

Submission on Mental Health Strategy

In this submission I focus on three areas. Viz

#1 Expansion of Early Childhood check to assess social and emotional development.

#2 Enhancement of Parental education and support.

#3 The need to consider “Who is the client?”

The patient?

The family ?

The patient’s microbiome?

Currently, Australia is developing National Taskforces to address twin and overlapping epidemics of the so-called Non-Communicable Diseases of {Obesity metabolic syndrome and Diabetes} and Mental illness.

These disorders are frequently co-morbid and share common determinants. Ie Early Childhood Adversity and Dysbiosis.

Trauma, dysbiosis, autonomic dysregulation, and subsequent impaired sense of Self predicate impaired emotional development.

A secure sense of self and the ability of manage negative emotions are clearly emergent by age of 3 years, and forms the scaffolding for future cognitive development. The ability of our children to PLAY is fundamental to their future mental and physical health.

Clinical microbiology has traditionally focused on the role of individual pathogens in human disease. Now high throughput DNA sequencing allows the study of entire distinct microbial communities referred to as the Microbiome. Disruption of this human micro-ecology is called Dysbiosis.

The microbiome is a microbial communities include both pathogenic and non-pathogenic organisms that can impact human health and homeostasis. Antibiotics are by far the most common medications prescribed for children, and epidemiological studies have identified associations between antibiotic usage in early infancy and the occurrence of diseases such as obesity, diabetes and asthma.¹ Moreover, the frequency of antibiotic resistance genes in the infant gut microbiome increases with age, and infants born via Caesarean-section harbour

¹ Pajau Vangay, Tonya Ward, Jeffery S.Gerber, and Dan Knights. Antibiotics, Pediatric Dysbiosis, and Disease. Cell Host and Microbe 17, May 13, 2015. 553-564. Elsevier.

a larger proportion of antibiotic resistant genes. Of relevance, children born by caesarean section are at higher risk for developing obesity in childhood.²

Our microbiome is essential in the maintenance of barriers to the external environment, “normal” training of our developing immune system, protection against pathogens and sits at the interface of nutrition and metabolism.³

Metagenomic and other comparative Human studies reveal reduced biodiversity and compositional alterations of gut and skin microbiota are associated with inflammatory Non Communicable Diseases (NCDs) including asthma, allergic and inflammatory bowel diseases, Obesity, Type 1 and Type 2 Diabetes, depression and other mental illnesses. Worrisome is the realisation, that a significant risk for NCDs is programmed early in life- even those that so not manifest for decades. But this also points to opportunities for timely intervention.

In tandem with these realisations for the pathogenesis of NCDs is the emerging link between the gut microbiome and the central nervous system (CNS), regarded as a paradigm shift in neuroscience.⁴ Mounting evidence suggests the gut microbiota can modulate brain development, function and behaviour by immune, endocrine and neural pathways. Structural similarities are evident between the intestine, placenta and blood-brain. This observation strengthens the hypothesis that the developing brain may be vulnerable to changes in the gut microbiota. Human studies further confirm that acute stress can affect intestinal permeability. Irritable Bowel Syndrome (IBS) is a stress related functional brain-gut-microbiota axis disorder associated with an altered gut microbiota profile. Stressful early –life events are strongly associated with the development of depression later in life, and other neurodevelopmental disorders.

Several factors play a role in the development of a normal microbiome, including mode of delivery- vaginal or caesarean section; diet during in infancy (breast milk or formula feeds), childhood (vegan or meat based) and the use of antibiotics. The gut of infants born vaginally are colonised by bacteria from the maternal vagina, in particular *Lactobacillus* and *Prevotella*. Children born by caesarean section are colonized by maternal skin flora, in particular *Streptococcus*, *Corynebacterium*, and *Propionibacterium*. Breast feeding and developing dietary composition across the life span continue to the composition, diversity and richness of the human microbiome, with implications for physical and mental health.⁵

² Kuhle S, Tong OS, Woolcott CG, Association between caesarean section and childhood Obesity: A systemic review and meta-analysis. *Obesity Reviews* 16 (4), 295-303, 2015

³ Susan L Prescott et.al. Dysbiotic drift and biopsychosocial medicine: how the microdome links personal, public and planetary health. *Biopsychosocial Medicine* (2018) 12:7

⁴ Kelly JR, Kennedy PJ, Cryan JF, Dinan TG, Clarke G, and Nyland NP. (2015) Breaking down the Barriers : the gut microbiome, interstitial permeability , and stress related psychiatric disorders. *Front. Cell. Neuroscience.* 9:392

⁵ Sai Manasa Jandhyala et. al. Role of the normal gut microbiota. *World J. of Gastroenterology* 2015 August 7; 21 (29)

Inflammation and the blood-brain-barrier may well play a major role in the developmental aetiology of cerebral palsy, autism and even schizophrenia.⁶ Alzheimer's disease and Parkinson's disease may well represent functional impairment of blood-brain-barrier associated with increase permeability of intestinal tight junctions. These conditions are often associated with impaired weight management.

The gut-brain axis consists of bi-directional communication between the central (CNS) and enteric nervous system (ENS), linking emotional and cognitive centres of the brain with peripheral intestinal function. Environmental stress, as well as elevated pro-inflammatory cytokines activates this system. The concept of a Microbiome-Gut –Brain-axis is now increasingly accepted.⁷

The bi-directional gut-brain communication is mediated via the Vagus nerve. Heart rate variability (HRV) is a well-validated psychophysiological marker of mental and physical well-being⁸, more familiar in the labour ward than General Practice. Over the long term reduced HRV leads to immune dysfunction and inflammation, and multiple physical and mental co-morbidities.

Moreover, emotion-regulating strategies are understood to influence food intake, and recent research at Monash University, Melbourne “support the contention that excess weight is linked to an abnormal pattern of neural activation and connectivity during the experience and regulation of negative emotions.” This study provides empirical support for the clinical observation of “ineffective regulation of emotional states contributing to the acquisition and preservation of excess weight.”⁹

These findings open the possibility of novel non-invasive approaches to self-regulation in patients with autonomic –emotional dysregulation. Heart rate variability (HRV) biofeedback, a technique which encourages slow meditative breathing, was offered to 25 in-patients with various eating disorder diagnoses- anorexia nervosa, bulimia nervosa and binge eating disorder. Researchers found that this modality had no serious side effects, and was subjectively useful to most participants. An enhanced ability to generate highly coherent HRV patterns in patients with recent onset anorexia nervosa was observed.¹⁰

⁶ H.B. Stolp and K.M. Dziegielewsks (2009) Role of developmental inflammation and blood-brain-barrier dysfunction in neurodevelopmental and neurodegenerative diseases.

⁷ Marilia Carabotti et al. The gut-brain axis : interactions between enteric microbiota, central and enteric nervous systems. *Annals of Gastroenterology* (2015) 28, 203-209

⁸ Andrew H. Kemp, Daniel S. Quintana. Review The relationship between mental and physical health: Insights from the study of Heart Rate Variability. *International Journal of Psychophysiology* . 89 (2013) 288-296.

⁹ Stewart T, Pico-Perez M, Mata F, Martinez-Zalacain I, Cano M, Contreras-Rodriguez O, et.al. (2016) Emotion Regulation and Excess Weight : Impaired Affective Processing Characterized by Dysfunctional Insula Activation and Connectivity . *PLOS One*

¹⁰ Scolnick et.al. Pilot study employing heart rate variability biofeedback training to decrease anxiety in patients with eating disorders. *Journal of Eating Disorders* 2014 2:17

Moreover it is important to note the observation of Fetal and postnatal metal dysregulation in Autism ¹¹ , and the opportunity for early intervention to prevent neurotoxicity of the developing emotional architecture in infancy.

In January 2019, the Lancet published Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems.¹² The report proclaims:

“Food systems have the potential to nurture human health and support environmental sustainability; however, they are currently threatening both. Providing a growing global population with healthy diets from sustainable food systems is an immediate challenge. Although global food production of calories has kept pace with population growth, more than 820 million people have insufficient food and many more consume low-quality diets that cause micronutrient deficiencies and contribute to a substantial rise in the incidence of diet-related obesity and diet-related non-communicable diseases, including coronary heart disease, stroke, and diabetes. Unhealthy diets pose a greater risk to morbidity and mortality than does unsafe sex, and alcohol, drug, and tobacco use combined.”

And concludes:

“The food we eat and how we produce it will determine the health of people and the planet, and major changes must be made to avoid both reduced life expectancy and continued environmental degradation.”

Key messages of the EAT Lancet Commission are included:

4 Healthy diets have an appropriate caloric intake and consist of a diversity of plant-based foods, low amounts of animal source foods, unsaturated rather than saturated fats, and small amounts of refined grains, highly processed foods, and added sugars.

5 Transformation to healthy diets by 2050 will require substantial dietary shifts, including a greater than 50% reduction in global consumption of unhealthy foods, such as red meat and sugar, and a greater than 100% increase in consumption of healthy foods, such as nuts, fruits, vegetables, and legumes. .

¹¹ Manish Arora et.al. Fetal and post-natal metal dysregulation in Autism. Nat. Commun. **8**, 15493

¹² Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Walter Willett, Johan Rockström, Brent Loken, Marco Springmann, Tim Lang, Sonja Vermeulen, Tara Garnett, David Tilman, Fabrice DeClerck, Amanda Wood, Malin Jonell, Michael Clark, Line J Gordon, Jessica Fanzo, Corinna Hawkes, Rami Zurayk, Juan A Rivera, Wim De Vries, Lindiwe Majele Sibanda, Ashkan Afshin, Abhishek Chaudhary, Mario Herrero, Rina Agustina, Francesco Branca, Anna Lartey, Shenggen Fan, Beatrice Crona, Elizabeth Fox, Victoria Bignet, Max Troell, Therese Lindahl, Sudhvir Singh, Sarah E Cornell, K Srinath Reddy, Sunita Narain, Sania Nishtar, Christopher J L Murray

A major impediment to progress in developing strategic plans to tackle obesity is the conflict of interest in medical research, education and practice. A landmark report by the Institute of Medicine recommended “that medical institutions – including academic medical centres, professional societies, patient advocacy groups and medical journals – establish conflict of interest policies that require disclosure and management of both individual and institutional financial ties to industry.”¹³

This is an international problem, and it is argued “endemic financial entanglement is distorting the production and use of healthcare evidence, causing harm to individuals and waste for health systems.” It has been shown that published outcomes of industry-sponsored studies repeatedly favour products, creating a “sponsorship bias”¹⁴ A global team of researchers, clinicians, regulators and citizen advocates provided five key messages -

#1. Trustworthy evidence is required to enable well-informed decisions about healthcare.

2. Widespread financial interest on industry brings commercial bias in research evidence, medical education and clinical practice.

#3. Such bias tends to overstate healthcare benefits and downplay harms.

4. Greater financial independence from industry is desirable and possible, with examples of reform across research, education, and practice.

5. The proposed steps toward financial independence from commercial interests will involve major cultural change.

This challenge to ethical research is not only the concern of professionals, but is now “everybody’s business.” Argues Sarah Franklin in a comment in Nature.¹⁵

Public-Private enterprises are fraught with moral hazard. Lack of transparency and accountability need rectification. This is especially the case for animal research. 40% of NHMRC funding is allocated to Animal research. Many would argue with little benefit toward human health outcomes at a population level. Moreover public-private research, involving international partners is not transparent, due to commercial in confidence provisions. It is to be noted that

¹³ Lo B, Field MJ. Conflict of Interest in medical research , education , and practice .National Academic Press, 2009.

¹⁴ Pathways to independence : Towards producing and using trustworthy evidence. Ray Moynihan, Lisa Bero, Sue Hill, Minna Johansson, Joel Lexchin, Helen Macdonald, Barbara Mintzes, Cynthia Pearson, Marc A Rodwin, Anna Stavdal, Jacob Stegenga, Brett D Thombs, Hazel Thornton, Per Oval Vandvik, Beate Wieseler, Fiona Godlee. BMJ 2019; 367: 16576 (3rd December 2019)

¹⁵ Sarah Franklin Ethical research – the long and bumpy road from shirked to shared. Nature Vol 574 31st October 2019.

NHMRC funding has a degree of transparency not apparent with Research Australia.

Given the regressive situation Australia finds itself with this long-developing obesity and mental health epidemics there is a strong argument to be made that current research spending on Animals research has demonstrably failed, of questionable ethics and be better spend on humane community-orientated Primary Care research. Community-orientated Primary Care as originally proposed by Sidney Kark, is that primary care should be rooted in communities, for communities, and with communities. ¹⁶

Australian Medicine is government supported through Medicare albeit highly commercialised, with private practice GPs playing the major role in primary care delivery. There is little research capacity at a Primary Care level. The International Classification for Primary Care, ICPC-2 developed at the National Centre for Classification in Health at Sydney University had approximately 1,800 GP's participating in 2004, however is underutilised outside of academic practice, especially since the closure of the BEACH PG research program in 2016 ¹⁷

Notwithstanding the apparent PHC community research vacuum in General Practice; there are outstanding community based lifestyle management programs with impressive results.¹⁸ The CHIP program is plant based, and informs in part the Australasian Society of Lifestyle Medicine. ASLM has adopted Michael Pollan's dictum "Eat food. Mostly plants. Not too much."

The Biopsychosocial paradigm considers the whole person, and her/his "intimate connection to the ecological theatre" in which they accumulate health relationships to other life forms, healthy emotional boundaries, and health relationship to food at the contact boundary. ¹⁹

What needs to be done??

1. The First 1,000 Days

Special consideration needs to be given the Mother -Child unit, whilst not ignoring the needs of the Father.

Identify Maternal -Child units at risk:

¹⁶ Editor's note: Community-Orientated Primary Care: The Legacy of Sidney Kark. American Journal of Public Health July 1993, Vol 83, no 7.

¹⁷ National Center for Classification in Health. Sydney University pc

¹⁸ Darren Morton , Paul Rankin, Lillian Kent and Wayne Dysinger . The Completed Health Improvement Program (CHIP) History, Evaluation and Outcomes. (2014) American Journal of Lifestyle Medicine. 22nd April 2014

¹⁹ Susan L Prescott et.al. Dysbiotic drift and biopsychosocial medicine: how the microdome links personal, public and planetary health. Biopsychosocial Medicine (2018) 12:7

**Maternal lifestyle, including a high- saturated fat-sugar diet.
Maternal IBS or other manifestations of Dysbiosis.
Past or current evidence of maternal trauma, as per Family or Personal
past history, and evidenced by low HRV.**

**Optimising maternal microbiome at birth. We need to operationalize
human studies to identify the range of normal and potentially pathological
microbiome populations.**

**Children born with assistance of Epidural, forceps, Caesarean section or
who were exposed to antibiotics cover pre-natal or peri-natal or in infancy
are at increase risk of dysbiosis.**

**Many children are monitored for “Stress” via Cardio- topography in labour.
This could easily be incorporated into a pre-discharge procedure and into
the 6 -week post – partum check.**

**A Secure sense of Self is a developing bio-social process requiring “Good
Enough Mothering “ (rather than the Good Enough Mother)**

**Mothers and their supportive partners need gently support , and some
mothers who have not had the experience of “Good Enough Mothering “ or
who find themselves in adversity may struggle to facilitate their child’s
secure attachment . The Adult Attachment Interview needs to be expanded
from the BPD clinics to the primary care level , Maternal –Child nurses
being ideally placed to identify mothers who need support.**

**Fathers, (other partners) need support in supporting the Mother –Child
dyad.**

A WHOLE OF FAMILY APPROACH IS CURRENTLY LACKING.

2 Environmental toxicity and the infant.

**Autism and associated neuro-developmental disorders are a
unrecognised as substantially environmental, and epitomise the
paradigm of trauma , dysbiosis , autonomic dysregulation ,
associated with ‘leaky gut’ and leaky Blood brain barrier.**

**This is in some measure iatrogenic, if we understand that
dysbiosis, like antibiotic resistance is being fuelled by the abuse
of antibiotics in factory farming and in primary care around the
world and here at home.**

All xenobiotics need to be considered in this domain. The infant is particularly vulnerable to Pb, Hg, Al , As as well as other heavy metal toxicities.²⁰

An OLIGOSCAN (TGA approved) for Heavy Metal and Trace element analysis could be used to screen infants at risk, and appropriate precautions taken.²¹

An initial screen for a se Cu/ Plasma Zn ratio may identify those infants at risk.

²⁰ Hiroshi Yasuda and Toyoharu Tsutsui. Assessment of Infantile Mineral Imbalances in Autism Spectrum Disorders (ASDs) Int. J. Environmental Res. Public Health 2013, 10,m6027-6043

²¹ info@biogenics.com.au