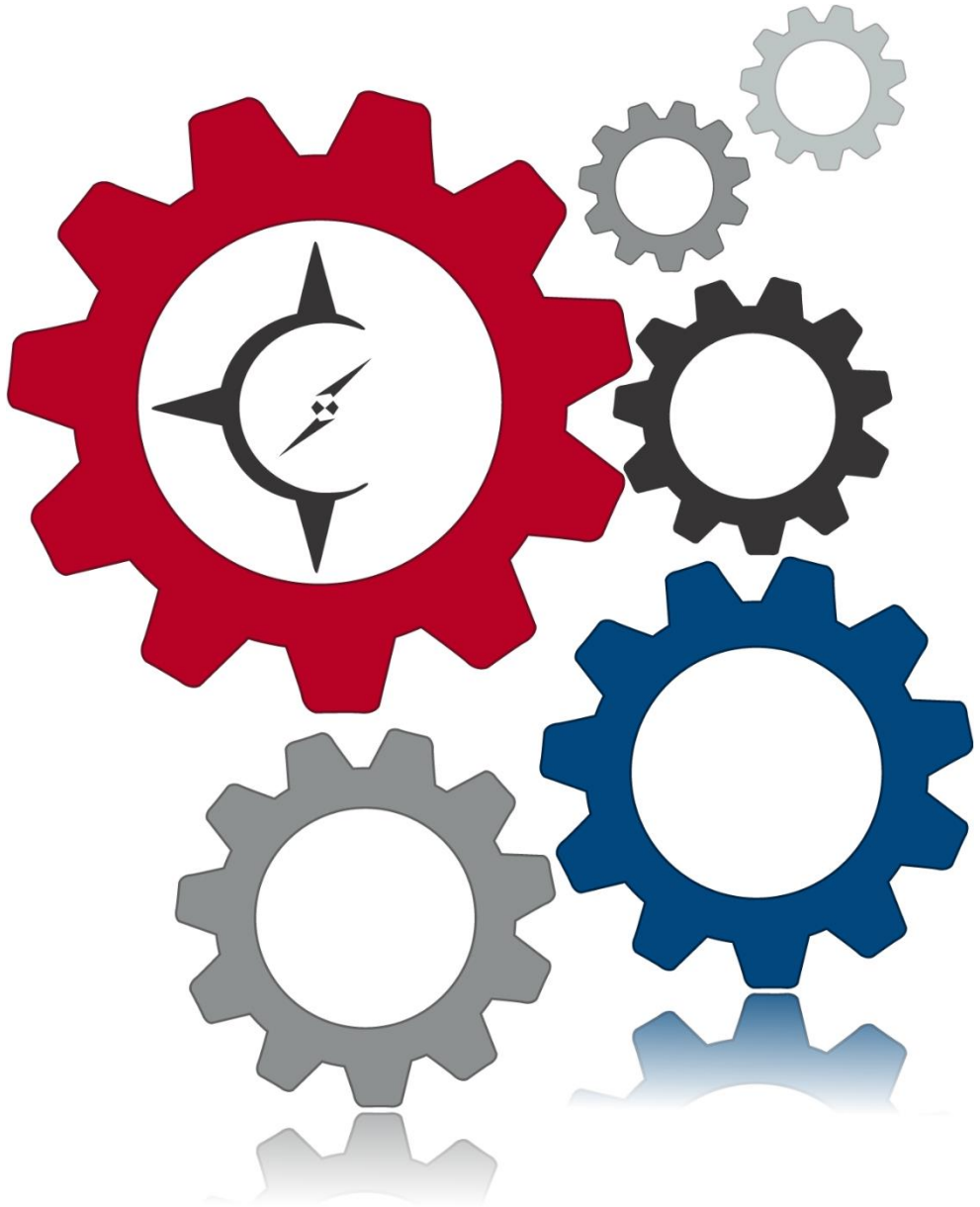

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Identifying complex illnesses in the IDI: Test case with MS

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Ethics approval granted 14/07/2023 [AH26469]

Motivation

- Complex chronic illnesses are illnesses that:
  - are not well-understood,
  - are difficult to diagnose and treat,
  - have high morbidity and substantial impacts on quality of life,
  - and are of fluctuating severity
- Gender bias: these illnesses disproportionately impact women and girls and receive little research funding or policy attention.

Have you heard of…

Multiple sclerosis (MS)?
Endometriosis?
Myalgic encephalomyelitis (ME)?
Chronic fatigue syndrome?
Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS)?
Fibromyalgia?
Migraine?
Systemic lupus erythematosus (SLE)?
Ehlers-Danlos syndrome (EDS)?
Postural orthostatic tachycardia syndrome (POTS)
Mast cell activation syndrome (MCAS)?
Long Covid/Post-acute sequalae of Covid-19 (PASC)

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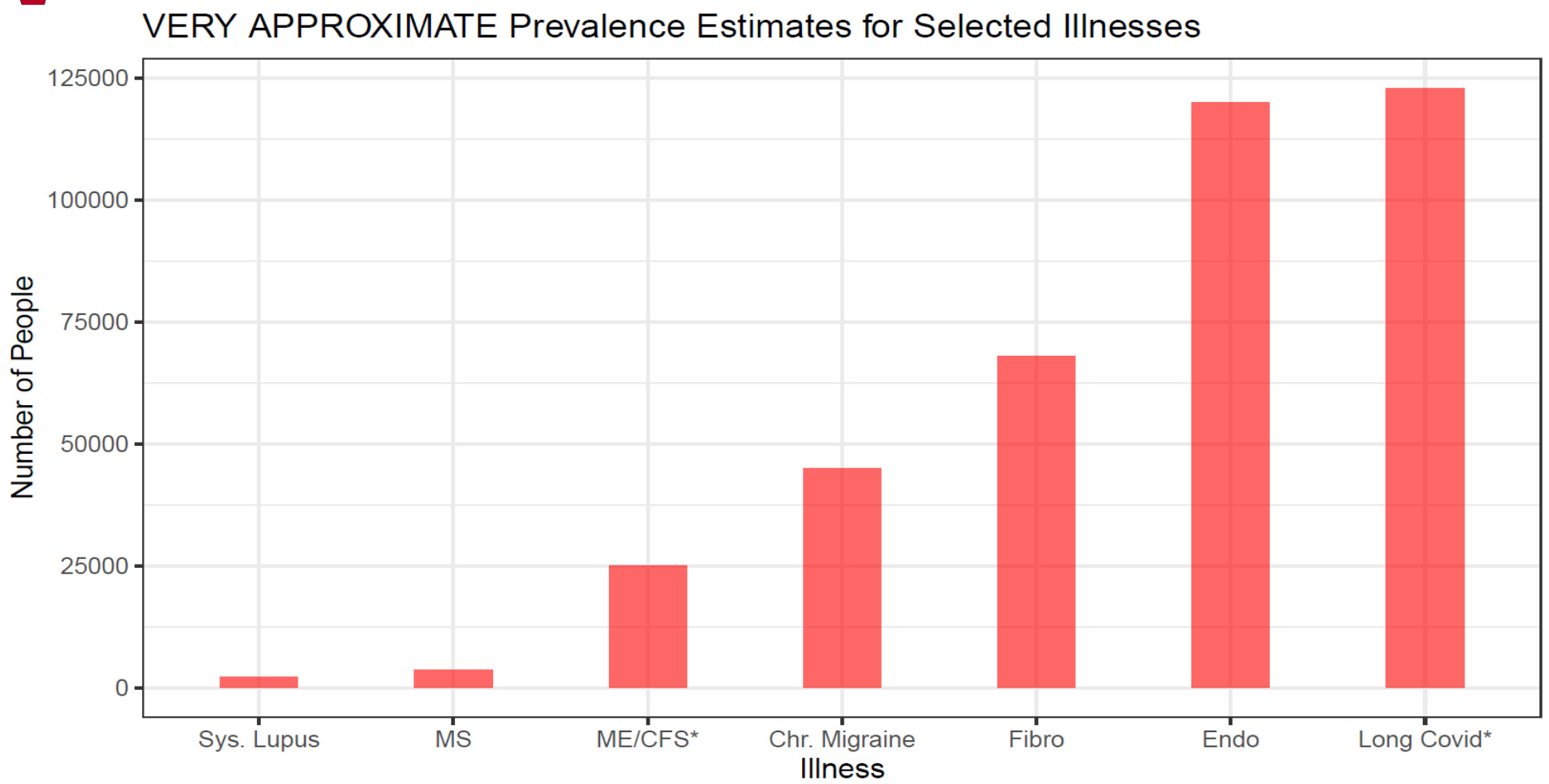
How common is common?



*ME/CFS: Pre-Covid prevalence; Long-Covid prevalence estimated as 5% of confirmed cases – conservative estimate

An example: US NIH disease funding vs disease burden

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Condition	Actual/Commensurate 2019	2019 (millions)
Multiple Sclerosis	0.82	$111
ME/CFS	0.06	$15
Migraine	0.07	$28
Endometriosis	0.18	$13

Mirin, A. A. (2021). Gender Disparity in the Funding of Diseases by the U.S. National Institutes of Health. *Journal of Women's Health*, *30*(7), 956–963. https://doi.org/10.1089/jwh.2020.8682

Equity and the double-penalty

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"Over half of survey participants with long COVID did not agree that they had received adequate health (56% for Tāngata Whenua and 53% for Tāngata Tiriti) or social care (47% for Tāngata Whenua and 33% for Tāngata Tiriti) for ongoing COVID-19 symptoms or long COVID.

- Russell et al. (2023)

" … it appears that females, those from Latinx and African American ethnicities have higher rates [of ME/CFS] than Caucasians. Of particular importance, over 95% of identified youth had not previously been diagnosed."

- Jason et al., 2020

Motivation

- Creating algorithms to identify complex chronic illnesses in the IDI will facilitate wide-ranging research, e.g.
  - Are women with endometriosis less likely to be in full-time employment than their peers?
  - Are there ethnic inequities in access to migraine medications?
  - Are people with ME/CFS less likely to receive support services than people with other disabling conditions?
- Produce code to identify conditions.
- Provide guidance on the extent and nature of mismatch between the observed populations and the true populations.

Feasibility study

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- Test the feasibility of using the IDI to identify cohorts of people with chronic complex illnesses, by answering…

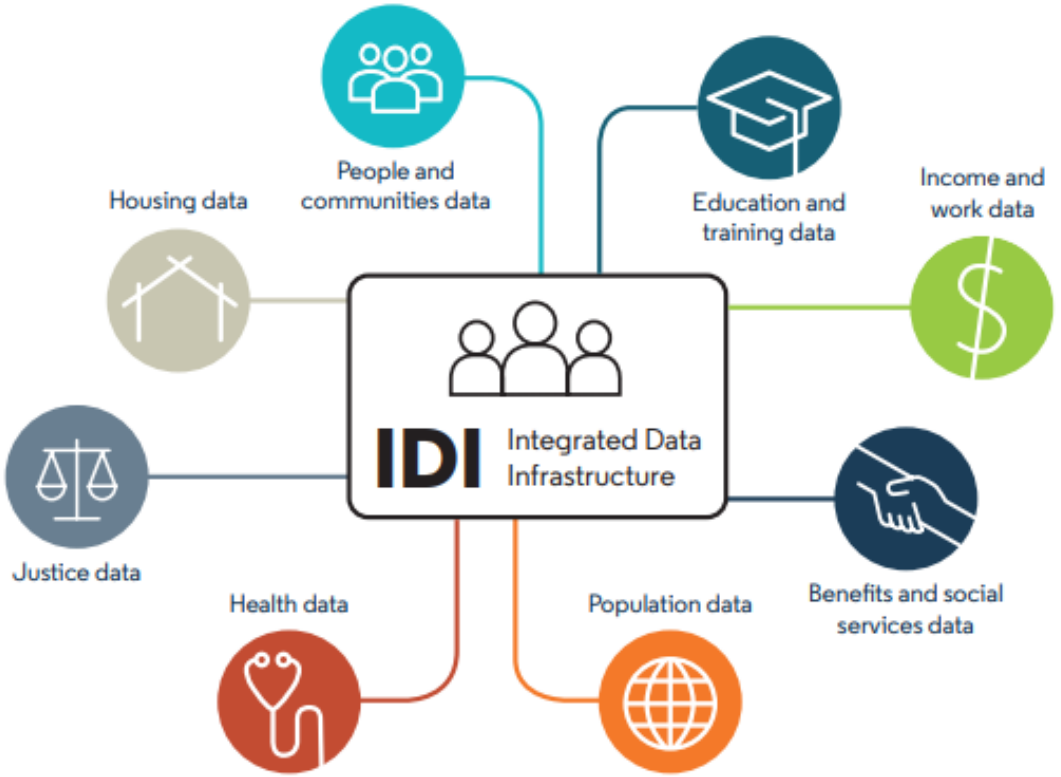
Are there differences in prescriptions of disease modifying treatments for patients with Multiple Sclerosis by ethnic group and/or SEP?

Multiple Sclerosis (MS)

- Chronic inflammatory demyelinating disease of the central nervous system with onset typically occurring in early adulthood (Broadley et al., 2014; McGinley et al., 2021).
- Causes neurological symptoms, profound fatigue, physical disability and cognitive impairment (McGinley et al., 2021).
- 8 funded disease-modifying treatments (DMTS) in NZ – strict approval criteria.
- No previous equity analyses of use in NZ
  - Overseas research suggests disparities by area deprivation (Calocer et al., 2018; Owens et al., 2013)

Step 1: Identify cohorts

- Identify cohorts of people with MS in the IDI, using
  - Hospital discharges
  - SOCRATES (disability services)
  - National Non-Admitted Patient Collection?
  - *Pharmaceuticals*



Source: Stats NZ (2023)

Step 2: Testing for inequities

Variable type	Variable	Source table
Outcome	Disease-modifying treatments dispensed	Pharmaceuticals
Explanatory	Ethnic group	Personal details table
	Education	Census, MoE tables
	Income	Tax data
	Area deprivation/NZDep	Address table
	Occupation/NZSEI	Census
Control	Age	Personal details table
	Gender	Personal details table
	Disability	WGSS Census, SOCRATES
	Relevant comorbidities	MoH tables

Step 2: Testing for inequities

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Specific research questions:

Diagnosed before November 2014:

1. Compare odds of being dispensed low efficacy DMT vs none over period 2006-November 2014
2. Compare odds of being dispensed high efficacy DMT, moderate efficacy DMT, low efficacy DMT, or no DMT between November 2014 and March 2021

Diagnosed between November 2014 and March 2021:

3. Compare odds of being dispensed high efficacy DMT vs not between November 2014 and March 2021.

By ethnic group & SEP.

DMT	Date funded	Efficacy
Interferon beta-1b	14/10/1999*	Low
Interferon beta-1a	24/01/2002*	Low
Glatiramer acetate	24/05/2002*	Low
Fingolimod	01/11/2014	High
Natalizumab	01/11/2014	High
Teriflunomide	01/02/2016	Moderate
Dimethyl fumarate	01/02/2016	Moderate
Ocrelizumab	01/12/2019	High

* Approval date rather than funding date shown

Step 3

- Compare the characteristics of cohorts of MS patients identified in the IDI to other data sources and published material.
  - E.g., NZ MS Prevalence Study (n=2,917); Taylor et al. (2010)
  - Alla et al. (2014)

Step 4

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- Identify strengths and limitations of using the IDI to identify people with MS, and hence people with other complex illnesses.
- Identify other complex illnesses that may be appropriate to study with the IDI.
- Develop relationships.

Limitations & challenges

- No access to primary care & outpatient diagnostic data currently.
- Underdiagnosis & misdiagnosis
  - Differential by ethnic group & socioeconomic position?
  - Lack of suitable ICD codes for some conditions?
- No good comparison data for many illnesses.
- Small numbers & estimated prevalence of MS lower among Māori and Pacific – type 2 error.

Conclusions

- This research will use MS as a test case to understand the strengths and limitations of using the IDI to study complex illnesses, while examining treatment inequities.
- Identifying complex illnesses in the IDI will facilitate wide-ranging research into these conditions.
- People with complex illnesses may face barriers to care and social support
  - These barriers likely reflect gender bias, and
  - These barriers are likely to be amplified for Māori and Pacific and people from low SEP backgrounds.

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- Stats NZ
- Everyone for listening!
- Research proposal – *feedback is appreciated!*
- *Any questions?*

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Key changes in eligibility

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Period	Key Changes in eligibility criteria & approvals process	Source
1999–2005	• EDSS Score of 3.0–6.5 • Two clinically significant relapses (raising EDSS score by at least one point)	(Claflin et al., 2022) Appendix
2005 – Oct 2014	• EDSS Score of 2.0–5.5	(Claflin et al., 2022) Appendix
1 Nov 2014 – 28 Feb 2021	• EDSS Score of 0–4 • Shift from requiring stopping treatment if relapse rate is stable to stopping treatment if progression of disability. • Those who have an EDSS score of 4.5–5.5, meet other criteria and are not currently on funded DMTs can apply for treatment with interferons or glatiramer acetate prior to 31 October 2015. • Funded natalizumab and fingolimod and change in criteria for beta interferons and glatiramer acetate.	(Pharmac, 2014)
1 March 2021 – 1 July 2022	• EDSS Score of 0–6 (able to walk 100m with or without assistance and/or rest). This applies to all of the funded DMTs (earlier criteria differed for switching between funded DMTs). • Approval through standard Special Authority Criteria. • 'Grand-parenting' to allow those who no longer meet eligibility criteria to remain on current treatment (affecting small number of patients).	(Pharmac, 2021)
1 July 2022 – present	• Widened criteria so only one clinical attack required for treatment with funded DMTs (McDonald 2017 criteria for diagnosis of MS, as opposed to McDonald 2010 criteria).	(Pharmac, 2022)