



ASAR

Australasian Severe
Asthma Registry



The Thoracic Society
of Australia & New Zealand
LEADERS IN LUNG HEALTH

PUBLIC

ANNUAL
REPORT
2022



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SUMMARY

Severe asthma is a public health concern in the Australasian region. The medical complexity and heterogeneity of severe asthma poses unique challenges for the clinical management of patients in healthcare settings. Furthermore, it is highly prevalent in Australia and New Zealand. Consequently, it is responsible for deleterious illness outcomes, economic burden, and burden of disease. Little is known about the longitudinal clinical outcomes and the impact of severe asthma on the Australasian cohort.

The Australasian Severe Asthma Registry (ASAR) is a collaborative clinical quality registry established to address this lack of knowledge about the severe asthma cohort in the Australasian region. After transitioning from the Severe Asthma Web-based Database (SAWD), the ASAR is now a longitudinal clinical quality registry (CQR) following patients for 10 years. 2022 was a successful year for the ASAR, with many exciting milestones achieved, including the well-anticipated ASAR Biennial Research Summit, continued collaboration with the International Severe Asthma Registry (ISAR) and progress on all the ASAR publication papers. As of 31 December 2022, the ASAR had registered 1,037 eligible patients who had completed the baseline visit.

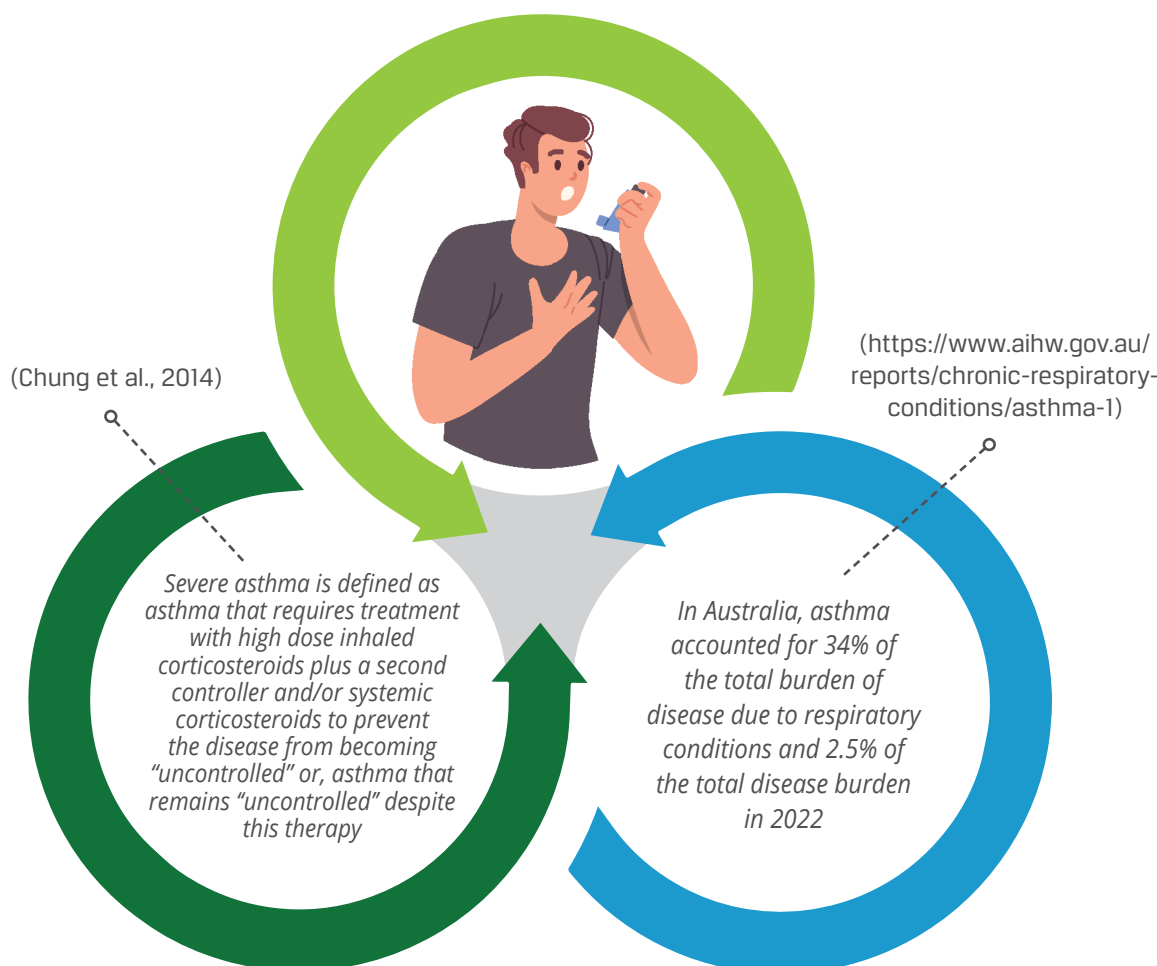
The purpose of this report is to share an overview of the ASAR. This includes the key achievements of the ASAR in 2022, in addition to preliminary data analysis of the registry population. The future directions of the ASAR, its importance and contribution to the understanding of the clinical management and quality of life for the Australasian and international severe asthma cohort is also discussed.

This report was prepared by the TSANZ Registries Team:

Rita Salameh, Natasa Petrovic, Dattatreya Stott



Australia and New Zealand have some of the highest rates of severe asthma in the world. Severe asthma – heterogenous and medically complex – presents unique challenges for the clinical management of patients in healthcare settings. Consequently, it is responsible for substantial adverse illness outcomes, economic burden, and burden of disease. Little is known about the longitudinal clinical outcomes and the impact of severe asthma in the Australasian context.



In Australia, approximately one in nine (11%), or 2.7 million Australians have a diagnosis of asthma (Australian Institute of Health and Welfare, 2020) and in New Zealand, it is one in eight (12%), or 452,000 New Zealanders (Ministry of Health, 2017). International datasets estimate that of these, 3-10% (Chung et al., 2014, Hekking et al., 2015) will have a severe, uncontrolled form of the disease. This equates to 81,000–270,000 people in Australia and 13,560–45,200 New Zealanders suffering with an uncontrolled severe form of asthma.

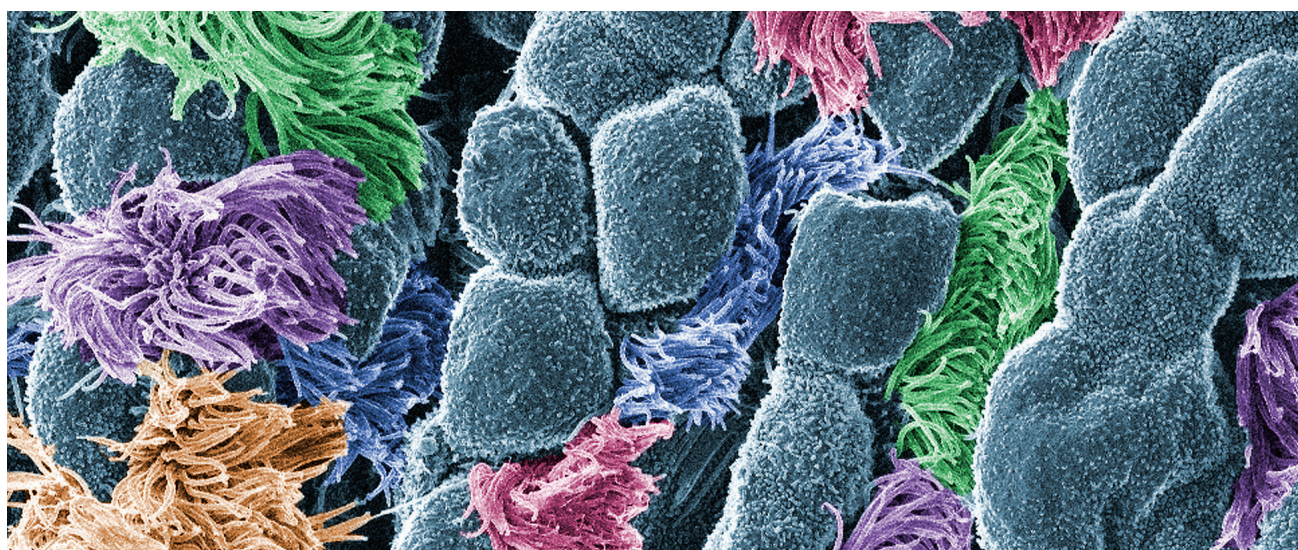
Pivotal randomised-controlled trials (RCTs) have demonstrated the efficacy of emerging and available biologic treatments. While promising in the treatment of severe asthma, these treatments are inherently expensive and require effective targeting to eligible patients who meet the criteria through adequate phenotyping (Grainge et al., 2016). With only 10% of patients meeting the specific eligibility criteria for clinical trial entry, questions about the generalisability of the RCT outcomes are raised. To achieve a more comprehensive, real-world understanding of the efficacy of these treatments for severe asthma, investigation and evaluation of clinical practice evidence is warranted (Albers et al., 2018).

The high prevalence and clinical complexity of severe asthma translates to significant burden of disease, healthcare costs and deaths in our region (Australian Bureau of Statistics, 2019). In New Zealand, asthma was estimated to cost \$1.018 billion in 2018, with \$198.3 million in direct costs, and \$828.2 million in indirect costs from workdays lost, disability-affected life years, and mortality (Telfar Barnard and Zhang, 2018). The estimated cost of asthma to the Australian health system in 2015 was \$1.2 billion. Severe asthma, while representing only 3–10% of the asthma population, consumes up to 50% of asthma-related healthcare expenditure (O'Neill et al., 2015). Further associated economic costs (including productivity loss and associated financial costs e.g., travel and government programs) totalled \$3.3 billion (Asthma Australia and National Asthma Council Australia, 2015).

The overall burden of disease which accounts for suffering and premature death experienced by people with asthma in Australia in 2015 was estimated at \$24.7 billion. These numbers reflect the significant long-term impact of severe asthma on daily living and quality of life.

The burden of disease of asthma is disproportionately high in our region and is indicative of the far-reaching consequences for individuals with asthma. Adverse physical effects of oral corticosteroid toxicity are well known and include hypertension, decreased bone density with resultant increased risk of fractures, cataract, gastrointestinal conditions, and metabolic issues (Rice et al., 2017). People with severe asthma are more likely to experience greater impairment at work and outside the workplace than people who have non-severe asthma (Hiles et al., 2018). Furthermore, they are two to three times more likely to experience symptoms of anxiety and depression than those with mild or non-steroid-dependent asthma (Amelink et al., 2014). Understanding the complexity and impact of severe asthma from a real-life, local perspective is imperative to manage the significant burden of this disease.

Severe asthma registries are valuable evidence platforms used to systematically obtain and report outcomes. They provide the basis for understanding population status, treatment options and to promote evidence-based clinical guidelines. The ASAR is a prospective, clinical quality registry of people with severe asthma in Australia and New Zealand and will be utilised to monitor clinical outcomes and quality of life for the severe asthma cohort in Australia and New Zealand.



Cells lining the trachea, viewed with ZEISS ORION NanoFab microscope

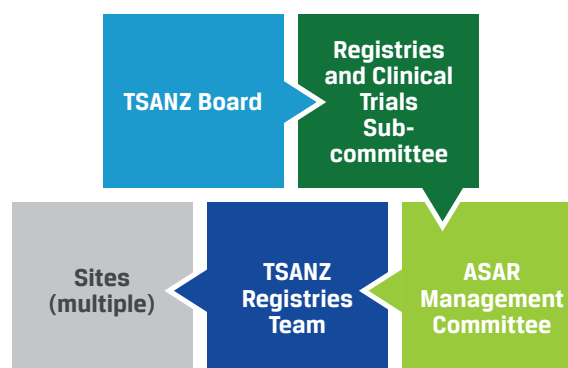
Credit: Eva Mutunga and Kate Klein, University of the District of Columbia and National Institute of Standards and Technology



REGISTRY GOVERNANCE

Governance for the ASAR is provided by the Thoracic Society of Australia and New Zealand (TSANZ). The TSANZ ASAR Management Committee met bi-monthly to provide strategic guidance, in addition to managing ongoing academic aspects and interests of the ASAR (Table 1).

Table 1. TSANZ ASAR Management Committee



Name	Position	Affiliations
Professor Peter Gibson (Chair)	Senior Staff Specialist	Hunter Medical Research Institute/ John Hunter hospital, NSW
Professor Matthew Peters	Respiratory and Sleep Medicine Physician, Head of Respiratory Medicine	Concord Repatriation General Hospital
Professor John Upham	Senior Respiratory Physician	Princess Alexandra Hospital
Professor Philip Bardin	Respiratory and Sleep Physician	Monash University and Medical Centre, VIC
Dr Gregory Katsoulotos	Consultant Physician and Senior Lecturer	St George & Sutherland Clinical School, UNSW Sydney, NSW
Dr Li Ping Chung	Respiratory Physician	Fiona Stanley Hospital, WA
Dr James Fingleton	Respiratory physician and Clinical Director – Sub Speciality Medicine Medical Director	Te Whatu Ora- Capital Coast and Hutt Valley Asthma and Respiratory Foundation New Zealand
Dr Elaine Yap	Respiratory Physician	Middlemore Hospital, New Zealand
Dr Erin Harvey	Biomedical Scientist	Hunter Medical Research Institute / John Hunter Hospital, NSW
Anna Mackay	Registered Nurse	The Alfred Hospital, VIC

The TSANZ Registries Team (Table 2) is responsible for coordinating the daily processes of the ASAR, including liaising with key stakeholders, site communication, data analyses and dissemination of information.

Table 2. TSANZ Registries Team 2022

Name	Position
Dr Graham Hall	TSANZ CEO
Dr Hayley See	TSANZ Research and Policy Manager
Bharvi Maneck	TSANZ Research and Policy Manager
Dr Ezinne Igwe	TSANZ Clinical Research Analyst
Ms Laura Mitchell	TSANZ Senior Registries Officer
Rebecca Hetherington	TSANZ Registries Officer



KEY ACHIEVEMENTS 2022

In 2022 we saw continuous challenges with the ongoing COVID-19 pandemic. Sites and clinics reported staff shortages, staff burnout and extreme exhaustion within the respiratory area. Despite this, the ASAR continued to expand with new enrolments, follow up visits and a focus on data quality. In 2022 we achieved our enrolment milestone of 200 participants for the Benralizumab Registry and we received ethics approval for the Dupilumab Registry.

On behalf of the ASAR Management Committee and the TSANZ, we extend our sincere appreciation to our ASAR colleagues for the continued commitment and contributions to the registry.

Clinical Quality Reporting

The TSANZ Registries Team continue to release quarterly Clinical Quality Reports (CQR) in alignment with the requirements of the CQR framework. The CQR reports continue to focus on data quality and improvement. These reports have presented a snapshot of data completeness for the ASAR overall, and each site has been provided with a site-specific report. This has been helpful in identifying areas with lower levels of data completion, and the subsequent improvement in completion.



ASAR Biennial Research Summit

The Thoracic Society of Australia and New Zealand (TSANZ) Registries Team and the ASAR Management Committee hosted the Biennial ASAR Research Summit in Sydney, NSW. The Summit brought together ASAR collaborators, respiratory practitioners, researchers, site staff, and ASAR sponsor representatives. Attendees had the opportunity to share their unique perspectives and experiences, share ideas for improvements, discuss future research, and other ASAR projects.

ASAR Registry Modules

The ASAR is designed to allow additional modules to be added as new research studies. These research studies will be considered if a specific question, concept or enquiry into the ASAR arises which involves extensive data collection and receives approval by the ASAR Management Committee. The modules will be added to the existing ASAR in order to streamline data collection and utilise existing resources. The modules may be active for a defined time or be continuous upon introduction. We currently have two modules on the ASAR, the Australian Benralizumab Registry (ABenRA) and the Australian Severe Asthma Dupilumab Registry (ASADR).



Australian Benralizumab Registry (ABenRA)

The Australian Benralizumab Registry (ABenRA) collects data on patients with severe refractory asthma who receive benralizumab for the management of their asthma. This includes those with treatment-resistant severe eosinophilic asthma who receive PBS-subsidised benralizumab, and those with treatment-resistant severe asthma who receive benralizumab outside of the PBS scheme.

The data being collected in this Registry will be used for clinical research and to monitor patient-specific clinical management undertaken by participating sites.

Australian Severe Asthma Dupilumab Registry (ASADR)

The Australian Severe Asthma Dupilumab Registry (ASADR) examines the characteristics of people initiated on dupilumab and their responses to treatment in a real-world setting in Australia.

This registry will provide researchers and clinicians with insights on the clinical use, efficacy, and safety associated with dupilumab treatment of severe asthma. The ASADR has the potential to achieve innovative approaches to care which reduce variation in practice and better patient outcomes.

This Registry received Human Research Ethics Committee (HREC) approval in November 2022. Meeting this major milestone has paved the way for site-specific applications to begin and once approved, participant recruitment can commence. We anticipate the first participant enrollment in early 2023.

ASAR Publication Working Groups

The ASAR currently has three publication groups who are working on developing a publication plan and analysing data to produce a paper to submit for publication. Each group focuses on a specific area of research including: oral corticosteroid stewardship, comorbidities, and phenotypes and biologics. All three groups were established in 2022 and have met on numerous occasions.

International Collaboration

The ASAR continued its collaboration with the International Severe Asthma Registry (ISAR). The anonymous ASAR data transferred in 2020 and 2022 is now being used in several ethically approved research analyses. The contribution to and inclusion of the ASAR data in the ISAR dataset provides important geographical representation of the real-world experience from our region to the global understanding of severe asthma.

This is a significant achievement for TSANZ. A collaboration of this nature demonstrates the importance of the ASAR in its contribution to the understanding of severe asthma on the global scale. The ISAR is a global research initiative collecting anonymous longitudinal real-life data for the severe asthma cohort with collaborators from over 29 countries.

The Australian Register of Clinical Registries (ARCR)

The Australian Commission on Safety and Quality in Healthcare (ACSQHC) operates and maintains the Australian Register of Clinical Registries (the Register) to facilitate collaboration and awareness of registry activity among key stakeholders.

Both the ASAR and ABenRA are registered on the ACSQHC's Australian Register of Clinical Registries (ARCR). The ASADR will be registered on the Commission in 2023.



ETHICS AND SITE GOVERNANCE

Ethics Approvals

Australia

The ASAR is approved by the Hunter New England (HNE) Human Research Ethics Committee (HREC) in Australia with National Mutual Acceptance (NMA) for sites within Australia.

New Zealand

The ASAR is approved by the Health and Disability Ethics Committees (HDECs) in New Zealand.

Site Governance

As of December 2022, we have 18 approved ASAR sites across Australia and New Zealand.

ASAR approved sites:

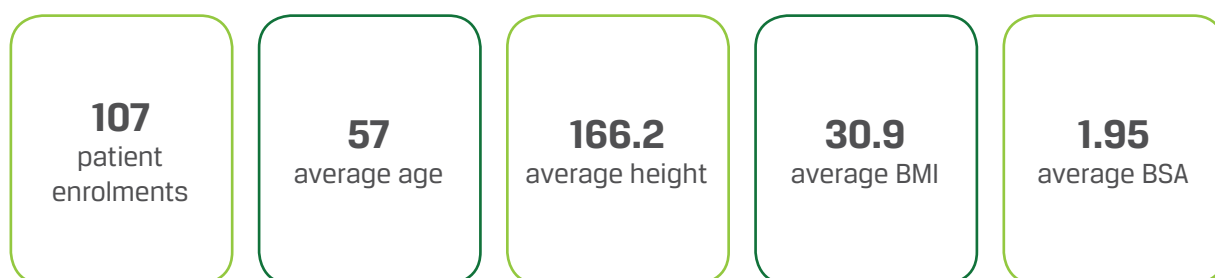
Sites	Approvals
John Hunter Hospital, HMRI, NSW	Approved
Alfred Hospital, VIC	Approved
Austin Hospital, VIC	Approved
Box Hill Hospital, VIC	Approved
Campbelltown Hospital, NSW	Approved
Concord Repatriation General Hospital, NSW	Approved
Cairns and Hinterland Hospital and Health Service, QLD	Approved
Fiona Stanley Hospital, WA	Approved
Frankston Hospital, VIC	Approved
Liverpool Hospital, NSW	Approved
Mater Hospital South Brisbane	Approved
Princess Alexandra Hospital, QLD	Approved
Royal Adelaide Hospital, SA	Approved
Royal Prince Alfred Hospital, NSW	Approved
St George Specialist Centre (private room)	Approved
St Vincent's Clinic (private room)	Approved
Westmead Hospital, NSW	Approved
Middlemore Hospital, Auckland, NZ	Approved

Population and Recruitment

Demographic Profile

Between January and December 2022, 107¹ new patients were enrolled in ASAR. 67 have been classified as severe asthma patients and 39 are non-severe asthma patients.

For the ASAR population in 2022, the average age is 57 years, average height is 166.2 cm, average body mass index (BMI) is 30.9 and average body surface area (BSA) is 1.95.



Severe Refractory Asthma: This group includes asthma for which control is not achieved despite the highest level of recommended treatment [refractory asthma and corticosteroid-resistant asthma], and asthma for which control can be maintained only with the highest level of recommended treatment.

The defining characteristics for this group are as follows:

- 1) Confirmed asthma diagnosis;
- 2) Using maximum inhaled therapy [Inhaled high dose of corticosteroid and 2nd controller];
- 3) Uncontrolled asthma [currently, or on reduction in maximal therapy], which constitutes any ONE or more of:
 - a) Poor symptom control;
 - b) Frequent and/or very severe exacerbations;
 - c) Airflow obstruction;
- 4) Optimised management skills; and
- 5) Triggers and relevant co-morbidity have been assessed and managed.

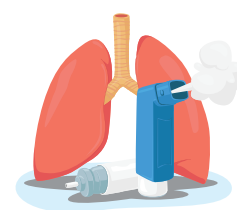


Figure 5 - ASAR definition of severe asthma

¹ Number of enrolled patients and number of visits in a year may not align. For example, a patient can enrol in 2022, but attend the first visit in 2023.

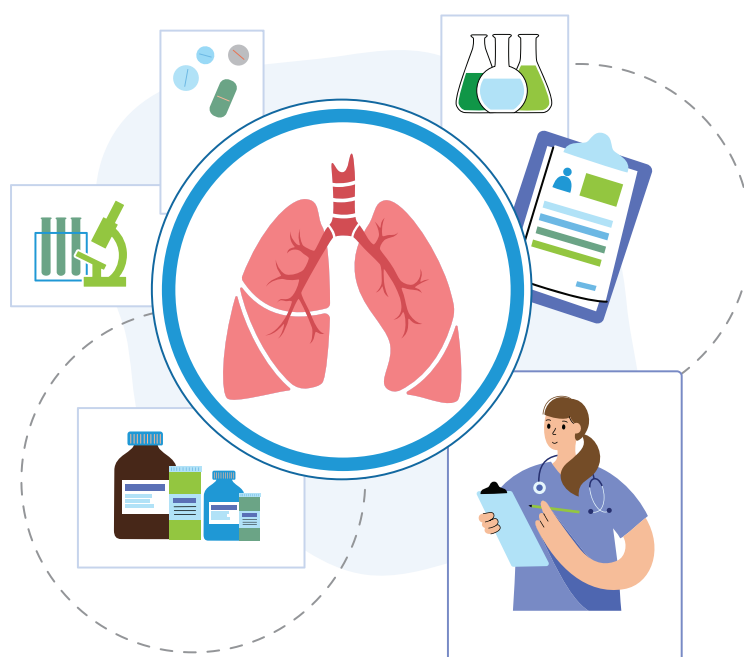
Visits Trend

As shown in *Table 4*, there were 78 first visits entered into the ASAR database in 2022.

Visits	2022
<i>Visit 1</i>	78
<i>12 month Follow-up (Year 1)</i>	37
<i>24 month Follow-up (Year 2)</i>	66
<i>36 month Follow-up (Year 3)</i>	25
<i>48 month Follow-up (Year 4)</i>	15
<i>5 year follow-up</i>	39
<i>6 year follow-up</i>	23
<i>7 year follow-up</i>	15
<i>8 year follow-up</i>	11
<i>9 year follow-up</i>	1
Total	310

Table 4 - Visits across the years

The current total ASAR population that has completed visit 1 since 2013 is 1,038.



FUTURE DIRECTIONS

The ASAR is a well-established multicentre clinical quality registry (CQR). The future of ASAR will encompass continued quality improvement, expansion, registry outputs and ongoing active collaborations and strong partnerships with our sponsors.

Clinical Quality Reports

A key focus of the ASAR is continuous quality improvement of the data capture and integrity of the registry through Clinical Quality Reports. These reports present a snapshot of data completeness for the overall registry and per site, helping to improve the data within the registry. The systematic monitoring of the quality of our healthcare data through routine collection, analysis, and reporting of health-related information will help identify outcome benchmarks, significant outcome variance, and inform improvements in healthcare quality.



ASAR Expansion

Expansion of the ASAR will include a range of different targets. Enrolment and recruitment will continue at existing approved sites together with new interested sites progressing their local site approvals. The addition of module arms to the ASAR database will also continue as opportunities arise.

Research Publications

As discussed earlier in this report, there are three publication groups currently established and working on their publication plan and write-up. These groups will produce valuable output and information to better understand this complex area of severe asthma. We look forward to sharing these publications with all very soon.

International Collaboration

The ASAR will continue its collaboration with the International Severe Asthma Registry (ISAR). There have been numerous publications since the collaboration began which will continue with more currently in the pipeline. Importantly, this collaboration helps to improve and enhance the global understanding of severe asthma.

New Registries

Launching the Dupilumab Registry will occur next year with the first patient enrolment to take place in the first half of 2023. The registry will provide researchers and clinicians with insights on the clinical use, efficacy, and safety associated with dupilumab treatment of severe asthma.



CONCLUSION

The ASAR continues to see substantial growth with site approvals and ongoing enrolments. The ASAR collaboration with the International Severe Asthma Registry (ISAR) is a significant contributor to the understanding of severe asthma on a global scale. The success of the ASAR Biennial Summit was a fantastic way to end the year, highlighting achievements, sharing knowledge and welcoming new ideas for future collaborations.

With ongoing support from researchers, patient populations and external stakeholders, the ASAR will continue its important contribution to the understanding of severe asthma and its treatment in real-world settings. It will allow us to characterise severe asthma in Australia and New Zealand and the impact of asthma and its treatments on the quality of life and clinical outcomes of the cohort. The ASAR is a robust registry with the potential for research outcomes to be used to significantly improve patient care and management of severe asthma.



Table 13. SAWD and ASAR reports, presentations, and publications to date.

Type	Details	Date
Report	Clinical Quality Report (circulated to ASAR PIs and site personnel)	December 2022
Report	ASAR Biennial Research Summit: Report. Circulated to Summit delegates, ASAR Sponsors and supporters, TSANZ members, and ASAR site personnel	December 2022
BIENNIAL RESEARCH SUMMIT	ASAR Biennial Research Summit	October 2022
Report	Clinical Quality Report (circulated to ASAR PIs and site personnel)	September 2022
Annual Report	ASAR Annual Report 2021 (circulated to site personnel, PIs, Sponsors). Public edition circulated to all TSANZ members and appropriate consumer groups.	August 2022
Report	Clinical Quality Report (circulated to ASAR PIs and site personnel)	June 2022
Report	Clinical Quality Report (circulated to ASAR PIs and site personnel)	March 2022
Report	Clinical Quality Report (circulated to ASAR PIs and site personnel)	December 2021
Report	ASAR – Dual and Triple Therapies Report. Circulated to internal ASAR sponsors and sites.	November 2021
Report	Clinical Quality Report (circulated to ASAR PIs and site personnel)	September 2021
Annual Report	ASAR Annual Report 2020 (circulated to site personnel, PIs, Sponsors). Public edition circulated to all TSANZ members and appropriate consumer groups.	August 2021
Report	ASAR Biennial Research Summit: Virtual Research Day Report. Circulated to Summit delegates, ASAR Sponsors and supporters, TSANZ members, and ASAR site personnel.	February 2021
BIENNIAL RESEARCH SUMMIT	ASAR Biennial Research Summit	3 December 2020
Annual Report	ASAR Annual Report 2019 (circulated to PIs, Sponsors). Public edition circulated to all TSANZ members and appropriate consumer groups.	June 2020
PUBLICATION	Eileen, W., Wechsler, M. E., Tran, T. N., Heaney, L. G., Jones, R. C., Menzies-Gow, A. N., ... & Cho, Y. S. (2019). Characterization of severe asthma worldwide: data from the International Severe Asthma Registry (ISAR). <i>Chest</i>. 157(4), 790-804. doi: 10.1016/j.chest.2019.10.053	Nov 2019
PUBLICATION	Denton, E. et al. (2019). Severe Asthma Global Evaluation (SAGE): An electronic platform for severe asthma. <i>The Journal of Allergy and Clinical Immunology: In Practice</i>. 2019;7(5), 1440-1449. doi: 10.1016/j.jaip.2019.02.042	May 2019
Poster	Price, D. B. et al. (2019). International Severe Asthma Registry (ISAR): The Story so Far. In <i>C44. Asthma Epidemiology</i> (pp. A4900-A4900). American Thoracic Society.	May 2019

Type	Details	Date
Poster	Price, D. B. et al. (2019). Cross-Country Comparison of Demographic and Clinical Characteristics of Patients Managed in Severe Asthma Services Across UK, USA, Australia, South Korea, and Italy. In <i>C44. Asthma Epidemiology</i> (pp. A4899-A4899). American Thoracic Society	May 2019
PUBLICATION	Bulathsinhala, L. et al. Development of the International Severe Asthma Registry (ISAR): A modified Delphi study. <i>The Journal of Allergy and Clinical Immunology: In Practice</i>. 2019; 7(2), 578-588. doi: 10.1016/j.jaip.2018.08.016	February 2019
PUBLICATION	McDonald, V. et al. Treatable traits can be identified in a severe asthma registry and predict future exacerbations. <i>Respirology</i>. 2019; 24: 37- 47. doi: 10.1111/resp.13389	September 2018
Oral presentation	McDonald, V. et al., Treatable Traits in severe asthma. <i>Presented at the Newcastle Asthma Meeting (NAME), Newcastle</i>	25 October 2018
Poster	McDonald, V. et al., Identification of treatable traits in a severe asthma registry: prevalence and exacerbation predictors. <i>Presented at the ERS International Congress 2018, Paris</i>	18 Sept 2018
PUBLICATION	Hiles, S. et al., Working while unwell: Workplace impairment in people with severe asthma. <i>Clin Exp Allergy</i>. 2018; 48(6):650-662.	June 2018
Oral presentation	McDonald, V et al., TSANZ Oral: Severe asthma treatable traits: prevalence and exacerbation prediction. <i>Respirology</i> (2018) 23 (Issue S1). <i>Presented at the TSANZ ASM, Adelaide</i>	27 March 2018
Oral presentation	Hiles, S et al., TSANZ Oral: Working while unwell: Workplace impairment in people with severe asthma. <i>Respirology</i> 2018; 23 (Issue S1). <i>Presented at the TSANZ ASM, Adelaide</i>	27 March 2018
Oral Presentation	Hiles, S. et al. The Impact of Severe Asthma – Workplace productivity in the Severe Asthma Web-based Database. <i>Presented at the Newcastle Asthma Meeting (NAME), Newcastle</i>	27 Oct 2017
PUBLICATION	Wang, G. et al. Severe and uncontrolled asthma in China: A cross-sectional survey from the Australasian Severe Asthma Network. <i>J Thorac Dis</i>. 2017; 9(5):1333-1344. doi: 10.21037/jtd.2017.04.74	May 2017
Report	SAWD data report, Q4 2016	19 Dec 2016
Poster	Harvey, E et al., ASAN group, TSANZ Asthma & Allergy SIG 2 Poster Presentations: Severe asthma is associated with work productivity loss, activity impairment and reduced quality of life, <i>Respirology</i> (2016);21(issue S2):108-15 <i>Presented at the TSANZ ASM, Perth</i>	April 2016
Poster	Harvey, E. et al., ASAN group, TSANZ Asthma & Allergy SIG 2 Poster Presentations: Characterisation of severe asthma phenotypes via a severe asthma registry: The Severe Asthma Web-based Database, <i>Respirology</i> 2016;21(issue S2):108-15. <i>Presented at the TSANZ ASM, Perth</i>	April 2016
Report	SAWD data report, Q3 2015 (circulated to PIs and sponsors)	1 Oct 2015
Report	SAWD enrolment report, Q1 2015 (circulated to PIs and sponsors)	29 April 2015
Report	SAWD data report, Q4 2014 - preliminary baseline data (circulated to PIs and sponsors)	5 March 2015



ACKNOWLEDGEMENTS

The Thoracic Society of Australia and New Zealand in collaboration with the Australasian Severe Asthma Network extend our sincere appreciation to the supporters of the Australasian Severe Asthma Registry:

AstraZeneca 

GSK

sanofi

TSANZ acknowledges the in-kind support of HMRI in hosting REDCap.

- ALBERS, F. C., MÜLLEROVÁ, H., GUNSOY, N. B., SHIN, J. Y., NELSEN, L. M., BRADFORD, E. S., COCKLE, S. M. & SURUKI, R. Y. 2018. Biologic treatment eligibility for real-world patients with severe asthma: The IDEAL study. *J Asthma*, 55, 152-160.
- AMELINK, M., HASHIMOTO, S., SPINHOVEN, P., PASMA, H. R., STERK, P. J., BEL, E. H. & TEN BRINKE, A. 2014. Anxiety, depression and personality traits in severe, prednisone-dependent asthma. *Respir Med*, 108, 438-44.
- ASTHMA AUSTRALIA AND NATIONAL ASTHMA COUNCIL AUSTRALIA. 2015. *The Hidden Cost of Asthma* [Online]. Canberra: Deloitte Access Economics. Available: <https://www.nationalasthma.org.au/living-with-asthma/resources/health-professionals/reports-and-statistics/the-hidden-cost-of-asthma-2015> [Accessed 12/03/2021].
- AUSTRALIAN BUREAU OF STATISTICS 2019. Causes of Death, Australia, 2018, cat. no. 3303.0. ABS, Canberra.
- AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE 2020. Asthma, Cat. no. ACM 33. Canberra: AIHW.
- CHUNG, K. F., WENZEL, S. E., BROZEK, J. L., BUSH, A., CASTRO, M., STERK, P. J., ADCOCK, I. M., BATEMAN, E. D., BEL, E. H., BLEECKER, E. R., BOULET, L.-P., BRIGHTLING, C., CHANEZ, P., DAHLEN, S.-E., DJUKANOVIC, R., FREY, U., GAGA, M., GIBSON, P., HAMID, Q., JAJOUR, N. N., MAUAD, T., SORKNESS, R. L. & TEAGUE, W. G. 2014. International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma. *European Respiratory Journal*, 43, 343-373.
- GLOBAL INITIATIVE FOR ASTHMA. 2021. *Global Strategy for Asthma Management and Prevention* [Online]. Available: www.ginasthma.org [Accessed].
- GRAINGE, C. L., MALTBY, S., GIBSON, P. G., WARK, P. A. & MCDONALD, V. M. 2016. Targeted therapeutics for severe refractory asthma: monoclonal antibodies. *Expert Rev Clin Pharmacol*, 9, 927-41.
- HEKKING, P. P., WENER, R. R., AMELINK, M., ZWINDERMAN, A. H., BOUVY, M. L. & BEL, E. H. 2015. The prevalence of severe refractory asthma. *J Allergy Clin Immunol*, 135, 896-902.
- HILES, S. A., HARVEY, E. S., MCDONALD, V. M., PETERS, M., BARDIN, P., REYNOLDS, P. N., UPHAM, J. W., BARAKET, M., BHIKOO, Z., BOWDEN, J., BROCKWAY, B., CHUNG, L. P., COCHRANE, B., FOXLEY, G., GARRETT, J., HEW, M., JAYARAM, L., JENKINS, C., KATELARIS, C., KATSOULOTOS, G., KOH, M. S., KRITIKOS, V., LAMBERT, M., LANGTON, D., LARA RIVERO, A., MARKS, G. B., MIDDLETON, P. G., NANGUZGAMBO, A., RADHAKRISHNA, N., REDDEL, H., RIMMER, J., SOUTHCOTT, A. M., SUTHERLAND, M., THIEN, F., WARK, P. A. B., YANG, I. A., YAP, E. & GIBSON, P. G. 2018. Working while unwell: Workplace impairment in people with severe asthma. *Clin Exp Allergy*, 48, 650-662.
- JUNIPER, E. F., BOUSQUET, J., ABETZ, L. & BATEMAN, E. D. 2006. Identifying 'well-controlled' and 'not well-controlled' asthma using the Asthma Control Questionnaire. *Respir Med*, 100, 616-21.
- JUNIPER, E. F., BUIST, A. S., COX, F. M., FERRIE, P. J. & KING, D. R. 1999. Validation of a standardized version of the Asthma Quality of Life Questionnaire. *Chest*, 115, 1265-70.
- MINISTRY OF HEALTH 2017. Annual Data Explorer 2018/19: New Zealand Health Survey. Wellington: Ministry of Health.
- O'NEILL, S., SWEENEY, J., PATTERSON, C., MENZIES-GOW, A. & NIVEN, R. 2015. The cost of treating severe refractory asthma in the UK: an economic analysis from the British Thoracic Society Difficult Asthma Registry. *Thorax* 70, 376-8.
- RICE, J. B., WHITE, A. G., SCARPATI, L. M., WAN, G. & NELSON, W. W. 2017. Long-term Systemic Corticosteroid Exposure: A Systematic Literature Review. *Clin Ther*, 39, 2216-2229.
- TELFAR BARNARD, L. & ZHANG, J. 2018. The impact of respiratory disease in New Zealand: 2018 update.



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