# Supplement One: Nation specific details of mental health laws and policies, data preparation and analysis

***Australia***

Australia’s private hospitals do not treat patients who are compulsorily hospitalised, and it is thought that they are unlikely to use restraints much since their patients are free to leave and are paying with their own (or their insurance’s) money. As part of policies to minimise the use of seclusion and restraint in people with mental illness, the Australian Institute of Health and Welfare, a government agency, publishes data on restrictive practices in mental health care in its public hospitals on its web site1. In these reports, mechanical restraint accorded with our definition, except that forensic patients were included in a limited number of cases, and all ages were included. About 10% of the discharges from specialist psychiatric care facilities in Australia were for people older than 65, and that percentage was stable between 2015 and 20182 . The data on restraints were restricted to public hospitals as the private sector does not treat involuntary patients.

We divided the number of restraint events per year by 365 to get a number of mechanical restraints per day. We divided the number per day by the total population of Australia (all ages) to derive a number of mechanical restraints per day per head of population. The regional data were reported by numbers of restraints per 1000 patient bed-days in each of the Australian states/territories. We therefore scaled these numbers to our standard rate by multiplying each state/territory’s reported restraint rates by the ratio of the country’s average number of mechanical restraint events per day to the reported average of the country’s number of mechanical restraints per 1000 bed days. Restraint use by age were reported for the whole country by numbers of restraints per 1000 patient-beds but not given with absolute numbers, nor broken down by state.

***New Zealand***

There is no central reporting of restraint in New Zealand, but to aid in attempts to reduce restraint, each of the 20 District Health Boards (DHBs), the public providers of psychiatric inpatient beds, is required to document the use of restraints and seclusion under its jurisdiction. There is only one private psychiatric hospital in New Zealand, which follows the same regulatory requirements. This means restraint information is kept by all 21 institutions and is available for public disclosure under New Zealand’s Official Information Act statute. The Health Sector Workers Network asked each DHB for the numbers of restraints used in general and psychiatric wards between 1 July 2016 and 30 June 2017, and provided it on a public website3. We used this information for our main comparison. We also made direct enquiries of each DHB and the private hospital, to study changes over time. To keep the request burden minimal (so that it would not be refused due to workload limitations), our request asked only about calendar years 2008 and 2018, and only about mechanical restraints. For this report we extracted the values related to acute adult psychiatric in-patient wards. We compiled the results from all the requests (Supplementary Tables S1 and S2). For restraint episodes that lasted longer than 24 hours (one of 9 days, another of 27 days, both in 2018), we considered each day to be a separate restraint episode. Several restraint episodes were reported without duration, but of the 25 that included duration, the median was 30 minutes (Supplementary Table S2).

We determined an average daily number of mechanical restraint episodes in New Zealand by dividing the number of restraints in each year by 365. We divided that number by the total population of New Zealand between the ages of 15 to 64 to determine a rate of mechanical restraints per population per day. To determine the rate of mechanical restraints per 1000 bed-days, we divided the total number of restraints in 2017 (Supplementary Table S1) by the number of bed-nights used for adult mental health services in 2017 4 and multiplied by 1000.

***United States of America (USA)***

For the USA, we accessed 2017 restraint data from the Centers for Medicare and Medicaid Services (CMS)5,6, which included results from 1718 facilities. The CMS provides measures of quality designed to help people decide which hospitals to use. High use of mechanical restraints is considered a problem due to the possibility of adverse events, including death. The database included the majority of both public and private psychiatric hospitals, general hospitals, and VA medical centres that provided 24-hour inpatient care, but because not all such facilities provided restraint data to CMS our count of restraints is likely an under-estimate. For most years, including 2017, data on patient ages were not available. For the available years, 2013, 2014 and 2018, the population >65 years of age made up about 17% of the bed-days. People younger than 18 made up a negligible proportion of bed-days in hospital, and also of restrained people

In the USA physical restraint is defined by CMS as “…any manual method or physical or mechanical device, material, or equipment that immobilizes or reduces the ability of a patient to move his or her arms, legs, body, or head freely when it is used as a restriction to manage a patient’s behaviour or restrict the patient’s freedom of movement and is not a standard treatment for the patient’s medical or psychiatric condition.”6 As such, the USA data included one person holding another, unlike data from Japan, Australia and New Zealand. Further, the USA data described restraint as hours of restraint for every 1,000 hours of patient care, rather than determining the numbers of restraint events or people restrained in any time period. We therefore used separate data on restraints used in response to injurious assaults7 to estimate rates.

Staggs7 published trend data on the use of seclusion and restraint as a response to injurious assault in 437 psychiatric wards in 317 US hospitals. The data came from the National Database of Nursing Quality Indicators® (NDNQI®), which collects data from roughly 2,000 US hospitals for quality bench-marking. Hospitals pay a fee for participation. Press Ganey, which owns the NDNQI, makes de-identified versions of its proprietary data available to researchers under certain circumstances.

He considered three categories of restraint: mechanical (or “device”) restraint, personal restraint (or “hold”), and chemical restraint. For each study year he computed the percentage of injurious assaults that were followed by each type of restraint. The percentage of injurious assaults followed by restraint of any type remained in the 27-34% range across the study years. Of all restraint episodes (including chemical), however, the percentage involving mechanical restraint decreased significantly from 72.2% in 2007 to 53.7% in 2013. In the updated statistics (Supplementary Tables S3 and S4) for 2017, mechanical restraint was used in 47.0% of all restraint episodes (including chemical) and 71.4% of restraint episodes excluding chemical (the other 28.6% involving only personal, non-mechanical restraint). Staggs (2015) also calculated mean duration of restraint use but omitted durations longer than one day to avoid skewness leading to an overestimate of the rates. In the updated statistics we included all episodes of mechanical and personal restraint, regardless of length, to calculate the total hours of restraint, to make them more comparable to what is measured in the CMS data. Overall, the mean restraint duration was 4.06 hours; the mean duration of episodes involving mechanical restraint was 5.37 hours, and the mean duration of episodes involving only personal restraint was 0.79 hours. The medians were 2.00 hours and 0.08 hours, respectively, indicating a very long “tail” of durations for both kinds of restraints, up to 23 days for one incident of mechanical restraints (Table S4). A further consideration for the duration data is that the facilities used to determine the restraint duration self-selected to participate in the quality-tracking database from which the data were extracted. Thus the mean duration was estimated with some bias and would change from year to year as hospitals enter/exit the database or start/stop reporting data on that particular measure.

In order to express the numbers of restraint events in the USA using the same denominator as above (restraints per patient days per population), we used the total number of hours of restraints in the CMS data in 2017 and divided it by 365 to calculate the number of hours of restraint per day. We then divided the number of hours of restraint per day by the mean hours of restraint of 4.06 to give the total number of restraint events (mechanical + personal) per day (Tables S3 and S4). If the hours of restraint used in response to injurious assault tend to be substantially greater than hours of restraint used in other situations, then we have underestimated the numbers of restraint events.

To estimate the number of mechanical restraints, we used the percentage of mechanical restraints as a share of all restraint episodes (mechanical + physical) that we calculated for 2017 (71.4%). We multiplied the total number of restraints (mechanical + physical) per day as reported to CMS by 0.714 to get the total number of mechanical restraints per day. We divided that number by the total population (all ages) of the US to get the number of restraints per head of population. For the regional data we scaled the CMS numbers to our standard rate by multiplying each state’s restraint rate by the ratio of our calculation for the country’s average number of mechanical restraint events per day to the country’s reported average of the hours of mechanical restraints per 1000 hours of patient care. To determine the number of restraint events per 1000 psychiatric bed-days, we divided our calculated number of mechanical restraints per year by the number of days of psychiatric patient care in the year (HBIPS-2 overall denominator in days) and multiplied by 1000.

***Japan***

The standard set by the Japanese Ministry of Health, Labor and Welfare under Section 37 of the Mental Health and Welfare Act, states that restraints are a restriction of behaviour that focus on the protection of life and the prevention of serious physical injury. (https://www.mhlw.go.jp/web/t\_doc?dataId=80136000&dataType=0&pageNo=1

Last accessed 8 May 2020). It further states that if restraints are unavoidable, they must be changed to an alternative method of treatment as soon as possible. In addition, psychiatric patients are restrained when a suicide attempt or self-harm is extremely imminent, if hyperactivity or restlessness is prominent, or if there is a likelihood of any life-threatening risk to the patient.

An annual survey is done of all psychiatric hospitals in Japan, public and private, on 30th June called, ”The 630 Report"8 (Supplemental Tables S5 and S6). Seclusion and mechanical restraint incidents are tabulated, but no data is provided for personal restraints or restraint duration. This is significant because despite the ideal that restraints should be removed as soon as possible, restraints in Japan are often used longer than one day9. We assumed that the number of restraint events on 30 June was the same as the reported number of people restrained on that day (effectively assuming that no patient has more than one restraint per day). This reflected the minimum number of patient restraints per day in Japan (because for example, in New Zealand, there were several cases where people were restrained for a short time more than once in a single day). However, since 2017 the ministry has reported the number of restraint orders rather than the number of restrained people. Restraint orders could be used more than once, or not at all, on a given day, but here we assume the number of restraint orders equals the number of restraint events. We divided the number of restraint orders on 30 June 2017 by the Japanese population to derive a rate of mechanical restraint episodes per head of population per day. We examined data for the entire age population as well as for the group of adults between 20 and 65 years of age. To determine the number of restraints per 1000 bed-days, we divided the number of restraints on June 30 by the number of patients in psychiatric wards on that same day and multiplied by 1000.

References

1. Australian Institute of Health and Welfare. Mental Health Services in Australia. 2019. Accessed at: <https://www.aihw.gov.au/reports/mental-health-services/mental-health-services-in-australia/report-contents/restrictive-practices> on 23 MArch 2020

2. Australian Institute of Health and Welfare. Mental Health Services in Australia. 2019. Accessed at: https://www.aihw.gov.au/reports/mental-health-services/mental-health-services-in-australia/report-contents/restrictive-practices on 22 MAy 2020

3. NZ R. 2019. Accessed at: https://fyi.org.nz/search/restraints%20health%20sector%20workers%20network/all?commit=Search&utf8=%E2%9C%93 on 29 September 2019.

4. Ministry of Health. Office of the Director of Mental Health Annual Report 2017. *Wellington: Ministry of Health*. 2018.

5. Medicare. Vetrans Health Administration Behavioural Health Data. 2018 Accessed at: <https://data.medicare.gov/data/hospital-compare> on 1 February 2020

6. Medicare Cf and Services M. Inpatient psychiatric facility quality reporting program manual. 2016.

7. Staggs VS. Trends in use of seclusion and restraint in response to injurious assault in psychiatric units in US hospitals, 2007–2013. *Psychiatric services*. 2015;66:1369-1372.

8. Materials about Mental Health and Medical Welfare (translated fom Japanese). 2020. Accessed at <https://www.ncnp.go.jp/nimh/seisaku/data/> on 17 April 2020

9. Hasegawa. 長谷川利夫. (2016). 精神科医療における隔離・ 身体拘束実態調査 ～その急増の背景要因を探り縮減への道筋を考える～. 病院・地域精神医学, 59(1), 18–21. 2016.