional and social difficulties. The report draws on the 2nd interim report (report 3) and project reports 9, 11 and 15.

7. Roulstone, S. & Lindsay, G. (2012). *The perspectives of children and young people who have speech, language and communication needs, and their parents.* London: DfE.

The BCRP ensured that the perspectives of parents and children were explored through a number of different projects. This project explores the evidence primarily from projects 9 and 12, drawing on evidence from a series of specific studies of parents' and children's perspectives and also those of the parents in our prospective study.

Technical reports

8. Dockrell, J. E., Bakopoulou, I., Law, J., Spencer, S., & Lindsay, G. (2012). *Developing a communication supporting classroom observation tool.* London: DfE.

This study reports the development of an observational tool to support teachers, SENCOs, speech and language therapists and others to examine the degree to which classrooms support effective communication. The report comprises a review of the evidence base for developing effective communication and an account of the empirical study to develop and determine the technical qualities of the tool.

9. Dockrell, J., Ricketts, J., Palikara, O., Charman, T., & Lindsay, G. (2012). *Profiles of need and provision for children with language impairment and autism spectrum disorders in mainstream schools: A prospective study.* London: DfE.

The prospective study was the most substantial project in the BCRP running throughout the whole period of the research. Focusing on children and young people initially 6-12 years old, we report on the nature of their abilities in language, literacy, behavioural, emotional and social development; the perspectives of the parents; the support provided as examined by classroom observations and specially created questionnaires completed by their teachers and SENCOs.

10. Law, J., Lee, W., Roulstone, S., Wren, Y., Zeng, B., & Lindsay, G. (2012). *"What works": Interventions for children and young people with speech, language and communication needs.* London: DfE.

This report provides a review of 60 interventions for children and young people with SLCN, all evaluated against 10 criteria. The report will form the basis of a web-based resource to be developed by the Communication Trust for easy access by practitioners and parents.

11. Meschi, E., Mickelwright, J., Vignoles, A., & Lindsay, G. (2012). *The transition between categories of special educational needs of pupils with speech, language and communication needs (SLCN) and autism spectrum disorder (ASD) as they progress through the education system.* London: DfE.

Analyses of the School Census and National Pupil Database are used to examine the transition made by pupils with SLCN or ASD over time and by age. We examine factors that are associated with transition between levels of special educational need (School Action, School Action Plus and Statement) and having no special educational need (non-SEN), including having English as an Additional Language and attainment. We also explore school characteristics associated with different transitions to other categories of SEN.

12. Roulstone, S., Coad, J., Ayre, A., Hambley, H., & Lindsay, G. (2012). *The preferred outcomes of children with speech, language and communication needs and their parents.* London: DfE.

This report provides findings from four different studies addressing the perspectives of children and young people with SLCN, and those of their parents. Data are reported from arts-based participating workshops for children, focus groups and a survey for parents; and a systematic review of quality of life measures for children.

13. Roulstone, S., Wren, Y., Bakopoulou, I., & Lindsay, G. (2012). *Exploring interventions for children and young people with speech, language and communication needs: A study of practice.* London: DfE.

As a complementary study to our analysis of the evidence for interventions, we also carried out an interview study of speech and language therapy managers and educational psychology service managers, on the basis of which we conducted a national survey of speech and language therapists to examine prevalence of use of the different approaches.

14. Snowling, M. J., Hulme, C., Bailey, A. M., Stothard, S. E., & Lindsay (2011). *Better communication research project: Language and literacy attainment of pupils during early years and through KS2: Does teacher assessment at five provide a valid measure of children's current and future educational attainments? DFE-RR172a.* London: DfE. https://www.education.gov.uk/publications/eOrderingDownload/DFE-RR172a.pdf

We report a study led by Margaret Snowling and Charles Hulme which explored whether teacher assessment and monitoring could be used to identify children with language difficulties in need of early interventions. This study was conducted to inform the Tickell Review of the Early Years Foundation Stage, in particular the proposals for a simplified framework and assessment process.

15. Strand, S., & Lindsay, G. (2012). *Ethnic disproportionality in the identification of speech, language and communication needs (SLCN) and autism spectrum disorders (ASD).* London: DfE.

This report complements that of Meschi et al (number 11). Using School Census data from four years (2005, 2007, 2009 and 2011) the report examines the issue of ethnic disproportionality (i.e. over- and underrepresentation of pupils from different ethnic groups) with respect to SLCN and ASD.

16. Roulstone, S., Hayhow, R., White, P. & Lindsay, G. (2012). *Prospective cohort study of speech and language therapy services for young children who stammer.*

This prospective cohort study follows children referred to speech and language therapy services because of stammering. The study tracks the children's process through the system and their outcomes.

17. Meschi, E., Vignoles, A., & Lindsay, G. (2010). *An investigation of the attainment and achievement of speech, language and communication needs (SLCN).* http://www.warwick.ac.uk/go/bettercommunication

APPENDIX 2 – ADDRESSING GAPS IN THE EVIDENCE BASE

We specify below some obvious gaps in the evidence based which we would like to see addressed over the next few years

More intervention studies

We need to know more about:-

- Population level Wave 1, (universal) interventions in the preschool and early in primary school, and the potential that they have to prevent children from needing subsequent Wave 2 (targeted) interventions.
    - Specifically it would be helpful to know more about the nature of communication enhancing environments and their implications in the home and in school; how the different aspects of intervention from Waves 1-3 fit together; and whether it is possible to create meaningful and robust "pathways of care" through the system which can be shared with parents so that they can know what to expect;
- Direct work carried out by specialists and the extent to which teaching assistants and paraprofessional staff can be trained to use such techniques.
    - At the heart of this question is the extent to which it is possible to manualise interventions for others to use, or whether there is something distinct and "special" about the role of the expert practitioner that makes a discernible difference to the child's outcomes;
- Oral language interventions and their relationship to literacy in older children and young people;
- The effectiveness of speech and language interventions for children with very specific conditions such as childhood apraxia of speech/developmental dyspraxia;
- The potential impact of improved communication skills on the child's broader well-being and mental health.

Better Study Design

- This is partly a question of the design of the study (blind assessment, randomisation etc.), but it is also a question of obtaining the right size of sample to feel confident about the results.

Better sampling

- We need to know from which part of the population the groups receiving intervention are drawn. For example, are they a self-selecting sample who volunteered to attend a university clinic or a referred population in a day centre for vulnerable children?

Better coverage

- All too often criteria are introduced in intervention studies that exclude children from different ethnic/language groups. This is not, of course, the reality for services providing intervention. So we need intervention studies which examine the effects of interventions for different cultural and language groups. Similarly we need to know more about the effects of early intervention on development in middle childhood and beyond.

- For many children, SLCN may reduce in severity but many do not necessarily disappear completely as they get older.

Better reporting

- We need studies to report exactly what they did so that others can replicate them.

Better training

- We need effective interventions to be manualised to facilitate training and maintain fidelity to the original intervention.

Better integration of research and practice

- Although the published studies are important we need to understand better how to translate findings to practice.

Replication

- We need practitioners to replicate the findings of promising studies. All too often the interventions are driven by highly motivated individuals but we need to see that the same results can be obtained by others. Key to this is the use of a common set of measures which practitioners across the sector agree to use, which capture the child's speech and language skills, educational attainment etc.

Better cost and cost-effectiveness studies

- We need more studies that report use of services more clearly. This starts with appropriate and systematic data collection. The associated costs need to include the intervention, and ideally combinations of services used (education, health and social care, and the voluntary sector in the UK). We also need to consider carefully the costs to parents where they are a critical part of the intervention or support. Including just a single element of the whole service that a child receives can be misleading.
    - The BCRP economic effectiveness work-stream has made a start towards understanding allocation of SLCN resources at the national and local level. By combining existing research findings and best economic evaluation practice in health and social care we have examined how economic evaluation techniques could be integrated into SLCN research, and begun to disseminate this knowledge.
    - Concepts and techniques already used in evaluations of health and social care can guide economic evaluation of interventions for SLCN and help interpret their findings.
    - The 'Drummond check list' can be used to help design research to include an economic evaluation. It can also to help readers to assess the quality of research evidence that will inform policy and practice.
    - We suggest wide use of the check list of data items required to estimate the costs of any SLCN intervention. This can also be used in many other service contexts.

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