

Analysis of Distance Travelled by Plastic Consumables Used in the First 24 Hours of an Intensive Care Admission: Impacts and Methods of Mitigation

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Abstract : The intensive care unit (ICU) is a particularly resource heavy environment, in terms of staff, drugs and equipment required. Whilst many areas of the hospital are attempting to cut down on plastic use and minimise their impact on the environment, this has proven challenging within the confines of intensive care. Concurrently, as globalization has progressed over recent decades, there has been a tendency towards centralised manufacturing with international distribution networks for products, often covering large distances. In this study, we have modelled the standard consumption of plastic single-use items over the course of the first 24-hours of an average individual patient's stay in a 12 bed ICU in the United Kingdom (UK). We have identified the country of manufacture and calculated the minimum possible distance travelled by each item from factory to patient. We have assumed direct transport via the shortest possible straight line from country of origin to the UK and have not accounted for transport within either country. Assuming an intubated patient with invasive haemodynamic monitoring and central venous access, there are a total of 52 distincts, largely plastic, disposable products which would reasonably be required in the first 24-hours after admission. Each product type has only been counted once to account for multiple items being shipped as one package. Travel distances from origin were summed to give the total distance combined for all 52 products. The minimum possible total distance travelled from country of origin to the UK for all types of product was 273,353 km, equivalent to 6.82 circumnavigations of the globe, or 71% of the way to the moon. The mean distance travelled was 5,256 km, approximately the distance from London to Mecca. With individual packaging for each item, the total weight of consumed products was 4.121 kg. The CO₂ produced shipping these items by air freight would equate to 30.1 kg, however doing the same by sea would produce 0.2 kg CO₂. Extrapolating these results to the 211,932 UK annual ICU admissions (2018-2019), even with the underestimates of distance and weight of our assumptions, air freight would account for 6586 tons CO₂ emitted annually, approximately 130 times that of sea freight. Given the drive towards cost saving within the UK health service, and the decline of the local manufacturing industry, buying from intercontinental manufacturers is inevitable. However, transporting all consumables by sea where feasible would be environmentally beneficial, as well as being less costly than air freight. At present, the NHS supply chain purchases from medical device companies, and there is no freely available information as to the transport mode used to deliver the product to the UK. This must be made available to purchasers in order to give a fuller picture of life cycle impact and allow for informed decision making in this regard.

Keywords : CO₂, intensive care, plastic, transport

Conference Title : ICSRSD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020