

The Impact of Re-Admissions in COPD

Jaber S Alqahtani, Swapna Mandal, John R Hurst

UCL Respiratory, University College London, London, UK

j.hurst@ucl.ac.uk

The respiratory community is failing people living with chronic obstructive pulmonary disease (COPD) by not addressing the problem of high re-admission rates following hospital treatment for exacerbations of COPD. This failure is not because of inadequate data describing the scale of the problem. In the UK national audit, 43% of 74,645 patients had been re-admitted by 90 days and this figure had increased over time [1]. 35% of 15,191 patients in the European COPD Audit were re-admitted by 90 days [2]. A US database of 1,055,830 index admissions had a re-admission rate of 19.2% at 30 days [3], which compares to 24% at 30 days in the UK: remarkably similar re-admission rates are seen across diverse health settings.

Our failure to address re-admissions in COPD is also not due to a lack of evidence explaining their causes, and risk factors. The commonest cause of re-admissions are respiratory-related, COPD and pneumonia for example, accounting for 52% in the US study referred to above [3]. A recent systematic review of risk-factors for all-cause readmissions highlighted co-morbidities, previous exacerbations and hospitalisation, and increased length of stay as significant risk factors for all-cause readmission. In particular, heart failure, renal failure, depression and alcohol use were all associated with an increased risk of 30-day re-admission [4].

The significant impact of re-admissions on patients is clear. In a systematic review of how people living with COPD value COPD outcomes, exacerbations and hospitalisations due to exacerbation were the outcomes rated most important [5]. Moreover, patients with COPD and frequent hospital admissions are at significant risk of increased mortality with a survival rate of only 20% at five years [6]. Our failure to address re-admissions in COPD occurs despite evidence that exacerbations, particularly hospitalised exacerbations cause much of the health-care burden and costs associated with COPD: the cost of a severe (hospitalised) exacerbation being eight times the cost of a community treated event [7].

Thus, hospitalised COPD exacerbations are important to payers and patients, there is abundant evidence from diverse health care systems highlights the scale of the problem, and the causes and risk-factors appear well understood. What has gone wrong? It must be time to think again about this problem.

First, understanding risk-factors for, and causes of re-admission following hospital treatment for an exacerbation of COPD is not the same as having evidence-based interventions to mitigate this risk. The likely candidates of supported self-management and 'Discharge Bundles' have had disappointing results in clinical trials [8], likely because they are complex interventions requiring input from several individuals thus making it difficult to implement them effectively. Although only applicable to a

minority of the sickest patients with hypercapnoea, domiciliary NIV is an example of an intervention where there is high quality trial evidence of benefit in reducing the risk of re-admission (and death) [9]. Evidence is emerging on the benefits of post-exacerbation pulmonary rehabilitation (PR) [10], but access to PR in general is limited [1] and implementation of post-exacerbation PR would require significant additional resource.

There is clearly need for more work to understand the mechanisms of re-admissions and exacerbation recurrence, and find better ways to prevent exacerbations. These concepts were both identified as top-ten research priorities in a shared patient-clinician research prioritisation exercise for exacerbations of COPD [11]. In the meantime, practical advice for front-line clinicians must be to identify and optimise common co-morbidities, and deploy evidence-based interventions to reduce COPD exacerbations. Importantly, for pharmacotherapy, this includes not just using the right drugs but selecting the optimal device: patients with severe COPD, and those recovering from severe exacerbations may not generate sufficient inspiratory flow to activate dry-powder inhalers, and critical inhaler errors are associated with increased risk of hospital care for COPD [12]. A reduction in admissions for COPD exacerbations in association with COVID-19 restrictions has highlighted the potential value of respiratory viral infection control measures to reduce exacerbations [13], but these have yet to be recommended in guidelines.

An important question is to what extent re-admission reflect a failure of care. Financial penalties to reduce reimbursement for re-admissions assume this to be the case. However, there is evidence that people with COPD are at highest risk for a recurrent exacerbation in the period immediately following a first exacerbation, even when that first event has completely recovered [14]. It may be time to add a paradigm of 'high risk time-periods' when considering exacerbation risk, to the familiar strategy of identifying high-risk patients [15]. Financial incentives might better focus on care quality, as has been implemented with the UK national COPD audit [1]. Discharge from hospital care back to the community represents a vulnerable time for our sickest patients and it is incumbent on us all to ask if the communication and care we provide and receive at this time is optimal. Early re-admissions, therefore, may be different from late re-admissions, and may require different strategies to mitigate them. We are not alone in facing these challenges: 30 day re-admissions for heart failure are similar to those for COPD, and there is a similar strategy to better implement effective therapies [16].

To conclude, COPD re-admissions are a challenging problem. We don't yet have all the answers to provide a solution. The minimum we can currently achieve is to optimise COPD care and co-morbidity prior to discharge, and ensure effective transfer of care across hospital-based and community teams. Ultimately, we need further prospective research in this area, to identify novel and simple interventions that are effective and implementable at scale. Only by doing this can we reduce the burden of COPD re-admissions. Our patients deserve nothing less. They are waiting for us to act.

WORD COUNT: 934

References:

1. Hurst JR, Quint JK, Stone RA, Silove Y, Youde J, Roberts CM. National clinical audit for hospitalised exacerbations of COPD. *ERJ Open Res.* 2020 Sep 21;6(3):00208-2020. doi: 10.1183/23120541.00208-2020. PMID: 32984418; PMCID: PMC7502696.
2. Hartl S, Lopez-Campos JL, Pozo-Rodriguez F, Castro-Acosta A, Studnicka M, Kaiser B, Roberts CM. Risk of death and readmission of hospital-admitted COPD exacerbations: European COPD Audit. *Eur Respir J.* 2016 Jan;47(1):113-21. doi: 10.1183/13993003.01391-2014. Epub 2015 Oct 22. PMID: 26493806.
3. Jacobs DM, Noyes K, Zhao J, Gibson W, Murphy TF, Sethi S, Ochs-Balcom HM. Early Hospital Readmissions after an Acute Exacerbation of Chronic Obstructive Pulmonary Disease in the Nationwide Readmissions Database. *Ann Am Thorac Soc.* 2018 Jul;15(7):837-845. doi: 10.1513/AnnalsATS.201712-913OC. PMID: 29611719; PMCID: PMC6207114.
4. Alqahtani JS, Njoku CM, Bereznicki B, Wimmer BC, Peterson GM, Kinsman L, Aldabayan YS, Alrajeh AM, Aldhahir AM, Mandal S, Hurst JR. Risk factors for all-cause hospital readmission following exacerbation of COPD: a systematic review and meta-analysis. *Eur Respir Rev.* 2020 Jun 3;29(156):190166. doi: 10.1183/16000617.0166-2019. PMID: 32499306.
5. Zhang Y, Morgan RL, Alonso-Coello P, Wiercioch W, Bała MM, Jaeschke RR, Styczeń K, Pardo-Hernandez H, Selva A, Ara Begum H, Morgano GP, Waligóra M, Agarwal A, Ventresca M, Strzebońska K, Wasylewski MT, Blanco-Silvente L, Kerth JL, Wang M, Zhang Y, Narsingam S, Fei Y, Guyatt G, Schünemann HJ. A systematic review of how patients value COPD outcomes. *Eur Respir J.* 2018 Jul 19;52(1):1800222. doi: 10.1183/13993003.00222-2018. PMID: 30002103.
6. Soler-Cataluña JJ, Martínez-García MA, Román Sánchez P, Salcedo E, Navarro M, Ochando R. Severe acute exacerbations and mortality in patients with chronic obstructive pulmonary disease. *Thorax.* 2005 Nov;60(11):925-31. doi: 10.1136/thx.2005.040527. Epub 2005 Jul 29. PMID: 16055622; PMCID: PMC1747235.
7. Løkke A, Lange P, Lykkegaard J, Ibsen R, Andersson M, de Fine Licht S, Hilberg O. Economic Burden of COPD by Disease Severity - A Nationwide Cohort Study in Denmark. *Int J Chron Obstruct Pulmon Dis.* 2021 Mar 10;16:603-613. doi: 10.2147/COPD.S295388. PMID: 33731990; PMCID: PMC7956888.
8. Kong CW, Wilkinson TMA. Predicting and preventing hospital readmission for exacerbations of COPD. *ERJ Open Res.* 2020 May 11;6(2):00325-2019. doi: 10.1183/23120541.00325-2019. PMID: 32420313; PMCID: PMC7211949.
9. Murphy PB, Rehal S, Arbane G, Bourke S, Calverley PMA, Crook AM, Dowson L, Duffy N, Gibson GJ, Hughes PD, Hurst JR, Lewis KE, Mukherjee R, Nickol A, Oscroft N, Patout M, Pepperell J, Smith I, Stradling JR, Wedzicha JA, Polkey MI, Elliott MW, Hart N. Effect of Home Noninvasive Ventilation With Oxygen Therapy vs Oxygen Therapy Alone on Hospital Readmission or Death After an Acute COPD Exacerbation: A Randomized Clinical Trial. *JAMA.* 2017 Jun 6;317(21):2177-2186. doi: 10.1001/jama.2017.4451. PMID: 28528348; PMCID: PMC5710342.
10. Ibrahim W, Harvey-Dunstan TC, Greening NJ. Rehabilitation in chronic respiratory diseases: In-hospital and post-exacerbation pulmonary rehabilitation. *Respirology.* 2019 Sep;24(9):889-898. doi: 10.1111/resp.13516. Epub 2019 Mar 5. PMID: 30835884.

11. Alqahtani JS, Aquilina J, Bafadhel M, Bolton CE, Burgoyne T, Holmes S, King J, Loots J, McCarthy J, Quint JK, Ridsdale HA, Sapey E, Upadhyaya S, Wilkinson TMA, Hurst JR. Research priorities for exacerbations of COPD. *Lancet Respir Med*. 2021 May 14:S2213-2600(21)00227-7. doi: 10.1016/S2213-2600(21)00227-7. Epub ahead of print. PMID: 34000234.
12. Molimard M, Raheison C, Lignot S, Balestra A, Lamarque S, Chartier A, Droz-Perroteau C, Lassalle R, Moore N, Girodet PO. Chronic obstructive pulmonary disease exacerbation and inhaler device handling: real-life assessment of 2935 patients. *Eur Respir J*. 2017 Feb 15;49(2):1601794. doi: 10.1183/13993003.01794-2016. PMID: 28182569.
13. Alqahtani JS, Oyelade T, Aldhahir AM, Gonçalves Mendes R, Alghamdi SM, Miravittles M, Mandal S, Hurst JR. Reduction in COPD exacerbations during COVID-19: a systematic review and meta-analysis. Preprint at medRxiv accessible at: <https://www.medrxiv.org/content/10.1101/2021.05.17.21257335v1> - last accessed June 3rd 2021
14. Hurst JR, Donaldson GC, Quint JK, Goldring JJ, Baghai-Ravary R, Wedzicha JA. Temporal clustering of exacerbations in chronic obstructive pulmonary disease. *Am J Respir Crit Care Med*. 2009 Mar 1;179(5):369-74. doi: 10.1164/rccm.200807-1067OC. Epub 2008 Dec 12. PMID: 19074596.
15. Hurst JR, Vestbo J, Anzueto A, Locantore N, Müllerova H, Tal-Singer R, Miller B, Lomas DA, Agusti A, Macnee W, Calverley P, Rennard S, Wouters EF, Wedzicha JA; Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints (ECLIPSE) Investigators. Susceptibility to exacerbation in chronic obstructive pulmonary disease. *N Engl J Med*. 2010 Sep 16;363(12):1128-38. doi: 10.1056/NEJMoa0909883. PMID: 20843247.
16. Ziaeian B, Fonarow GC. The Prevention of Hospital Readmissions in Heart Failure. *Prog Cardiovasc Dis*. 2016 Jan-Feb;58(4):379-85. doi: 10.1016/j.pcad.2015.09.004. Epub 2015 Oct 21. PMID: 26432556; PMCID: PMC4783289.