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Bibliometric Profile of Metered Dose Inhalers

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pharmaceuticals MDPI

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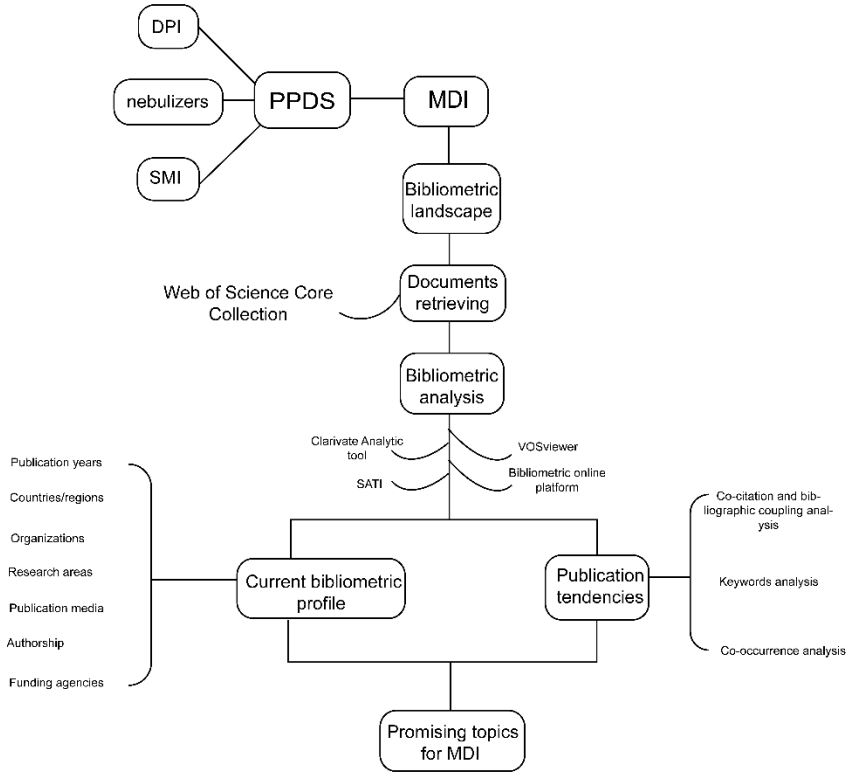
Graphical Abstract



Abstract

Pulmonary drug delivery systems (PDDS) have gained particular attention by pharmaceutical scientists due to its potent in the therapy of both pulmonary diseases and systemic diseases. Metered dose inhalers (MDI) as a delivery approach of PDDS have ample advantages over other approaches. No drying process is associated with MDI, which avoids the chemical and physical instability. MDI are cost-effective, portable and can be self-administered. It was recently reported that MDI had occupied a large proportion of the respiratory drug market since the last century. To facilitate the future studies on MDI, this work was aimed to conduct bibliometric analysis of the publications of MDI in Science Citation Index Expanded database of Web of Science from 2000 to 2020 (2,858 in total). The documents were processed by Clarivate Analytic tool equipped by Web of Science, VOSviewer, Statistical Analysis Toolkit for Informetric (SATI) and bibliometric online platform, and the data were visualized. After describing the detailed bibliometric profile of MDI publications, which included publication years, countries/regions, organizations, research areas, publication media, authorship and funding agencies, we assessed the publication tendencies by virtue of analysis of co-citation, bibliographic coupling, keywords and co-occurrence. Based on the results, we put forward three promising topics for future studies of MDI. Taken together, we believed that MDI had become a topic under investigation across the world, and will still be an emphasis for fundamental and translational researches.

Keywords: Metered dose inhalers; Publication landscape; Bibliometric analysis; Web of Science

Introduction

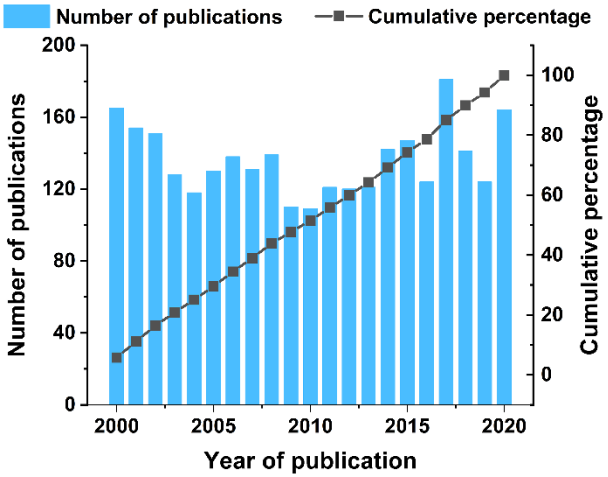
Pulmonary drug delivery systems (PDDS） are potent in the therapy of both pulmonary diseases and systemic diseases.

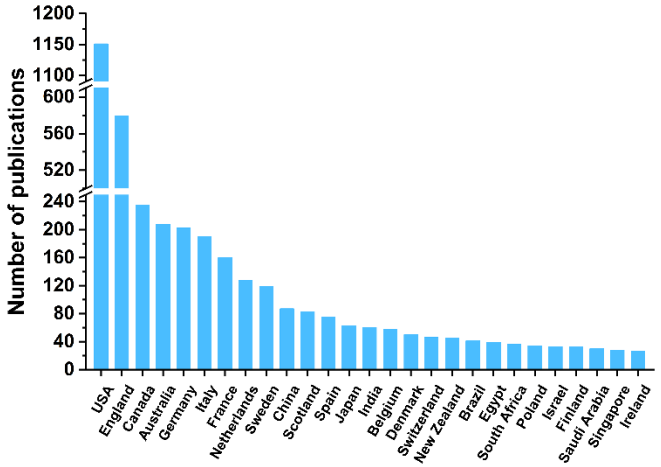
To be specific, PDDS mainly includes four preparation patterns, namely, metered dose inhalers (MDI), dry powder inhalers, soft mist inhalers and nebulizers .MDI is composed of drugs dissolved/suspended propellant (sometimes propellant-containing co-solvent) and a pressure vessel . The formulation of MDI is in a liquid state, and no drying processes are involved during the production . Thus, some chemical or physical stability issues provoked by drying processes may be prevented . In many cases, drying processes are mandatory in dry powder inhalers manufacturing, and chemical or physical instability may occur, especially for macromolecular drugs. Compared to soft mist inhalers, MDI are much more cost-effective , and more real-world clinical evidences are collected to support the efficacy of MDI . MDI are portable and can be self-administered, while nebulizers should be applied in a hospital under the care of professional medical staff.

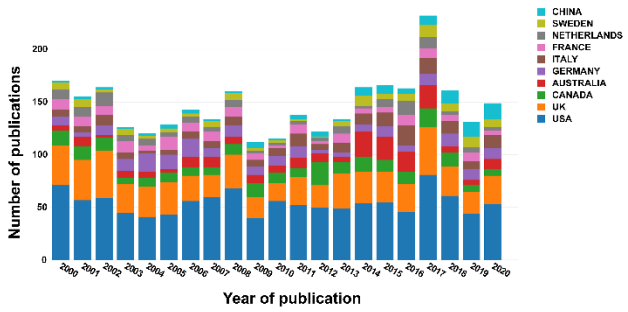
It is recently reported that MDI have occupied a large proportion of the respiratory drug market since the last century, albeit the other dosage forms (dry powder inhalers, soft mist inhalers and nebulizers) exert unneglectable impacts . Motivated by the marketing circumstances, we believed that MDI will still be an emphasis for fundamental and translational researches.

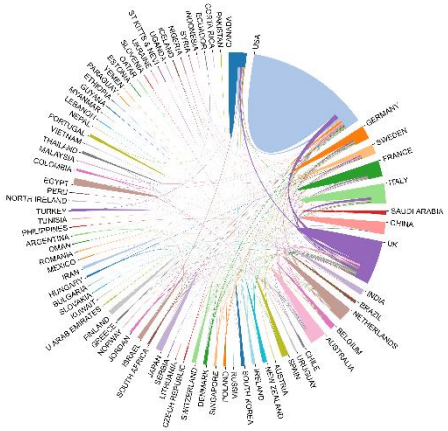
To facilitate the future studies on MDI, it is advisable to explore the current bibliometric landscape, so that the region unexploited can be figured .

Results and discussion









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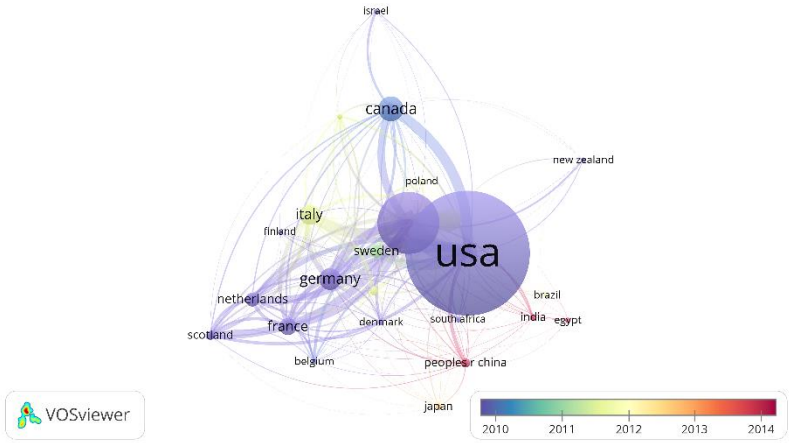

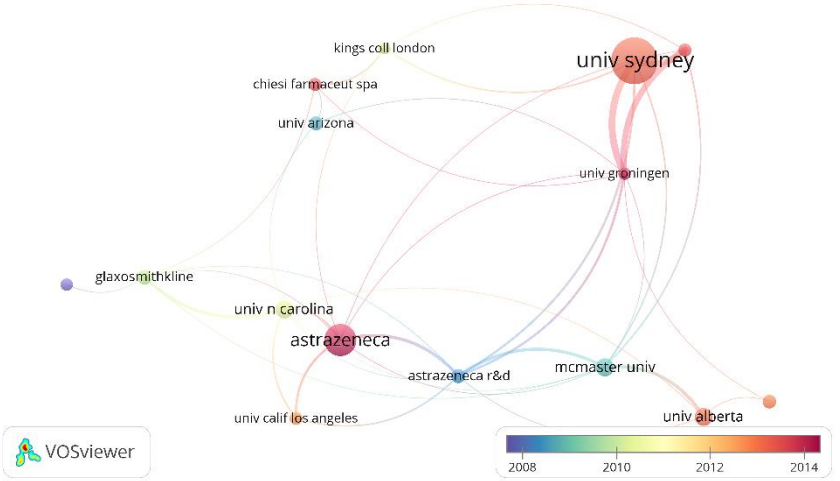

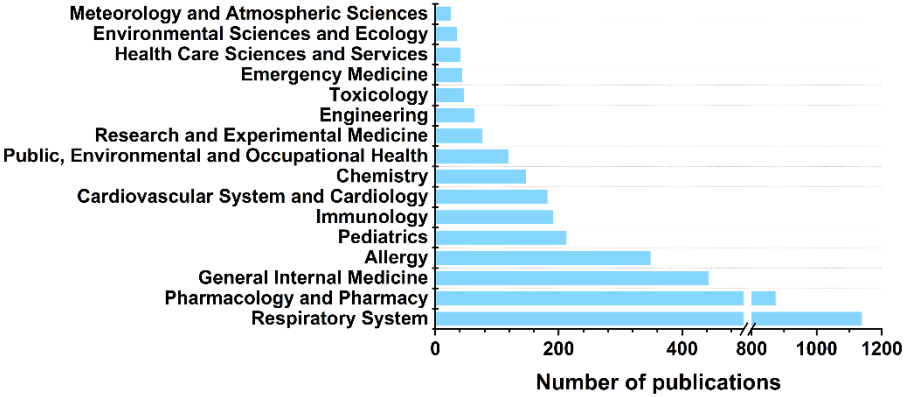

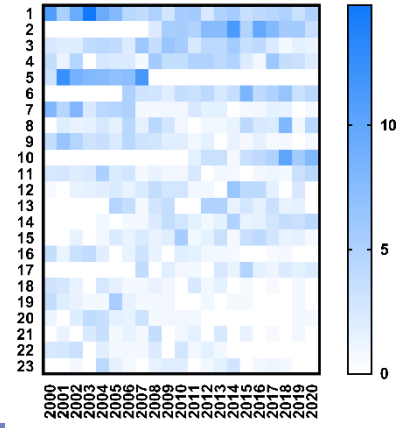

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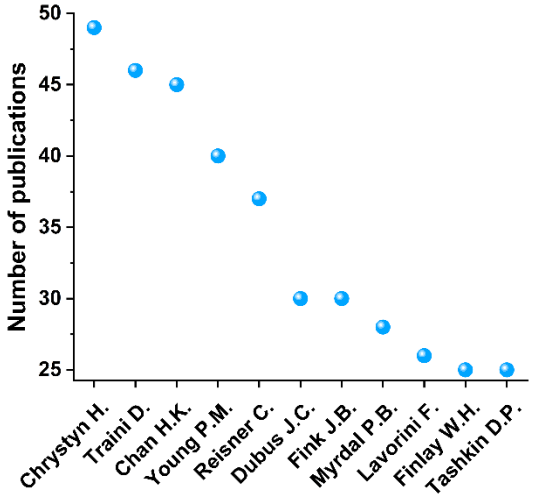

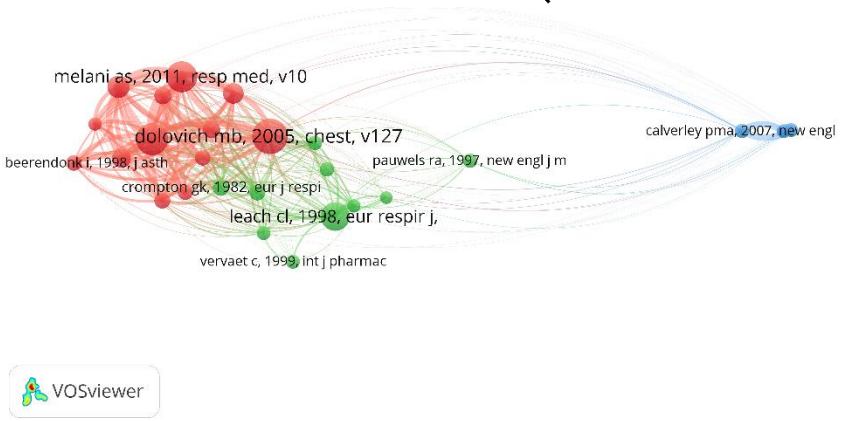

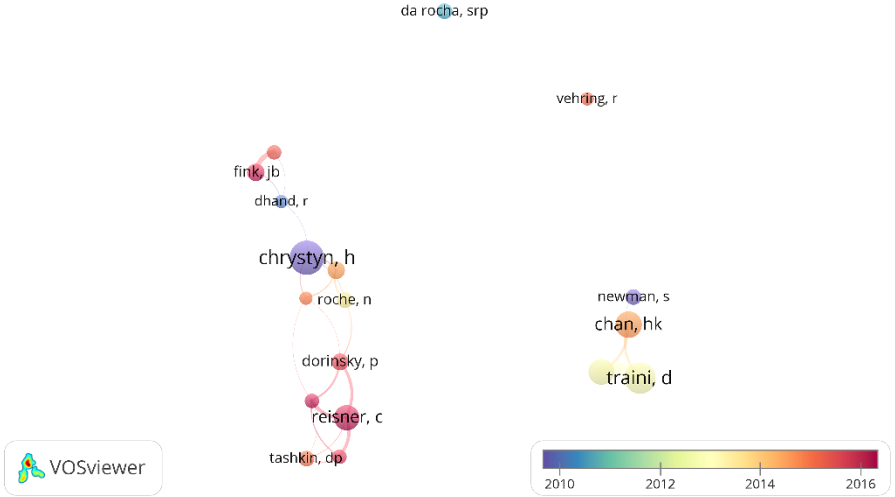

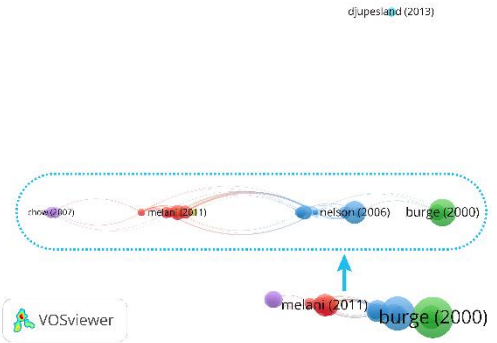

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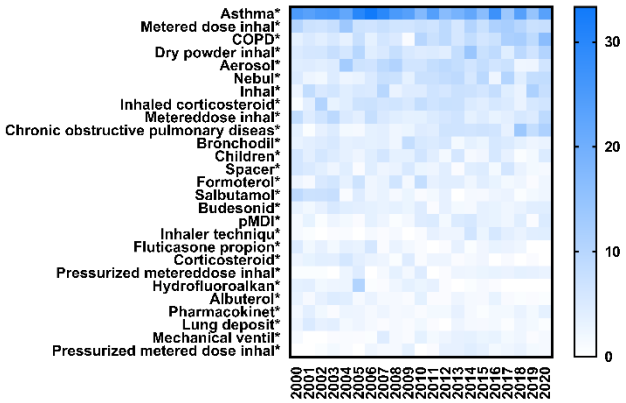

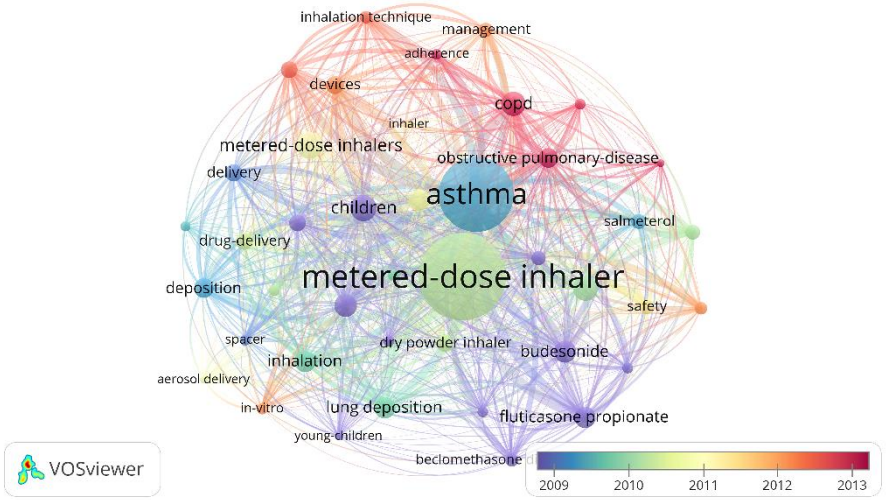

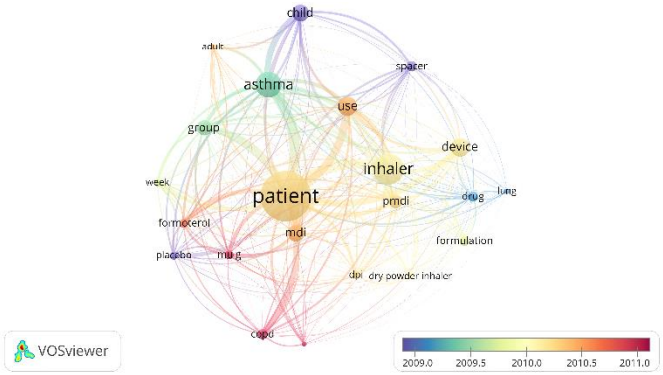

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A possible limitation of this work was that only the Science Citation Index-Expanded database of Web of Science Core Collection was used for literature survey. Although the quality of resulted documents could be guaranteed, the searching scope was undeniably restricted. In our future studies, the PubMed/MEDLINE and Scopus database would also be utilized to improve the extent of exhaustion.

Conclusions

- MDI had become a topic under investigation all over the world.
- Clinical administration practice, the formulation development and the application of COPD treatment were the research focuses in the field of MDI, and nasal MDI design might be the research frontier.
- Clinical evidence of MDI in developing countries, nasal MDI and MDI intended for anti-COVID-19 are three of promising topics for MDI.
- The basic researches of MDI will continue to be a critical topic in the field of pharmaceutical sciences.

Acknowledgments

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