Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Judicious use of incentive spirometry in resource limited times of COVID-19 pandemic

Dear Editor:

We recently read, with great interest, the article by Seyller et al. encouraging the use of Incentive Spirometry (IS) in patients affected by the 2019 Novel Coronavirus disease (COVID-19) [1]. We wanted to look at the topic from a novel and a critical approach. The COVID-19 pandemic has far reaching consequences. From psychological and mental well-being to economic and financial constraints, the effects of current COVID-19 pandemic can be felt in all aspects of life [2]. Given the strains imposed by this pandemic on healthcare systems, it is imperative to advocate for the judicious use of limited resources. While large-scale randomized control trials are underway to determine the risk vs. benefit of drugs and other therapeutic interventions, even seemingly benign therapeutic interventions, such as IS should be critically appraised due to the issues surrounding healthcare worker exposure and PPE utilization. IS has been used in a multitude of patients with respiratory diseases, including COVID-19 pneumonia. However, its use and effectiveness have only been studied in post-operative patients. We believe that in this resource limited environment, it is more important than ever to provide high quality, evidence-based care. IS is a therapeutic intervention that has been often used in situations beyond its evidence.

Prior data shows that the prescription of IS has only been extensively studied in preventing post-operative pulmonary complications [3]. Even in this patient population, various clinical trials have reported a lack of benefit in preventing mortality and post-op complications [4]. Studies have exceedingly shown that unmonitored use of IS provides no benefits [5], but the monitored use of in COVID is not feasible due to the safety concerns imposed by the high transmissibility of SARS-CoV2, viral agent responsible for COVID-19. The American Association for Respiratory Care does not recommend IS for routine prophylactic use in even post-operative patients [6]. A recently published paper [7] estimated the annual cost of prescribing IS to be $1.04 billion in post-operative patients. However, the combined cost of implementing IS for all of its non-evidence based indications is expected to be much higher.

In order to further prove our point, we conducted a small retrospective observational study in our hospital, after approval from our Institutional Review Board (IRB). We used the SlicerDicer tool in the Epic electronic medical record (EMR) system (EPIC, Verona, WI). All patients admitted in Ochsner LSU Shreveport hospital with an ICD-10 code for COVID-19 (ICD-10-CM: U07.1) from 3/8/2020 (first case in Louisiana, USA) to 5/8/2020 were included. Our study population included critically ill and non-critically ill patients, excluding patients intubated on arrival. Using medication administration records (MARs) for IS, two groups were created: COVID-19 patients who were prescribed IS (IS group) vs. patients who were not prescribed IS (non-IS group). In each group, the primary outcome was mortality. Secondary outcomes included the rate of intubation. Outcomes were determined using Boolean operators and linking/unlinking events when necessary. Data were collected in Microsoft Excel (version 2018) and the outcomes compared using odds ratio (OR). Total of 155 patients with COVID-19 as their primary diagnosis were admitted to the hospital. The IS group had 41 patients, whereas the non-IS group had 114 patients. No significant difference was found between the two groups in terms of mortality (OR = 0.649; 95% CI 0.270–1.558; $p = 0.334$) and intubation rates (OR = 0.925; 95% CI: 0.094–9.152; $p = 0.947$) (Table 1).

Table 1
Outcomes of incentive spirometer in COVID-19 patients

	Mortality	Intubation
	OR (95% CI)	OR (95% CI)
Overall		
Non spirometry	REF	REF
Spirometry	0.649 (0.270–1.558)[a]	0.925 (0.094–9.152)[b]

[a] $p = 0.334$.
[b] $p = 0.947$.

Our small observational study is in line with existing evidence that does not support the use of IS in primary pulmonary pathologies such as pneumonia and ARDS [8]. COVID -19 is a multisystemic disease and has a complex interplay of multiple factors that determine mortality. Since IS does not provide a benefit against respiratory decline, we postulate that no mortality benefit should be seen, even in larger population based studies. Despite all the evidence against it, given its benign nature, ease of administration, and the perceived benefit of deep breathing, IS continues to be highly prescribed.

We would like to conclude by saying that given the paucity of data on the efficacy of IS in conditions other than post-operative period, we advocate thoughtful and evidence guided use of this tool during these resource limited times. The authors recognize the need for further studies, especially randomized clinical trials, to shed light on this topic further. However, the current study can serve as a nidus for encouraging further research discussion regarding the use of IS in COVID-19 patients.

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Aakash R. Sheth MD
Department of Internal Medicine, LSU Health Sciences Center, Shreveport, LA, USA
E-mail address: ashet1@lsuhsc.edu

Mehdi Faraji MD
Department of Internal Medicine, LSU Health Sciences Center, Shreveport, LA, USA

Sukhmani Boparai MD
Department of Internal Medicine, LSU Health Sciences Center, Shreveport, LA, USA

Lovekirat Dhaliwal MBBS
Department of Internal Medicine, LSU Health Sciences Center, Shreveport, LA, USA

Shreedhar Kulkarni MD
Department of Internal Medicine, LSU Health Sciences Center, Shreveport, LA, USA

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