Inequity in Child Health
addressing the inverse care law – be part of the solution not the problem

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The national frameworks

**Healthy, Safe and Thriving:**
National Strategic Framework for Child and Youth Health

August 2015

Australian Health Ministers’ Advisory Council

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**National Framework for Child and Family Health Services – secondary and tertiary services**

December 2015

Australian Health Ministers’ Advisory Council
Guiding Principles

- Prevention and early intervention: universal and targeted prevention services and early intervention for those identified as in need is best practice and essential for achieving optimal health outcomes.

- Strengths based approach: health services for children, young people and families are delivered from a social health perspective, building on strengths, enabling children and young people to grow up thriving and resilient.

- Environment: children and young people should grow up in healthy and safe families, environments and communities.

- **Equity**: all children and young people in Australia should have appropriate access to health services to ensure equitable outcomes.

- Proportionate universalism: the provision of health services must be universal, but with services provided at a level proportionate to need.
Increasing evidence
Reducing preventable premature mortality
Reducing the impact of disability
Reducing the incidence of vaccine preventable disease
Reducing the impact of conditions occurring in adulthood with their origins or early manifestation in childhood or adolescence
Enhancing family and social functioning
Days of our lives

• In 1900 life expectancy was 17,773 days

• In Australia, a child born in 2013 - 2015 can expect to live approximately 30,000 days (some variation)

• If a child is Aboriginal or Torres Strait Islander they are expected to live approximately 10.6 years or 3,800 days less

• The first 2000 days from conception to school are critical
1. Antenatal
2. Alcohol
3. Architecture
4. Adverse childhood
dohAd
6. “Apigenetics”
7. Aboriginal
ATTACHMENT
Antenatal - Stress
Stressful life events study

To determine the impact of maternal stressful life events during pregnancy on offspring behavioural outcomes with differentiation between:

- The number of stressful events
- The type of stressful events
- The timing of stressful events
Raine Study

Stressful Life Events

- Pregnancy problem
- Death of a relative
- Death of a friend
- Job loss
- Moving house
- Problem other children
- Separation & divorce
- Relationship problem
- Mothering problems
Prenatal stress and child behavioural morbidity

- 2900 pregnant women – detailed obstetric data
Prenatal antidepressant exposure and child behavioural outcomes at 7 years of age: a study within the Danish National Birth Cohort

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Untreated prenatal depression compared with treatment & unexposed children


*Behavioural problems defined as scores above the 90th percentile on the parent-report version of the Strengths and Difficulties Questionnaire (SDQ)
NSW Policy Response

- SAFESTART
- Antenatal Psychosocial Questionnaire
2. Antenatal - Alcohol
**Alcohol**

**Brain Structures Most Sensitive to Prenatal Alcohol Exposure**

<table>
<thead>
<tr>
<th>Brain Structure</th>
<th>Function</th>
<th>Prenatal alcohol exposure may result in problems with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corpus Callosum</td>
<td>Communicates motor, sensory and cognitive information between the two hemispheres of the brain</td>
<td>Storing and retrieving information, problem solving, attention and verbal memory</td>
</tr>
<tr>
<td>Cerebellum</td>
<td>Processes input from other areas of the brain to coordinate motor and cognitive skills</td>
<td>Controlling movements, maintaining balance and fine motor skills</td>
</tr>
</tbody>
</table>

National Organization on Fetal Alcohol Syndrome (NOFAS)
1.800.66NOFAS or visit www.nofas.org
Guideline 4: Pregnancy and breastfeeding

Maternal alcohol consumption can harm the developing fetus or breastfeeding baby.

A. For women who are pregnant or planning a pregnancy, not drinking is the safest option.

B. For women who are breastfeeding, not drinking is the safest option.
3. Architecture
The Developing brain

- At birth brain connections are relatively few – 50 trillion – these are determined by genes from parents
- In the first few months connections increase to 1,000 trillion – these are determined by a baby’s experience
- Experience determine which pathways are formed & repeated experiences make these stronger and stronger – pathways not used fade away
- Experiences wire channels – emotions of love and affection or anger and aggression
Brain Structure - Head Circumference

My personal health record

Head circumference for age percentiles
GIRLS - birth to 2 years


Source: My Personal Health Record
NSW Health
Romanian orphanage study

A “Natural” Experiment

- Children adopted into middle class homes after 8 months in the orphanages show at 11 years in contrast to children adopted early:
  1. Abnormal brain development (small brain, low metabolic activity, abnormal EEG)
  2. Social and cognitive problems
  3. High vulnerability to behavioural problems (ADHD, aggression, quasi autism)

Kolb, U Lethbridge

RESILIENCE!
Adversity impacts on brain development

**Healthy Brain**
This PET scan of the brain of a normal child shows regions of high (red) and low (blue and black) activity. At birth, only primitive structures such as the brain stem (center) are fully functional; in regions like the temporal lobes (top), early childhood experiences wire the circuits.

**Back**

**Temporal lobes**

**An Abused Brain**
This PET scan of the brain of a Romanian orphan, who was institutionalized shortly after birth, shows the effect of extreme deprivation in infancy. The temporal lobes (top), which regulate emotions and receive input from the senses, are nearly quiescent. Such children suffer emotional and cognitive problems.

**Front**

**Temporal lobes**

Source: The Founders' Network www.founders.net
Sensitive Periods for Early Development

- Binocular vision
- Central Auditory System
- Emotional control
- Habitual ways of responding
- Peer social skills
- Language
- Cognitive skills: symbols

Critical period: Sensitive period
Critical period wanes: Age (yrs)
NSW POLICY RESPONSE

SCHOOL SCREENING FOR VISION AND HEARING REPLACED BY

- SWISH – AND HEARING SURVEILLANCE
- StEPS – AND VISUAL SURVEILLANCE
“A child’s development score at just 22 months can serve as an accurate predictor of educational outcomes at 26 years.”

Data Support

- Australian Early Development Census
- NAPLAN
POLICY RESPONSE

Child Health Programme

- Developmental Surveillance

- NSW - LEARN THE SIGNS ACT EARLY
4. Adverse childhood events
Negative experiences in the early years have long-lasting effects that can be difficult to overcome later.

ACE Score has strong and graded relationship to health-related behaviours and outcomes during childhood and adolescence including early initiation of smoking, sexual activity, and illicit drug use, adolescent pregnancies, and suicide attempts.
Adverse Childhood Experience (ACE) Pyramid

One of the largest studies undertaken to examine the associations between childhood maltreatment and later-life health and well-being

Source: changingmindsnow.org
Adverse Childhood Experiences

Abuse
  ● Emotional abuse ● Physical abuse ● Sexual abuse

Neglect
  • Emotional neglect
  • Physical neglect

Household Dysfunction
  • Mother treated violently
  • Household substance abuse
  • Household mental illness
  • Parental separation or divorce
  • Incarcerated household member
Early experience - life long outcomes

**Significant Adversity Impairs Development in the First Three Years**

- Children with Developmental Delays
- Number of Risk Factors

**Risk Factors for Adult Heart Disease are Embedded in Adverse Childhood Experiences**

- Odds Ratio
- Adverse Experiences

*Source: Harvard Developing Child*
Long term affect on life

![Life Course Problems Related to Early Life](https://alfinnextlevel.wordpress.com/2013/08/12/getting-started-early-sensitive-periods-of-childhood-development/)

<table>
<thead>
<tr>
<th>2nd Decade</th>
<th>3rd/4th Decade</th>
<th>5th/6th Decade</th>
<th>Old Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Failure</td>
<td>Obesity</td>
<td>Coronary Heart Disease</td>
<td>Premature Aging</td>
</tr>
<tr>
<td>Teen Pregnancy</td>
<td>Elevated Blood Pressure</td>
<td>Diabetes</td>
<td>Aging</td>
</tr>
<tr>
<td>Criminality</td>
<td>Depression</td>
<td>Memory Loss</td>
<td>Memory Loss</td>
</tr>
</tbody>
</table>

Source: https://alfinnextlevel.wordpress.com/2013/08/12/getting-started-early-sensitive-periods-of-childhood-development/
Biochemistry – Stress Hormones

POSITIVE
Brief increases in heart rate, mild elevations in stress hormone levels.

TOLERABLE
Serious, temporary stress responses, buffered by supportive relationships.

TOXIC
Prolonged activation of stress response systems in the absence of protective relationships.

Source: Center on the Developing Child, Harvard University
5. DOHaD
Who is this midwife?
Documentation that launched DOHAD!

<table>
<thead>
<tr>
<th>Weight at Birth</th>
<th>Weight 1st Year</th>
<th>Food</th>
<th>No. of Visits</th>
<th>Condition, and R Health Visi</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 1/2 lbs</td>
<td>24.5 lbs</td>
<td>15</td>
<td>11</td>
<td>Y</td>
</tr>
<tr>
<td>Healthy, well developed</td>
<td>Buckland School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 lbs</td>
<td>18.5 lbs</td>
<td>13</td>
<td>12</td>
<td>h, y</td>
</tr>
<tr>
<td>Moved to Bury Green, L. Keelham.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 lbs</td>
<td>20 lbs</td>
<td>11</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Had measles, pneumonia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 lbs</td>
<td>22 lbs</td>
<td>9</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Healthy, normal</td>
<td>Buckland School</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dr Barker

- Identified 15,000 Hertfordshire residents with detailed birth records in 1930s
- 3000 dead
  - ~1500 from CHD
Early – the Foetal Origins of Disease 1995

Birth Weight and Coronary Heart Disease
Barker Hypothesis

Rich-Edwards 1997
DoHaD - Developmental Origins of Health and Disease

What happens in the womb lasts a lifetime
“Supports for families and appropriate training for providers of early care and education across all types of care, including informal arrangements as well as established centers, can improve health outcomes throughout the life course”
Aboriginal Maternal and Infant Health
Aboriginal Maternal and Infant Health Indicators NSW 2016

6. “Apigenetics”
The eggs that may someday become the grandchild are developed inside the daughter while she is still in the womb within the mother. The eggs are nourished by the diet and environment of the mother.

When you are pregnant, you are also pregnant with your grandchild.

Source: betterthefuture.org
A life course approach
How Early Experiences Alter Gene Expression and Shape Development

1. **EXTERNAL EXPERIENCES** (e.g., stress, nutrition, toxins) spark signals between neurons.
2. **NEURAL SIGNALS** launch production of gene regulatory proteins inside cells.
3. **GENE REGULATORY PROTEINS** attract or repel enzymes that add or remove epigenetic markers.
4. **EPIGENETIC “MARKERS”** control where and how much protein is made by a gene, effectively turning a gene “on” or “off,” thereby shaping how brains and bodies develop.

**GENE** – a specific segment of a DNA strand.

**DNA strands** encircle histones that determine whether or not the gene is “readable” by the cell.

**CHROMOSOME** – can pass on genes to next generation.

Illustration by Betsy Hayes. Source: Harvard Center on the Developing Child.
8. Attachment
Attachment

Source: Forældre og Fødse
What to do?

- Personal Health Record
- Developmental Surveillance
- Love Talk Sing Read Play
2) Scale Up Evidence Based Interventions

Immunisation

School Connectedness

Advocacy - enhance social, political, economic and physical environment; legislation (e.g. seatbelts); structural changes (e.g. housing design)

Equitable access to services

Population Parenting Programs

Evidence based universal and targeted early intervention

Antenatal Care

Nurse Home Visiting

Mother completing 12 years of Education

Breastfeeding support

Source and thanks to: Altman L, Burrett S, Woolfenden S 2017
POLICY

- PERSONAL HEALTH RECORD (THE BLUE BOOK)

- SAFE START

- FIRST 2000 DAYS FRAMEWORK
The draft First 2000 Days has three goals at its core

1. We all understand the importance of the first 2000 days of life and what needs to happen

2. The health system responds to the needs of mothers, children and families in NSW so that they receive the right help when they need it

3. Families are supported to develop skills, connections and resources to overcome challenges