Epidemiology of Attention-Deficit/Hyperactivity Disorder: National and State-Based Patterns and Opportunities for Policy Evaluation

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ADHD Symposium, Baton Rouge, LA

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Attention-Deficit/Hyperactivity Disorder
Diagnostic Criteria

The Gold Standard: *Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5)*

- **Symptom Count (6 or more; 5 or more for 17+)**
  - Inattention and/or Hyperactivity
  - Presentations (subtypes): Inattentive, Hyperactive, Combined

- **Age of Onset (symptoms before age 12)**

- **Impairment (significant)**

- **Pervasiveness (multiple settings)**

- **Rule-Outs**

Practice Guidelines from Professional Academies

- AAP Diagnostic and Treatment Guidelines
  - Recommendations and special considerations, by age
  - ADHD Process of Care Algorithm
- AACAP Diagnostic and Treatment Guidelines
AAP Guidance on Diagnosis and Management

- ADHD evaluation for any child (4-18) who presents with academic or behavioral problems and symptoms of inattention, hyperactivity, or impulsivity
- Assess with DSM criteria
  - Symptoms and impairment in more than 1 major setting
  - Information should be obtained from parents or guardians, teachers, and other school and mental health clinicians involved in the child’s care
  - Clinician should rule out alternative causes
- Clinician should assess comorbidities
- Clinician should recognize ADHD as a chronic condition

Prevalence of ADHD among School-Aged Youth: National Survey of Children’s Health

- **2011-12 National Population Estimates**
  - 6.4 million youth 4-17 years ever diagnosed
    - 2 million more than in 2003
  - 5.1 million with a current ADHD diagnosis
  - 3.5 million taking medication for ADHD
    - 1 million more than in 2003

- **2011-12 National Prevalence Rate (%)**
  - 11% of youth 4-17 years of age ever diagnosed
    - Up from 7.8% in 2003-2004; a 42% increase (~5% per year)
  - 8.8% with a current diagnosis
  - 6.1% taking medication for ADHD
    - Up from 4.8% in 2003; a 28% increase since 2007 (~7% per year)

Diagnosed ADHD Prevalence Estimates: National Parent Survey Data

Year
Prevalence estimate (%)
Weighted Prevalence Estimates (%) of Attention-Deficit/Hyperactivity Disorder (ADHD) Diagnosis by a Health Care Provider among U.S. Children, by Age and Medication Status

Parent-Reported Data from the National Survey of Children’s Health

Boys

Girls

Ever had ADHD diagnosis and currently taking medication

Ever had ADHD diagnosis but not currently taking medication

2003-2004

Weighted Prevalence Estimates (%) of Attention-Deficit/Hyperactivity Disorder (ADHD) Diagnosis by a Health Care Provider among U.S. Children, by Age and Medication Status

Parent-Reported Data from the National Survey of Children’s Health

Weighted Prevalence Estimates (%) of Attention-Deficit/Hyperactivity Disorder (ADHD) Diagnosis by a Health Care Provider among U.S. Children, by Age and Medication Status

Parent-Reported Data from the National Survey of Children’s Health

2011-2012

Anatomical Differences in Youth with ADHD

Anatomical Differences in Youth with ADHD

- Evidence of a Developmental Delay in Brain Growth and Subsequent Cortical Pruning Process
  - Multiple brain-imaging scans of 234 children with ADHD and 231 normally developing children
  - Scans beginning at 10 years and continued until 17
  - Cortical pruning happened around 13 for normally developing kids, but not until almost 15 for kids with ADHD

- Conclusions
  - Some children will “outgrow” ADHD when brain development catches up
    - Impairment may be felt long-term
  - Some children will never catch up

Persistence of ADHD Symptoms

Figure 1. Prevalence of parent-reported ADHD symptoms by developmental stage.

Average Prevalence of ADHD Symptoms by Developmental Stage

Prevalence (%)

Inattentive symptoms

Hyperactive-impulsive symptoms

Current ADHD Diagnosis:
NSCH, 2011-12

National Average: 8.8%

http://www.cdc.gov/ncbddd/adhd/prevalence.html
Current ADHD Medication Treatment: NSCH, 2011-12

National Average: 69%

http://www.cdc.gov/ncbddd/adhd/medicated.html
A CLOSER LOOK AT LOUISIANA
## State Profile: Louisiana

### Parent-Reported Diagnosis of ADHD by a Health Care Provider and Medication Treatment Among Children 4–17 Years: National Survey of Children’s Health* – 2003 to 2011

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>% Reporting ADHD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
</tr>
<tr>
<td><strong>Has a doctor or health care provider <strong>ever</strong> told you that your child had attention-deficit/hyperactivity disorder or attention deficit disorder (ADHD or ADD)</strong>?</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

**US**

**Louisiana**

<table>
<thead>
<tr>
<th>Does your child <strong>currently</strong> have ADHD or ADD?</th>
<th>2007</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among all US states, Louisiana ranked 2nd highest.</td>
<td>11.7%</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>is your child <strong>currently</strong> taking medication for ADHD or ADD?</th>
<th>2007</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among all US states, Louisiana ranked 1st highest.</td>
<td>8.3%</td>
<td>10.4%</td>
</tr>
</tbody>
</table>

*The National Survey of Children’s Health is conducted by CDC and sponsored by the Maternal and Child Health Bureau, HRSA: www.cdc.gov/nchs/data/nvss/nvss.htm

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**National Center on Birth Defects and Developmental Disabilities**

**Division of Human Development and Disability**
National Survey of Children’s Health: 2011-12

Prevalence (%)

<table>
<thead>
<tr>
<th>Current ADHD</th>
<th>Current ADHD medication use</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Louisiana</td>
<td>10 US</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

Legend:
- Louisiana
- US
Louisiana: ADHD Indicators by Gender

National Survey of Children’s Health: 2011-12

Current ADHD

<table>
<thead>
<tr>
<th>Prevalence (%)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ADHD</td>
<td>19</td>
<td>7</td>
</tr>
</tbody>
</table>

Current ADHD medication use

<table>
<thead>
<tr>
<th>Prevalence (%)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ADHD medication use</td>
<td>15</td>
<td>6</td>
</tr>
</tbody>
</table>
Louisiana: ADHD Indicators by Age

National Survey of Children’s Health: 2011-12

Prevalence (%)

<table>
<thead>
<tr>
<th>Age Group (y)</th>
<th>Current ADHD</th>
<th>Current ADHD medication use</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-10 y</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>11-14 y</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>15-17 y</td>
<td>13</td>
<td>10</td>
</tr>
</tbody>
</table>
### Louisiana: ADHD Indicators by Insurance Type

**National Survey of Children’s Health: 2011-12**

<table>
<thead>
<tr>
<th>Medicaid/SCHIP (public)</th>
<th>Non-Medicaid (private)</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current ADHD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td><strong>Current ADHD medication use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

Prevalence (%)
Louisiana: ADHD Indicators by Insurance Type

National Survey of Children’s Health: 2011-12

<table>
<thead>
<tr>
<th>Category</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever ADHD</td>
<td>16</td>
</tr>
<tr>
<td>Current ADHD</td>
<td>13</td>
</tr>
<tr>
<td>Current ADHD Meds</td>
<td>10</td>
</tr>
</tbody>
</table>

LA Overall

LA Medicaid
Louisiana: ADHD Indicators by Gender

National Survey of Children’s Health: 2011-12

<table>
<thead>
<tr>
<th></th>
<th>Current ADHD</th>
<th>Current ADHD medication use</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Overall</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>LA Overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>LA Medicaid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>6</td>
</tr>
</tbody>
</table>

Prevalence (%)
Age-specific ADHD Treatment Recommendations from AAP

- For preschoolers (4–5 years), evidence-based parent and/or teacher administered behavior therapy as the **first line of treatment**
  - May prescribe methylphenidate if the behavior interventions do not provide significant improvement and there is moderate-to-severe continuing disturbance in the child’s function
  - If evidence-based behavioral treatments are not available, **weigh the risks of starting medication at an early age against the harm of delaying diagnosis and treatment**
  - The primary care clinician should titrate doses of medication

- Children 6-12 should receive both ADHD medication and behavioral therapy

- Adolescents (13-18) should receive medication and behavioral therapy too, if possible

A CLOSER LOOK AT PRESCHOOLERS WITH ADHD
ADHD Diagnosis and Medication Treatment among Children Aged 2-5 Years

<table>
<thead>
<tr>
<th>Percent</th>
<th>Current ADHD Diagnosis</th>
<th>Currently Taking ADHD Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>~194,000 preschoolers with current ADHD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>~77,000 preschoolers taking medication for ADHD</td>
<td></td>
</tr>
</tbody>
</table>

All | Boys | Girls
---|------|------

Results – ADHD Diagnosis and Medication Treatment among Children Aged 2-5 Years

- **56% increase**
- **100% increase**

Current ADHD Diagnosis among Children Aged 2-5 Years

- National Estimate = 1.2%

† RSE > 30%

Percentage of Children Aged 2-5 Years with ADHD Who Currently Take ADHD Medication


National Estimate = 40.2%
Percentage of CSHCN aged 2-5 Years With ADHD Who Received Behavioral Therapy in Past 12 Months

National Estimate = 52.8%

† RSE > 30%

National Survey of Children with Special Health Care Needs, 2009-10
Percentage of CSHCN aged 2-5 Years With ADHD Who Received Neither Medication Nor Behavioral Therapy

National Survey of Children with Special Health Care Needs, 2009-10

National Estimate = 22.1%

† RSE > 30%
Digging Deeper with the GA Interagency Directors Team

GA as a Proof of Concept State

Among all US states, Georgia ranks 25th highest for current ADHD prevalence.
Percentage of GA Children in Medicaid with 2+ ADHD Diagnosis Codes (2012)

- 2 to 3: 1.0% (N=173,170)
- 4 to 5: 5.6% (N=172,797)
- 6 to 12: 11.3% (N=503,295)
- 2 to 12 (total): 8.1% (N=849,262)

Unpublished data; released in collaboration with Georgia Inter-Agency Directors Team
Treatment of GA Children in Medicaid with 1+ ADHD Diagnosis Codes and 1+ treatment claim (2012)

Unpublished data; released in collaboration with Georgia Inter-Agency Directors Team
Percentage of Children in Medicaid with 2+ ADHD Diagnosis Codes (2012), by Eligibility Categories

- Georgia Families (CMO) N=776,278, 7.3%
- Foster Care/Adopt Assist N=14,548, 29.2%
- SSI/Waiver N=33,477, 21.0%
- Other N=24,959, 2.3%

Unpublished data; released in collaboration with Georgia Inter-Agency Directors Team
Treatment of Children in Medicaid with 1+ ADHD Diagnosis Codes and 1+ Treatment Codes (2012), by Eligibility Categories

Unpublished data; released in collaboration with Georgia Inter-Agency Directors’ Team
Treatment of Children with 2+ ADHD Diagnosis Codes, by Insurance Status and Geography

Among a MarketScan sample of 10,000,000 individuals; unpublished data

* Unpublished data; released in collaboration with Georgia Inter-Agency Directors’Team
Age-Specific ADHD Treatment Recommendations from AAP: Preschoolers

- Parent and/or teacher behavior therapy should be the first line of treatment for children aged 4-5 years
  - Methylphenidate can be prescribed if behavior interventions do not provide significant improvement
  - If evidence-based behavioral treatments are not available, the risks of starting medication at an early age must be weighed against the harm of delaying diagnosis and treatment

### Comparative Effectiveness of ADHD and DBD Interventions in Young Children (< 6 years)

#### Table A. KQ1: Effectiveness of interventions for ADHD and DBD in children younger than 6 years of age

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Level of Evidence</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent Behavior Training</td>
<td>SOE: High</td>
<td>Parent behavioral interventions are an efficacious treatment option for preschoolers with DBD and show benefit for ADHD symptoms.</td>
</tr>
<tr>
<td></td>
<td>SMD: -0.68</td>
<td>These studies support the long-term effectiveness of parent interventions for preschoolers with DBD, including ADHD symptoms, with evidence that benefits are maintained for up to 2 years. There also appears to be a dose-response effect.</td>
</tr>
<tr>
<td></td>
<td>(95% CI, -0.88 to -0.47)</td>
<td></td>
</tr>
<tr>
<td>Medication (MPH Only)</td>
<td>SOE: Low</td>
<td>With evidence drawn primarily from the PATS study, MPH (e.g., short-acting, immediate-release MPH) is both efficacious and generally safe for treatment of ADHD symptoms, but there has been no long-term followup in preschoolers.</td>
</tr>
<tr>
<td></td>
<td>SMD: -0.83</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(95% CI, -1.21 to -0.44)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** ADHD = attention deficit hyperactivity disorder; CI = confidence interval; DBD = disruptive behavior disorder; KQ = Key Question; MPH = methylphenidate; PATS = Preschool ADHD Treatment Study; PBT = parent behavior training; SMD = standardized mean difference; SOE = strength of evidence.

Available at: http://effectivehealthcare.ahrq.gov/ehc/products/191/814/CER44_ADHD_ExecSumm_20111021.pdf

Behavioral Therapy is an Important and Cost-Effective ADHD Treatment

Evidence-Based Therapies for Preschoolers with ADHD

- The Agency for Health Care Research and Quality (AHRQ) reviewed treatments for preschoolers with behavioral problems.
- Recommended *parent behavioral interventions* as a good treatment option for preschoolers with ADHD, ADHD symptoms, and disruptive behavior in general.

- **4 programs for parents of preschoolers**
  - Triple P (Positive Parenting of Preschoolers program)
  - Incredible Years Parenting Program
  - Parent-Child Interaction Therapy (PCIT)
  - New Forest Parenting Programme

- **Key components of effective programs**
  - Help parents develop a positive relationship with their child
  - Teach them about how children develop
  - Help them manage negative behavior with positive discipline

Components of Effective Parenting Programs

- Proliferation of parent training programs as prevention/intervention
- New uses of parent training programs
- Research Questions
  - How effective is parent training?
  - Is all “parent training” the same?
- Meta-analysis of components of effective parenting programs (0-7 years of age) with outcomes on:
  - Parent behavior & skill acquisition
  - Child externalizing behaviors
- 77 published studies

Program Components that Predicted Parent and Child Outcomes

• Most robust predictors of parent skill acquisition
  – Teaching parents relationship-building communication skills
  – Having parents practice with their own child during the sessions

• Most robust predictors of child externalizing behaviors
  – Teaching parents to interact positively with their children and provide positive attention
  – Teaching parents consistent disciplinary responding

Behavioral Therapy for Preschoolers with ADHD: Sources of Behavioral Services

- Incredible Years
- Parent Child Interaction Therapy (PCIT)
- Triple P
- New Forest Programme

Evidence-Based Behavioral Parent Training (BPT) Programs*

- Incredible Years
- Parent Child Interaction Therapy (PCIT)
- Triple P
- New Forest Programme

BPT programs that include the evidence-based components (positive parenting-child interaction, consistent disciplinary responding)

- Promising Component Programs

Clinicians who can administer BPT consistent with the evidence-based components

- Clinical or Developmental Psychologists, Licensed Clinical Social Workers, Behavioral Analysts

Location quotient of clinical, counseling, and school psychologists, by state, May 2013

Blank areas indicate data not available.

http://www.bls.gov/oes/current/oes193031.htm
Practicing Child and Adolescent Psychiatrists in LA: 2012

Louisiana: Practicing Child and Adolescent Psychiatrists 2012
Rate per 100,000 children age 0-17

Louisiana: Practicing Child and Adolescent Psychiatrists 2012
Number per county

CAP per 100000 ages 0-17
none
10.0-20.0
2.0-5.0
20.0-50.0
5.0-10.0

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Child Psychiatrist cpint
None
10 - 14.9
0.1 - 1.9
15 - 19.9
2 - 4.9
20 - 49.9
5 - 9.9

(c) AACAP by C.E. Holzter capn 29MAR13
POLICY, PRACTICE, AND PROGRAM

Opportunities to Guide Clinical Practice and Family Choice
First-Line Treatment is Delivered to Young Children Diagnosed with ADHD

**Strategies**

- **Context**
  - Health Care Practitioner Knowledge, Behavior, & Preferences
  - Family Barriers
  - Infrastructure Deficits
  - Reimbursement Barriers

**Strategies**

- Characterize and Address Gaps in HCP Knowledge, Behavior, and Preferences
- Characterize and Address Family Barriers
- Characterize and Address Infrastructure Deficits
- Characterize and Address Reimbursement Barriers

**Enabling Support**

- Identify and Address Other Barriers
- Population-based Research and Surveillance
- Program Management
- Stakeholder Engagement

**Context**

- Children Under 6 are Diagnosed with ADHD by Clinicians

**Strategies**

- What can we learn from other practice change initiatives to speed uptake?
- How can we effectively change family KAPs for the better?
- Who can address these constraints? What models show success?
- What incentive strategies facilitate the right treatment?
Policy as an Impetus for a Change in Clinical Practice

- State Policies and Programs to Address Psychotropic Medication Use in Children – Foster Care Focus*
  - Additional justification required when prescribing psychotropics for young children
  - Preauthorization and peer-review for prescriptions for psychotropic medication in a young child
  - Psychiatric consultation lines to assist physicians in making referrals
  - Data registries that can be used to provide physician feedback and training
  - Preferred drug lists

Policy as an Impetus for a Change in Clinical Practice

State Policies to Address ADHD Medication Treatment in Young Children

- Preferred drug lists – consideration of FDA approvals (AMP formulations) and best practice guidelines (MPH formulations)
- Preauthorization and manual peer-review for prescribing ADHD medications in those under 6
- Requirements of psychosocial evaluation and non-med therapies tried first
## Quick Reference Drug List
### ADHD

**US Script Contact Information:** Prior Authorization Phone: 1-866-399-0928  
Prior Authorization Fax: 1-866-399-0929  
Clinical Hours: Monday – Friday  
10:00am – 8:00pm EST

**Peach State Contact Information:** Provider Inquiry Phone: 1-866-874-0633

**Key:** * = Generic product available

### NOTE: These medications are covered without prior authorization for members between ages 3-18, unless otherwise noted.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage Form</th>
<th>Medicaid PDL Status</th>
<th>Medicare Advantage Formulary Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphetamines</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| amphetamine/ dextroamphetamine mix*  
(Adderall®) | Tabs: 5mg, 7.5mg, 10mg, 12.5mg, 15mg, 20mg, 30mg | Yes | Yes |
| amphetamine/ dextroamphetamine ER mix*  
(Adderall XR®) | XR caps: 5mg, 10mg, 15mg, 20mg, 25mg, 30mg | Yes – Brand only  
Age limit – allowed for children over 6 years old | Yes – Brand only |
| dextroamphetamine*  
(Dexedrine®) | Tabs: 5mg, 10mg  
Caps ER: 5mg, 10mg, 15mg | Yes | Yes – except ER caps |
| methamphetamine*  
(Desoxyn®) | Tabs: 5mg | No | No |
| Vyvanse®  
(lisdexamfetamine) | Caps: 20mg, 30mg, 40mg, 50mg, 60mg, 70mg | No | No |
Prior Authorization Guidelines
ADHD Medications in Children Under 6 Years Old

FDA Approved Indication:
Treatment of Attention Deficit Hyperactivity Disorder (ADHD)

Guidelines for Approval:
1. The requesting clinician has documented that the child has a diagnosis of ADHD
2. Psychosocial issues and non-medical interventions are being addressed by the clinical team.
3. Documentation of psychosocial evaluation occurring before request for ADHD medications.
4. Documentation of non-medication alternatives that have been attempted before request for ADHD medications.

Additional Requirements:
Children under 6 years old will be monitored in accordance with the ADHS/DBHS Clinical Practice Protocol on Psychiatric Best Practice Guidelines for Children: Birth to Five Years of Age.

Coverage is Not Authorized for:
1. Indications other than ADHD.
2. Doses greater than FDA recommended maximum daily dosage.

References:
1. ADHS/DBHS: Provider Manual Section 3.15: Psychotropic Medication: Prescribing and Monitoring
2. Manufacturer Product Information
The Role of Insurers in Changing Clinical Practice

- Steps taken by Insurance Companies (select)
  - Alerts for:
    - 1+ psychotropic medications (including ADHD meds) for a child <6
    - 2+ psychotropic medications (including ADHD meds) for any child
    - 3+ psychotropic medications (including ADHD meds) for any child
    - 2+ prescribers prescribing the same psychotropic medication
    - High doses of ADHD medications
  - Targeted communication:
    - Physicians associated with the alerts above
    - Dissemination of ADHD guidelines, sometimes targeted to those treating young children
Importance of Policy Evaluation alongside Policy Intervention

“One of the great mistakes is to judge policies and programs by their intentions rather than their results.”

Milton Friedman
Contact Information

www.cdc.gov/ADHD

Susanna Visser, DrPH
svisser@cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.