Life after ‘Colic’: Long term outcomes of early infant crying

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The Irritable Infant Intervention Study

- The screening criteria for participation included parents or caregivers of healthy infants aged 3 to 8 months identifying their infant as suffering from crying problems.
- Infants were excluded if they had any medical or psychological condition that might influence their crying.

Reason for presenting to the hospital

- Worried the baby was sick: 45
- Last resort: 36
- Referred by Paediatrician: 32
- Wanted a second opinion: 15
- Referred by General Practitioner: 10
- Other reasons: 8
- Referred by MCHN: 4

(n=99)

208 infants recruited
- 19 medical exclusions
- 33 withdrawal
- 29 pathological reflux
- 127 randomized treatment
- 103 completed trial

iii study

- Effect of anti reflux medical treatment & infant mental health intervention
- Infants < 9 months of age
- Admitted to hospital
- Parent complaint of persistent crying
Sample n=103

- Mean age 3.2 months (range 0.5-8.2, SD1.98)
- 56 (44%) > 3 months old
- 52 (41%) firstborn
- 67 (53%) male
- 25% previous admission to hospital/mother baby unit

On admission

- Infant crying
  - Mean 253 minutes (SD 96.5)
  - 80% cried >3 hrs
  - 50% cried > 4 hours
- Mothers:
  - 75% daily/weekly contact with mgm
  - 69% 'very good' or 'excellent' support from mgm
  - Experience of Motherhood Questionnaire: mean 44.8 (SD8.6)

Research protocol

Admission: Randomization

<table>
<thead>
<tr>
<th>medical/placebo</th>
<th>infant mental health</th>
</tr>
</thead>
</table>

Day 1: History, physical exam, urinalysis
24 hour 'cry chart'
Baseline Questionnaires

Day 2: 24 hr pH monitoring

Day 3: discharge
active/placebo randomization

Week 4: 24 hour 'cry chart'
Questionnaires & Interview

Interventions

- Medical group (anti reflux medication or placebo)
  - Standard medical care
  - Referral to social work/mental health as indicated
  - Mixture A & Mixture B
    - Active group: ranitidine (Zantac)+ cisapride (Prepulsid)

Infant mental health consultation

- 90 min consult w MCHN & SW on ward

Focus
- Infant experience and emotional development
- Mother infant interaction and attachment relationship
- Parental emotional factors impacting on infant behavioural regulation or parent response to crying
- Individualized parent and nursing care plan for infant

Crying and fractional reflux time

\[ y = 252.3 - 0.29x \]
\[ r^2 = 0.000 \]
Predictors of pathological reflux

- Vomiting frequency (5+ times per day)
  
  NOT
  - volume of vomit
  - feeding refusal
  - back arching
  - extending head

Findings

- Anti reflux medication not superior to placebo in reducing crying duration/frequency/length of longest bout
- Mean reduction crying 94min
- Relative reduction similar in all 3 groups
- Reduction in maternal stress similar in all groups
- 27% of mothers (EPDS >13) at trial completion

Subsequent admit to mother baby unit

- Fisher’s exact p = 0.02

Life after Colic

- Prevalence of health & mental health problems at early school age in cohort of irritable infants admitted to hospital with persistent crying
- Identify early predictors of mental health problems

Aims
- 127 sent invitation letter by iii investigator
- Non responders sent another letter
- Electoral rolls and telephone directories if address changed
- Health Insurance Commission sent letter
- Responders contacted by researcher to arrange interview time

- 127 mother-infant pairs
  - 103 (81%) Completed trial
  - 12 Questionnaire only
    - 52 Full assessment
  - 24 (19%) Withdraw from trial
    - 3 Questionnaire only
      - 8 Full assessment
    - 13/24 (54%) lost to follow-up
  - 64/103 (62%) participants
  - 39/103 (38%) lost to follow-up

participants vs non participants

- No difference
  - Infant Age
  - Gender
  - Birth order
  - Other problems (feeding, sleeping)
  - Crying behaviour
- Maternal distress
  - EPDS mean score 11 (6.6) vs 8.6 in non participants p<0.05

hypotheses

- The prevalence of physical health problems would be no different from community norms.
- Despite a normal prevalence of physical health problems, parents would perceive their child as vulnerable.
- There would be a high prevalence of emotional and behavioural problems.

Evaluation measures

- Study questionnaire
  - Childs health & use of health services
  - Sleeping habits
  - Separations from parents
  - Socio demographic
- Forsyth Vulnerability Scale (Forsyth 1996)
- Strengths and Difficulties Questionnaire (Goodman 1997)
- Child Health Questionnaire – CHQ P50 (Waters 1999)

measures

- Child interview:
  - Mental State Exam – talking, drawing and play
- Interview with mother
comparison data

- Australia’s children: their health and wellbeing 2002
- Child and Adolescent Component of the National Survey of Mental Health and Wellbeing
- The Mental Health of Children and Adolescents in Great Britain
- The Health of Young Victorians Study

Demographic data

- Mean age 6.8 yrs (4.8-8.3, SD 0.5)
- 52% boys
- 52% < 3 months old at entry to infancy study
- 39% firstborn. 17% only child
- 53 (71%) families intact, 9 (12%) single parent, 13 (17%) step or blended families

Physical health outcome

- Medical cause for colic?
  - 2 x allergies
  - 1 NIDS
- 72/75 globally rated child’s health as good
- No difference prevalence of childhood illnesses
- No difference health service use (Medicare data)

Child mental health problems

- Strengths and Difficulties Questionnaire (Goodman 1997)
- Parent questionnaire
- 25 questions about child attributes
  - Emotional symptoms
  - Conduct problems
  - Hyperactivity-inattention
  - Peer relationship problems
- Total difficulties score
- Impact score – how much problems interfere with child’s everyday life

SDQ Results (scores in abnormal range)

<table>
<thead>
<tr>
<th>Life after colic</th>
<th>UK Community* sample</th>
<th>Risk ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total difficulties</td>
<td>19 (25.3%)</td>
<td>580 (9.9%)</td>
</tr>
<tr>
<td>Emotional symptoms</td>
<td>24 (32%)</td>
<td>632 (10.8%)</td>
</tr>
<tr>
<td>Conduct problems</td>
<td>23 (30.7%)</td>
<td>767 (13.1%)</td>
</tr>
<tr>
<td>Hyperactivity/ inattention</td>
<td>16 (21.3%)</td>
<td>943 (16.1%)</td>
</tr>
<tr>
<td>Peer problems</td>
<td>11 (14.7%)</td>
<td>644 (11.0%)</td>
</tr>
<tr>
<td>Total impact score</td>
<td>17 (22.7%)</td>
<td>457 (7.8%)</td>
</tr>
</tbody>
</table>

Impact of mental health problems on child

<table>
<thead>
<tr>
<th>Impact on child</th>
<th>Quite a lot</th>
<th>A great deal</th>
<th>Total significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>A cause of distress or upset to the child</td>
<td>12 (16%)</td>
<td>5 (7%)</td>
<td>17 (23%)</td>
</tr>
<tr>
<td>Interferes with child’s home life</td>
<td>11 (15%)</td>
<td>4 (5%)</td>
<td>15 (20%)</td>
</tr>
<tr>
<td>Interferes with child’s friendships</td>
<td>6 (7%)</td>
<td>2 (3%)</td>
<td>7 (10%)</td>
</tr>
<tr>
<td>Interferes with child’s classroom-learning</td>
<td>6 (8%)</td>
<td>5 (7%)</td>
<td>11 (15%)</td>
</tr>
<tr>
<td>Interferes with leisure activities</td>
<td>6 (8%)</td>
<td>4 (5%)</td>
<td>10 (13%)</td>
</tr>
</tbody>
</table>

* 1996 UK National Survey of Mental Health of Children and Adolescents
### Mental Disorders

<table>
<thead>
<tr>
<th>DSM-IV criteria</th>
<th>Total (n=61)</th>
<th>UK Study (ISD)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any disorders</td>
<td>15 (24.6%)</td>
<td>8.2%</td>
</tr>
<tr>
<td><strong>Emotional disorders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalised anxiety disorder</td>
<td>2 (3.3%)</td>
<td>0.7%</td>
</tr>
<tr>
<td>Depressive disorder (NOS)</td>
<td>2 (3.3%)</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Attention-deficit and disruptive behaviour disorders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD</td>
<td>1 (3.2%)</td>
<td>2.3%</td>
</tr>
<tr>
<td>Oppositional defiant disorder</td>
<td>11 (18%)</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

* 1999 UK National Survey of Mental Health of Children and Adolescents

### Child Health Questionnaire (Waters 1999)

- **Burden on family of child health problems**
  - Impact on parents
    - Emotional
    - Time
  - Impact on family
    - Activities
    - Cohesion

### Burden of child’s health/mental health problems on parent and family - CHQ

<table>
<thead>
<tr>
<th>Life after Colic</th>
<th>Normative sample</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=75) Mean (SD)</td>
<td>(n=5212) Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Burden over life of family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family activities</td>
<td>63.3 (26.3)</td>
<td>85.5 (16.7)</td>
</tr>
<tr>
<td>Parent time for own needs</td>
<td>70.4 (29.5)</td>
<td>91.5 (16.4)</td>
</tr>
<tr>
<td>Worry/concern</td>
<td>56.9 (28.4)</td>
<td>80.5 (20.1)</td>
</tr>
<tr>
<td>Burden over last 4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited family activities</td>
<td>77.8 (22.2)</td>
<td>85.5 (16.7)</td>
</tr>
</tbody>
</table>

*Health of young Victorians survey (1998)*

### Parental perception of child vulnerability

- 23/75 (31%) classified as vulnerable by parent.
- USA Community samples 10%

### Predictive factors for DSM IV diagnosis

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Normal (n=46)</th>
<th>Disorder (n=15)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth order – Twinborn</td>
<td>14/46</td>
<td>15/15</td>
<td>0.92</td>
</tr>
<tr>
<td>Sleeping difficulties present (n=90)</td>
<td>34/46</td>
<td>14/14</td>
<td></td>
</tr>
<tr>
<td>Birth/pregnancy complications</td>
<td>13/38</td>
<td>9/12</td>
<td>0.09</td>
</tr>
<tr>
<td>Illness during pregnancy (n=50)</td>
<td>23/39</td>
<td>15/12</td>
<td>0.04</td>
</tr>
<tr>
<td>Psychological changes in pregnancy</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience of Motherhood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 1 (mean, SD) (n=60)</td>
<td>44 (7.5)</td>
<td>50 (9.1)</td>
<td>0.04</td>
</tr>
<tr>
<td>Hospital admission prior to study</td>
<td>9/43</td>
<td>7/14</td>
<td>0.03</td>
</tr>
</tbody>
</table>

### Maternal reports at infancy follow-up & DSM diagnosis

<table>
<thead>
<tr>
<th>Maternal perception</th>
<th>Mental disorder (n=15)</th>
<th>No mental disorder (n=46)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crying Duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same (n=13)</td>
<td>6 (42%)</td>
<td>7 (15%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Better (n=36)</td>
<td>9 (61%)</td>
<td>22 (47%)</td>
<td></td>
</tr>
<tr>
<td>Data missing (n=10)</td>
<td>3 (23%)</td>
<td>7 (15%)</td>
<td></td>
</tr>
<tr>
<td>Baby’s routine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same (n=15)</td>
<td>7 (47%)</td>
<td>9 (17%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Better (n=36)</td>
<td>5 (13%)</td>
<td>31 (87%)</td>
<td></td>
</tr>
<tr>
<td>Data missing (n=10)</td>
<td>3 (23%)</td>
<td>7 (15.2%)</td>
<td></td>
</tr>
<tr>
<td>Easier of settling baby</td>
<td>4 (27%)</td>
<td>10 (22%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Easier of settling baby</td>
<td>8 (53%)</td>
<td>20 (43%)</td>
<td></td>
</tr>
<tr>
<td>Data missing (n=10)</td>
<td>3 (23%)</td>
<td>7 (15.2%)</td>
<td></td>
</tr>
<tr>
<td>Enjoyment of baby day</td>
<td>No improvement</td>
<td>4 (27%)</td>
<td>0.08</td>
</tr>
<tr>
<td>Better (n=36)</td>
<td>5 (13%)</td>
<td>35 (79%)</td>
<td></td>
</tr>
<tr>
<td>Data missing (n=10)</td>
<td>3 (23%)</td>
<td>7 (15.2%)</td>
<td></td>
</tr>
</tbody>
</table>
DSM IV Criteria for oppositional defiant disorder

A. A pattern of negativistic, hostile and defiant behaviour lasting at least 6 months
   - At least 4 of the following:
     - Often loses temper
     - Often argues with adults
     - Often actively defies or refuses to comply with adults requests or rules
     - Often deliberately annoys people
     - Often blames others for his or her mistakes or misbehaviour
     - Is often touchy or easily annoyed by others
     - Is often angry and resentful
     - Is often spiteful or vindictive

A. Clinically significant impairment in social, academic or occupational functioning

Summary of findings

- No significant difference in physical health problems or use of health resources
- ¼ of children have mental health problems on SDQ – emotional and conduct problems
- ¼ have a DSM IV diagnosis on clinical examination
- Problems are seen to impact on child + family
- No age group difference
- Infancy factors assoc with diagnosis
  - Mother reports no improvement in baby (crying, routine) ?
  - Enjoyment of baby
  - Firstborn
  - Psychological changes in pregnancy
  - Maternal distress when baby admitted
  - Previous ‘unsuccessful’ admissions

Conclusion

- Crying a sign or a cause of impaired relationships and emotional regulation difficulties?
- Not always a benign transient disorder
- Beware re prediction of ODD
  - Extreme sample
  - What does ODD really mean? - is it actually an attachment disorder?? Breakdown in intuitive parenting? emotional regulation problem?
  - Do treatment regimes contribute eg behaviour ‘management’ / controlled crying rather than relationship attunement?

Recommendations

- Waiting lists a problem
- Need for integrated maternal and child health/paediatric/mental health services
- Focus on infant’s emotional regulation, mental health, infant parent attachment relationship and parents mental health and relationship
- More research – which infants and parents at risk for poor outcomes?