Literature Review for *Bright Futures* Pediatric Visit Schedules, Developmental and Autism Screening

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Center for Evidence-based Policy
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About the Center for Evidence-based Policy

The Center for Evidence-based Policy (Center) is recognized as a national leader in evidence-based decision making and policy design. The Center understands the needs of policymakers and supports public organizations by providing reliable information to guide decisions, maximize existing resources, improve health outcomes, and reduce unnecessary costs. The Center specializes in ensuring diverse and relevant perspectives are considered, and appropriate resources are leveraged to strategically address complex policy issues with high-quality evidence and collaboration. The Center is based at Oregon Health & Science University in Portland, Oregon.
Suggested citation:

Introduction

The Washington State Legislature instructed the Washington State Institute for Public Policy (WSIPP) to assess the potential costs and benefits of implementing the American Academy of Pediatrics (AAP) Bright Futures recommended schedule of well-child visits, developmental, and autism screenings in state medical assistance programs.

In order to adopt Bright Futures recommendations, Washington Medicaid would have to pay for additional well child visits (moving to annual visits for children over age six) and formal developmental and autism screens during early childhood. WSIPP is examining the potential costs of these additional services using Medicaid enrollment and claims data and is contracting with the Center for Evidence-based Policy (CEbP) at Oregon Health & Science University to examine the potential benefits of these additional screens through an analysis of the literature. The analysis by CEbP will identify the literature base to determine:

- The evidence regarding medical necessity of more frequent well-child visits and their potential benefits in terms of reduced Emergency Department visits, hospitalizations, and other services.
- The degree to which developmental and autism screening tools improve diagnosis at an earlier age resulting in better outcomes (e.g., social development, readiness for school) and potentially offsetting costs.

Background

Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents, Third Edition, is a set of guiding principles and strategies to address child health needs. Published by the American Academy of Pediatrics (AAP) in 2008, Bright Futures advocates culturally appropriate health promotion interventions at multiple levels (e.g., family, practice, community, health system, community and policy).

The AAP also developed a tool and resource kit (Duncan 2010) to accompany the guidelines. The toolkit includes a section on developmental, behavioral and psychosocial screening and assessment tools. For developmental screening, the Bright Futures toolkit provides an extensive list of possible developmental tools from the AAP policy on identifying infants and young children with developmental disabilities in a medical home (AAP 2006). For autism-specific screening, the toolkit references and provides the Checklist for Autism in Toddlers (CHAT) and the Modified Checklist for Autism in Toddlers (M-CHAT). The toolkit also provides tools in other domains of well-child care including maternal mental health, behavior, family well-being, and substance use. Bright Futures notes that the inclusion of a particular tool in the toolkit does not imply a recommendation for use by the AAP (Bright Futures 2008). In addition, while the Bright Futures Guidelines published a list of tools, the authors explicitly state that they found no evidence of improved outcomes for patients and parents based on repeated screening during physical exams of well-child care (AAP 2008).
Key Questions

Frequency of Routine Visits
1a. Do more frequent preventive visits (especially a move from biennial to yearly visits for older children) compared to usual care or less frequent preventive visits improves outcomes?

1b. Do more frequent preventive visits result in cost savings through reduced ED utilization, avoidable hospitalizations and other services compared to usual care or less frequent preventive visits?

Developmental Screening
2a. Do developmental screens at 9, 18 and 24-30 months (as recommended by Bright Futures), compared to routine visits identify developmental conditions that would improve patient outcomes through early diagnosis and treatment?
   o If yes, for which conditions would the incidence, timing (age profile) and severity of diagnoses change?

2b. What are the cost implications of early diagnosis and treatment (e.g., healthcare, school readiness, special education) for conditions identified by a developmental screen tool?

Autism Screening
3a. Does screening for autism spectrum disorders at 18 and 24 months compared to routine visits improve patient outcomes?
   o If yes, how would the incidence, timing (age profile) and severity of diagnoses change?

3b. Does early diagnosis and treatment after the use of an autism screen or tool result in cost savings (e.g., healthcare, special education)?
Methods

A search of the MEDLINE, Cochrane Database of Systematic Reviews, and Cochrane Controlled Trials Register databases was completed for the last 10 years (January 2002 to August 2012). The detailed search strategy is available in Appendix A. One reviewer evaluated each abstract. If the reviewer concluded that the article could be eligible, we retained it. Two reviewers independently read the full text of each included article to determine final inclusion. Disagreements were resolved with a third reviewer.

Inclusion criteria

- Outcomes of interest
  - Patient important outcomes that are objectively measured, including but not limited to child physical health, cognitive and social development, and readiness for school (e.g., preventing grade repetition or placement in special education).

- Study design
  - Systematic reviews, technology assessments, randomized controlled trials, and observational comparative study designs (prospective, retrospective, and controlled clinical trials) and all relevant economic evaluations, cost-effectiveness analyses, and economic simulation models.

Exclusion criteria

- published prior to 2002;
- non-research articles such as narrative reviews, intervention descriptions, editorials; and
- articles not reported in English.
Results

A total of 566 unique citations were retrieved. Two articles met inclusion criteria. The two articles are listed below in alphabetical order by relevant Key Question. Study abstracts are directly from the MEDLINE® database and are in italics below each citation. Appendix B lists excluded articles alphabetically by the reason for exclusion and the first author’s last name.

**Frequency of Routine Visits**

1a. Do more frequent preventive visits (especially a move from biennial to yearly visits for older children) compared to usual care or less frequent preventive visits improve outcomes?


OBJECTIVES: To clarify the role of growth monitoring in primary school children, including obesity, and to examine issues that might impact on the effectiveness and cost-effectiveness of such programmes.

DATA SOURCES: Electronic databases were searched up to July 2005. Experts in the field were also consulted.

REVIEW METHODS: Data extraction and quality assessment were performed on studies meeting the review’s inclusion criteria. The performance of growth monitoring to detect disorders of stature and obesity was evaluated against National Screening Committee (NSC) criteria.

RESULTS: In the 31 studies that were included in the review, there were no controlled trials of the impact of growth monitoring and no studies of the diagnostic accuracy of different methods for growth monitoring. Analysis of the studies that presented a 'diagnostic yield' of growth monitoring suggested that one-off screening might identify between 1:545 and 1:1793 new cases of potentially treatable conditions. Economic modelling suggested that growth monitoring is associated with health improvements [incremental cost per quality-adjusted life-year (QALY) of 9500 pounds] and indicated that monitoring was cost-effective 100% of the time over the given probability distributions for a willingness to pay threshold of 30,000 pounds per QALY. Studies of obesity focused on the performance of body mass index against measures of body fat. A number of issues relating to human resources required for growth monitoring were identified, but data on attitudes to growth monitoring were extremely sparse. Preliminary findings from economic modelling suggested that primary prevention may be the most cost-effective approach to obesity management, but the model incorporated a great deal of uncertainty.
CONCLUSIONS: This review has indicated the potential utility and cost-effectiveness of growth monitoring in terms of increased detection of stature-related disorders. It has also pointed strongly to the need for further research. Growth monitoring does not currently meet all NSC criteria. However, it is questionable whether some of these criteria can be meaningfully applied to growth monitoring given that short stature is not a disease in itself, but is used as a marker for a range of pathologies and as an indicator of general health status. Identification of effective interventions for the treatment of obesity is likely to be considered a prerequisite to any move from monitoring to a screening programme designed to identify individual overweight and obese children. Similarly, further long-term studies of the predictors of obesity-related co-morbidities in adulthood are warranted. A cluster randomised trial comparing growth monitoring strategies with no growth monitoring in the general population would most reliably determine the clinical effectiveness of growth monitoring. Studies of diagnostic accuracy, alongside evidence of effective treatment strategies, could provide an alternative approach. In this context, careful consideration would need to be given to target conditions and intervention thresholds. Diagnostic accuracy studies would require long-term follow-up of both short and normal children to determine sensitivity and specificity of growth monitoring.


OBJECTIVE: This review is an update for the US Preventive Services Task Force on universal newborn hearing screening to detect moderate-to-severe permanent, bilateral congenital hearing loss. We focus on 3 key questions: (1) Among infants identified by universal screening who would not be identified by targeted screening, does initiating treatment before 6 months of age improve language and communication outcomes? (2) Compared with targeted screening, does universal screening increase the chance that treatment will be initiated by 6 months of age for infants at average risk or for those at high risk? (3) What are the adverse effects of screening and early treatment?

METHODS: Medline and Cochrane databases were searched to identify articles published since the 2002 recommendation. Data from studies that met inclusion criteria were abstracted, and studies were rated for quality with predetermined criteria.

RESULTS: A good-quality retrospective study of children with hearing loss indicates that those who had early versus late confirmation and those who had undergone universal newborn screening versus none had better receptive language at 8 years of age but not better expressive language or speech. A good-quality nonrandomized trial of a large birth
cohort indicates that infants identified with hearing loss through universal newborn screening have earlier referral, diagnosis, and treatment than those not screened. These findings are corroborated by multiple descriptive studies of ages of referral, diagnosis, and treatment. Usual parental reactions to an initial nonpass on a hearing screen include worry, questioning, and distress that resolve for most parents. Cochlear implants have been associated with higher risks for bacterial meningitis in young children.

CONCLUSIONS: Children with hearing loss who had universal newborn hearing screening have better language outcomes at school age than those not screened. Infants identified with hearing loss through universal screening have significantly earlier referral, diagnosis, and treatment than those identified in other ways.

1b. Do more frequent preventive visits result in cost savings through reduced ED utilization, avoidable hospitalizations and other services compared to usual care or less frequent preventive visits?


OBJECTIVES: To clarify the role of growth monitoring in primary school children, including obesity, and to examine issues that might impact on the effectiveness and cost-effectiveness of such programmes.

DATA SOURCES: Electronic databases were searched up to July 2005. Experts in the field were also consulted.

REVIEW METHODS: Data extraction and quality assessment were performed on studies meeting the review's inclusion criteria. The performance of growth monitoring to detect disorders of stature and obesity was evaluated against National Screening Committee (NSC) criteria.

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modelling suggested that primary prevention may be the most cost-effective approach to obesity management, but the model incorporated a great deal of uncertainty.

CONCLUSIONS: This review has indicated the potential utility and cost-effectiveness of growth monitoring in terms of increased detection of stature-related disorders. It has also pointed strongly to the need for further research. Growth monitoring does not currently meet all NSC criteria. However, it is questionable whether some of these criteria can be meaningfully applied to growth monitoring given that short stature is not a disease in itself, but is used as a marker for a range of pathologies and as an indicator of general health status. Identification of effective interventions for the treatment of obesity is likely to be considered a prerequisite to any move from monitoring to a screening programme designed to identify individual overweight and obese children. Similarly, further long-term studies of the predictors of obesity-related co-morbidities in adulthood are warranted. A cluster randomised trial comparing growth monitoring strategies with no growth monitoring in the general population would most reliably determine the clinical effectiveness of growth monitoring. Studies of diagnostic accuracy, alongside evidence of effective treatment strategies, could provide an alternative approach. In this context, careful consideration would need to be given to target conditions and intervention thresholds. Diagnostic accuracy studies would require long-term follow-up of both short and normal children to determine sensitivity and specificity of growth monitoring.

**Developmental Screening**

2a. Do developmental screens at 9, 18 and 24-30 months (as recommended by Bright Futures), compared to routine visits identify developmental conditions that would improve patient outcomes through early diagnosis and treatment?

- If yes, for which conditions would the incidence, timing (age profile) and severity of diagnoses change?

No studies that met inclusion were identified.

2b. What are the cost implications of early diagnosis and treatment (e.g., healthcare, school readiness, special education) for conditions identified by a developmental screen tool?

No studies that met inclusion were identified.
Autism Screening

3a. Does screening for autism spectrum disorders at 18 and 24 months compared to routine visits improve patient outcomes?
   o If yes, how would the incidence, timing (age profile) and severity of diagnoses change?
     No studies that met inclusion were identified.

3b. Does early diagnosis and treatment after the use of an autism screen or tool result in cost savings (e.g., healthcare, special education)?
     No studies that met inclusion were identified.

Summary & Next Steps

Two articles (Fayter 2007; Nelson 2008) were identified that met inclusion criteria. Both of the identified articles address Key Question #1a and one of those articles (Fayter 2007) additionally addresses Key Question #1b. Nelson (2008) is a systematic review on universal newborn hearing screening completed by the United States Preventive Services Task Force and Fayter (2007) addresses growth monitoring in primary school age children. No articles were identified that address Key Questions #2 and #3.

Though few articles met inclusion criteria, CEbP would welcome the opportunity to further research this topic. To determine the scope of any additional work, CEbP would work directly with WSIPP to define any remaining evidence needs and how the Center can meet them as well as a timeline and budget for this work. Examples of further research that may inform WSIPP’s report include 1) a summary report including the two articles identified by the literature search and/or 2) an expanded search of additional databases (e.g. PsychInfo, CINAHL).
Appendix A. Search Strategy

Database: Ovid MEDLINE(R) without Revisions <1996 to August Week 5 2012>, EBM Reviews - Cochrane Central Register of Controlled Trials <September 2012>, EBM Reviews - Cochrane Database of Systematic Reviews <2005 to August 2012>

Search Strategy:

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1  exp Child Development/ (21190)
2  exp mental disorders diagnosed in childhood/ (68785)
3  exp Communication Disorders/ (23441)
4  limit 3 to "all child (0 to 18 years)" [Limit not valid in CCTR,CDSR; records were retained] (12605)
5  1 or 2 or 4 (91471)
6  exp Mass Screening/ (63186)
7  screen$.mp. (321996)
8  6 or 7 (326318)
9  ((routin$ or frequen$ or yearly or annual$ or multiple$ or repeat$ or ((baby or babies or toddler$ or child$ or preschooler$) adj5 well$)) adj7 (exam$ or visit$ or physical$ or appointment$ or checkup$ or check up$)).mp. [mp=ti, ab, ot, nm, hw, ps, ui, sh, kw, tx, ct] (56399)
10  wellness.mp. (2901)
11  9 or 10 (59214)
12  exp "Outcome and Process Assessment (Health Care)"/ (640324)
13  exp Educational Status/ (24774)
14  exp Educational Measurement/ (72919)
15  exp Psychological Tests/ (112665)
16  ((education$ or school$ or class or classes or classroom$ or academic$) adj7 (assess$ or achiev$ or perform$ or accomplish$ or ready or readiness or prepar$ or placement$ or assign$)).mp. (43198)
17  exp education/ (324159)
18  16 or 17 (347778)
19  15 and 18 (9541)
20  13 or 14 or 19 (103288)
21  5 and 8 and 20 (289)
22  5 and 11 and 20 (47)
23  5 and 8 and 12 (250)
24  exp "Quality of Life"/ (96543)
25  5 and 8 and 24 (63)
26  5 and 11 and 24 (18)
27  exp Economics/ (261712)
28  ec.fs. (214425)
29  27 or 28 (328478)
30  5 and 8 and 29 (100)
31  5 and 11 and 29 (37)
32  21 or 22 or 23 or 25 or 26 or 30 or 31 (737)
33  limit 32 to yr="2002 -Current" (612)
34  limit 33 to english language [Limit not valid in CCTR,CDSR; records were retained] (566)
Appendix B. Excluded studies

**Intervention**


Grunau, R. E., Whitfield, M. F., & Fay, T. B. (2004). Psychosocial and academic characteristics of extremely low birth weight (< or =800 g) adolescents who are free of major impairment compared with term-born control subjects. *Pediatrics, 114*(6), e725-32.


Population


Pastor, P. N., & Reuben, C. A. Attention deficit disorder and learning disability: United states, 1997-98. *Vital & Health Statistics - Series 10: Data from the National Health Survey.* (206):1-12, 2002 may,


**Study design**


References


