Smoking in critically ill patients with COVID-19: the Australian experience

Mark P Plummer, Breanna Pellegrini, Aidan JC Burrell, Husna Begum, Tony Trapani and Andrew A Udy

To the Editor: It is well recognised that smoking increases the risk and severity of pulmonary infections, including Middle East respiratory syndrome coronavirus (MERS-CoV) infection, due to direct damage to the airways and a decrease in pulmonary immune function.[1,2] The ongoing coronavirus disease 2019 (COVID-19) pandemic has seen an evolving and disparate body of evidence concerning the interplay between smoking, COVID-19, and disease progression. An early meta-analysis of the first five articles (including 1399 patients) from China reported that there was no association between active smoking and severity of COVID-19 (pooled odds ratio, 1.69; 95% CI, 0.41–6.92; $P = 0.24$).[3] In another study, the smoking prevalence among adults with COVID-19 from China, Korea and the United States was lower than the national smoking prevalence in each population.[4] This has led some authors to conclude that smoking may be protective against COVID-19.[5] However, this disparity may be partly explained by an under-assessment of smoking in strained health care systems, whereby smokers are misclassified as non-smokers, biasing the risk estimate towards the null.[6] While the proportion of smokers among patients with COVID-19 appears lower than expected, recent data suggest smoking is indeed associated with disease progression. Two recent larger meta-analyses on smoking and COVID-19 (including 11 590 and 2473 patients respectively) have demonstrated a strong association between smoking and disease severity.[4,7]

Given the heterogeneity of these findings, we thought it important to report Australian observational data concerning smoking among critically ill patients with COVID-19. To date, Australia has been fortunate with a comparatively low incidence of COVID-19 and mortality; as of 7 July 2020, there have been 8586 cases and 106 deaths.[8] In response to the COVID-19 pandemic, the Australian and New Zealand Intensive Care Society Clinical Trials Group (ANZICS CTG) in collaboration with Monash University and the International Severe Acute Respiratory and Emerging Infection Consortium (ISARIC) launched the SPRINT-SARI (Short Period prevalence Study of Severe Acute Respiratory Infection) Australia intensive care unit (ICU) COVID-19 database to provide near real-time observational data of critically ill patients admitted to the ICU with COVID-19. As of 29 May 2020, a total of 48 ICU sites have contributed data pertaining to 172 critically ill patients with confirmed COVID-19 including 116 males and 54 females with a median age of 64 years (interquartile range [IQR], 54.5–72.0 years). Twenty-one patients (12.2%) reported a history of smoking. Smokers were older (median age, 68.0 years; IQR, 58.0–71.0 years) and had a higher incidence of chronic comorbidities (Table 1).

Table 1. Demographics for intensive care unit (ICU) patients with coronavirus disease 2019 (COVID-19) by smoking status

	Smoking history	Non-smoker	Not stated
Total number of patients	21	146	5
Age at admission (years), median (IQR)	68.0 (58.0–71.0)	63.0 (54.0–72.0)	63.0 (55.0–69.0)
Sex			
Male	12 (57.1%)	101 (69.2%)	3 (60.0%)
Female	9 (42.9%)	43 (29.5%)	2 (40.0%)
Not stated	0 (0.0%)	2 (1.4%)	0 (0.0%)
Comorbidities reported			
Chronic cardiac disease	4 (19.0%)	26 (17.8%)	2 (40.0%)
Chronic pulmonary disease	6 (28.6%)	7 (4.8%)	1 (20.0%)
Obesity	6 (28.6%)	28 (19.2%)	2 (40.0%)
Diabetes	6 (28.6%)	35 (24.0%)	1 (20.0%)
Asthma	2 (9.5%)	17 (11.6%)	0 (0.0%)

IQR = interquartile range. Notes: Data in this descriptive table were extracted on 27 May 2020 and pertains to ICU admissions in Australia reported to the SPRINT-SARI AUS ICU COVID-19 database between 6 March 2020 and 27 May 2020.

The prevalence of smoking in the SPRINT-SARI Australia dataset is similar to the national smoking prevalence of 14%.[9] It is, however, lower than the prevalence of smoking among all adult patients admitted to Australian and New Zealand ICUs. In 2018, the ANZICS CTG published a prospective cross-sectional point prevalence study (including 551 of 671 patients from 47 ICUs over 2 study days) where 112 patients were found to be current smokers (20.3%; 95% CI, 17.0–23.9%).[10] The lower proportion of critically ill patients with COVID-19 with a smoking history may be partly explained by under-reporting, whereby a detailed history and collateral from family is less practical.

As the pandemic continues to evolve and more data are collected with greater precision, it is possible for these distributions to change, particularly as our sample size is small. In addition, these data represent the sickest patients with COVID-19 being managed in the ICU and do not reflect the overall population of patients with COVID-19 in Australia. While it appears that smoking is associated with severity of COVID-19, the relationship between smoking and risk of COVID-19 at a population level remains uncertain. As community testing increases, it would be valuable to collect data on smoking and nicotine exposure at a population level to more accurately determine the association between COVID-19, disease progression and death.

Acknowledgements: SPRINT-SARI Australia is an ANZICS CTG-supported study. The SPRINT-SARI Australia Management Committee are Aidan Burrell, Allen Cheng, Andrew Udy, Annamaria Palermo, Benjamin Reddi, Claire Reynolds, Craig French, D James Cooper, Edward Litton, Husna Begum, Lewis Campbell, Mahesh Ramanan, Mark Plummer, Richard McAllister, Simon Erickson, Tessa Broadley, Tony Trapani and Winston Cheung.

The SPRINT-SARI Australia Investigators are Adam Visser, Adrian Mattke, Adrian Regli, Alan Rashid, Alexis Tabah, Alison Walker, Allen Cheng, Andrew Udy, Anil Ramnani, Anthony Eidan, Bart DeKeulenaer, Benjamin Reddi, Brent Richards, Cameron Knott, Cara Moore, Catherine Boschert, Catherine Tacon, Craig French, Danielle Austin, David Brewster, David Cooper, David Crosbie, David Hawkins, Edda Jessen, Eduardo Martinez, Edward Fysh, Edward Litton, Felix Oberender, Gavin Salt, Glenn Eastwood, Gopal Taori, Hayden White, Hergen Buscher, Ian Seppelt, Isabel Anne Leditschke, Janelle Young, Jayshree Lavana, Jeremy Cohen, Jessica Lugsdin, John Botha, John Santamaria, Jonathan Barrett, Kasha Singh, Khaled El-Khawas, Kristine Estensen, Kush Deshpande, Kyle White, Leigh Fitzpatrick, Lewis Campbell, Mahesh Ramanan, Manoj Saxena, Mark Kol, Mark Page, Mark Plummer, Martin Sterba, Matthew Anstey, Matthew Brain, Matthew Maiden, Myrene Kilminster, Naomi Hammond, Neeraj Bhadange, Nicole Humphreys, Paul Azzi, Paul Secombe, Paula Lister, Peter Chan, Peter McCanny, Phillip Britton, Pierre Janin, Ravi Krishnamurthy, Ravi Tiruvoipati, Ravikiran Sonawane, Richard Totaro, Rinaldo Bellomo, Ritesh Sanghavi, Sandra Peake, Shailesh Bihari, Shane George, Simon Erickson, Steve Webb, Subodh Ganu, Thomas Rozen, Toni McKenna, Umesh Kadam, Vineet Nayyar, Wei Han Choy and Wisam Albassam.

The SPRINT-SARI Australia participating sites are Albury Wodonga Health, Alice Springs Hospital, Angliss Hospital, Austin Hospital, Ballarat Base Hospital, Bankstown–Lidcombe Hospital, Barwon Health, Bendigo Hospital, Box Hill Hospital, Bunbury Hospital, Bundaberg Hospital, Caboolture Hospital, Cabrini Hospital Malvern, Cairns Hospital, Calvary Mater Newcastle, Campbelltown Hospital, Canberra Hospital, Concord Hospital, Dandenong Hospital, Epworth Richmond, Fiona Stanley Hospital, Flinders Medical Centre, Footscray Hospital, Frankston Hospital, Gold Coast University Hospital, Hervey Bay Hospital, Ipswich Hospital, John Hunter Hospital, Joondalup Health Campus, Launceston General Hospital, Lismore Base Hospital, Liverpool Hospital, Logan Hospital, Lyell McEwan Hospital, Maroondah Hospital, Mater Hospital Brisbane, Mildura Base Hospital, Monash Children's Hospital, Monash Medical Centre, Nepean Hospital, Northeast Health Wangaratta, Northern Hospital, Port Macquarie Base Hospital, Prince of Wales Hospital, Princess Alexandra Hospital, Princess Margaret Children's Hospital, Queensland Children's Hospital, Redcliffe Hospital, Rockingham Hospital, Royal Adelaide Hospital, Royal Brisbane and Women's Hospital, Royal Children's Hospital, Royal Darwin Hospital, Royal Hobart Hospital, Royal Melbourne Hospital, Royal North Shore Hospital, Royal Perth Hospital, Royal Prince Alfred Hospital, Sir Charles Gairdner Hospital, St George Hospital, St John of God Hospital Midland, St John of God Hospital Murdoch, St Vincent's Hospital Melbourne, St. Vincent's Hospital Sydney, Sunshine Coast University Hospital, Sunshine Hospital, Sydney Children's Hospital Randwick, The Alfred Hospital, The Children's Hospital at Westmead, The Prince Charles Hospital, The Queen Elizabeth Hospital, Toowoomba Hospital, Warrnambool Base Hospital, Werribee Mercy Hospital, Westmead Hospital, Wollongong Hospital and Women's and Children's Hospital Adelaide.

Institution

Australian and New Zealand Intensive Care Research Centre (ANZIC-RC), Monash University, Melbourne, VIC, Australia.

Competing interests

None declared.

Author details

Mark P Plummer[1]

Breanna Pellegrini[2]

Aidan JC Burrell[3,4]

Husna Begum[4]

Tony Trapani[3,4]

Andrew A Udy[*,3,4]

for the SPRINT-SARI Australia Investigators

1 Department of Intensive Care, Royal Melbourne Hospital, Melbourne, VIC, Australia.
2 School of Public Health and Preventative Medicine, Monash University, Melbourne, VIC, Australia.
3 Department of Intensive Care and Hyperbaric Medicine, The Alfred Hospital, Melbourne, VIC, Australia.
4 Australian and New Zealand Intensive Care Research Centre, Monash University, Melbourne, VIC, Australia.
* Corresponding author.

Correspondence: mnhs-sprint.sari@monash.edu

References

1 Bauer CMT, Morissette MC, Stampfli MR. The influence of cigarette smoking on viral infections: translating bench science to impact COPD pathogenesis and acute exacerbations of COPD clinically. *Chest* 2013; 143: 196-206.
2 Park JE, Jung S, Kim A, Park JE. MERS transmission and risk factors: a systematic review. *BMC Public Health* 2018; 18: 574.
3 Lippi G, Henry BM. Active smoking is not associated with severity of coronavirus disease 2019 (COVID-19). *Eur J Intern Med* 2020; 75: 107-8.
4 Patanavanich R, Glantz SA. Smoking is associated with COVID-19 progression: a meta-analysis. *Nicotine Tob Res* 2020; doi: 10.1093/ntr/ntaa082. [Epub ahead of print]
5 Farsalinos K, Barbouni A, Niaura R. Systematic review of the prevalence of current smoking among hospitalized COVID-19 patients in China: could nicotine be a therapeutic option? *Intern Emerg Med* 2020; doi: 10.1007/s11739-020-02355-7. [Epub ahead of print]
6 Polubriaginof F, Salmasian H, Albert DA, Vawdrey DK. Challenges with collecting smoking status in electronic health records. *AMIA Annu Symp Proc* 2017; 2017: 1392-400.
7 Alqahtani JS, Oyelade T, Aldhahir AM, et al. Prevalence, severity and mortality associated with COPD and smoking in patients with COVID-19: a rapid systematic review and meta-analysis. *PLoS One* 2020; 15: e0233147.
8 Australian Government, Department of Health. Coronavirus (COVID-19) current situation and case numbers [website]. Commonwealth of Australia, 2020. https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/coronavirus-covid-19-current-situation-and-case-numbers (viewed July 2020).
9 Kalisch DW. National Health Survey: first results 2017–2018 [Cat. No. 4364.0.55.001]. Canberra: Australian Bureau of Statistics; 2019. https://www.abs.gov.au/ausstats/abs@.nsf/mf/4364.0.55.001 (viewed July 2020).
10 McGain F, Durie ML, Bates S, et al. Smoking cessation therapy in Australian and New Zealand intensive care units: a multicentre point prevalence study. *Crit Care Resusc* 2018; 20: 68-73.