


# Palliative care and COVID-19: a bibliometric analysis

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## ABSTRACT

**Objective** To assess the impact of COVID-19 on the palliative care (PC) publication trend in the last 10 years and the collaboration between countries and main topics that were discussed in the papers.

**Methods** We used Scopus to identify publications on PC between 2012 and 2021 and publications about PC and COVID-19 between 2020 and 2021. We used VOSviewer to assess the main topics using the keywords from the papers and to assess country collaboration.

**Results** 1937 publications resulted. An increase in publications about PC was observed during the pandemic, only partially explained by COVID-19-related publications. Cancer-related PC publications were the ones with the most marked increase. We identified six clusters in the distribution of the keywords: bioethics, cancer, nursing home/telemedicine, public health, caring and PC following the WHO definition. The countries with higher number of publications were the United States and England.

**Conclusion** We showed an increase in the number of PC publications in the last 2 years that was only partially explained by COVID-19-related publications. Most of the publications increase was due to cancer-related publications, since, during the time of the pandemic, publications on cancer and PC increased markedly, while those on heart failure, lung disease and dementia, remained constant.

## INTRODUCTION

Due to public health measures put in place in the countries to try to contain the spread of COVID-19, people infected with this virus were isolated from their families. In addition, as a precautionary measure, people with certain diseases or conditions that made them more likely to develop a severe form of the disease were also, in many cases, isolated from their families. Although hospitalised patients were isolated from their families or had very limited visits, these patients did have

### WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ During the COVID-19 pandemic, there was an increased demand for knowledge about palliative care (PC) and end-of-life care. However, it remained unknown whether this increase was also represented in research, increasing the number of publications on PC compared to previous years.

### WHAT THIS STUDY ADDS

⇒ An increase in publications about PC was observed during the pandemic, only partially explained by COVID-19-related publications. Cancer-related PC research was the one with the most marked increase.

### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Even though since the beginning of the pandemic it rapidly became evident that PC would have a crucial role in the delivery of care during these times, little was published about PC and COVID-19. Literature on PC in the context of COVID-19 is relevant not only during that pandemic but also later, in preparation for another pandemic.

contact with healthcare personnel. Therefore, the support of healthcare personnel became more important to compensate for the fact that patients could not be with their families or other close people. Because palliative care (PC) is intended to help healthcare providers be an integral support for patients and their families,<sup>1–3</sup> it rapidly became evident that PC would have a crucial role in the delivery of care during the pandemic.<sup>3</sup> In particular, the expertise of PC trained personnel regarding symptoms management, advanced care planning, difficult decision making and complicated grief was fundamental.<sup>1,3</sup> Internationally, the pressure for the guidance of care and innovative solutions increased.<sup>4,5</sup> Suddenly, the importance of multidisciplinary collaboration

with PC specialists became clear, both in intensive care units, emergency rooms and at a community level with nurses and general practitioners. In particular, basic training on PC issues, such as advanced care planning and end-of-life care, received a boost.<sup>3 4 6</sup> In addition, pharmacological and non-pharmacological management of certain symptoms, such as dyspnoea and anxiety, became a priority.<sup>3</sup> The use of virtual technologies also played an important role in times of lockdowns and reduced physical contact between patients, families and healthcare providers.<sup>3 5 6</sup>

While it is clear that the demand for knowledge about PC and end-of-life care grew, we do not know whether this increase in demand for PC knowledge was also represented in research, increasing the number of publications on PC compared with previous years. One would think that the more PC was used in times of pandemic, the more PC publications would increase. However, it can also be logical to think that due to the increased burden in the clinical work, the psychological stress and the restrictions of the pandemic, it was difficult for clinicians and researchers to write and publish articles.<sup>7</sup> With a bibliometric approach, we could assess the number of published papers, analyse keywords used in the publications, and assess the cooperation between countries, institutions and authors.<sup>8</sup> Both an increase and a decrease in the production of PC literature seemed plausible, and yet there was no literature evaluating this aspect. Therefore, we conducted this bibliometric analysis to assess whether the onset of COVID-19 generated an increase in the number of PC publications compared with previous years.<sup>8</sup> Additionally, we analysed the keywords of COVID-19 and PC articles as a proxy for the most discussed topics. Finally, since in the current era of globalisation the interaction between countries is very valuable to exchange epidemiological information and recommendation for best clinical practice, we aimed to evaluate international collaboration between academics on the topic of PC and COVID-19.

## METHODS

### Literature search

We used Scopus database to search for published scientific papers on PC. We conducted six different searches: one about PC in general, four about PC in common diseases (cancer, heart failure (HF), dementia and chronic obstructive pulmonary disease (COPD)), and one about PC and COVID-19 (online supplemental material 1). The five first searches were done for the 10 years period comprised between January 2012 and December 2021. The sixth search, about PC and COVID-19, was done for the period between January 2020 and December 2021. We did not apply any exclusion criteria.

The day of the search was 6 April 2022. All the search strategies were discussed with an expert in

medical informatics from the medical library of the University of Bern, Switzerland.

### Publication trends

To assess PC publication trends in the last 10 years (from 2012 to 2021), we built a graph showing the number of papers published each year about PC and each of the diseases assessed. Because the study aimed to assess the impact of COVID-19 on the number of PC publications, we also evaluated how the graph of publication trends would have looked like, if COVID-19 had not appeared in 2019. If we wanted to generate the graphs of the publication trends in the hypothetical case that COVID-19 had not emerged, we could subtract from the total number of publications on PC those that were about COVID-19. However, we have to take into account that the pandemic situation may have changed clinical practice and the number of publications on PC in patients with cancer, dementia or other progressive diseases. That is, the arrival of COVID-19 may not only have had an impact on publications on PC and COVID-19 but also on publications on PC and cancer, dementia or other progressive diseases. Therefore, to try to predict more accurately how the number of publications would have behaved if COVID-19 had not emerged, we looked for the best fit mathematical function for the publication trend of each of diseases assessed (cancer, HF, COPD, dementia, no disease-specific). For each disease category, we took the data from 2012 to 2019 and found the type of function (linear, parabola/hyperbola, exponential, power or logarithmic) that best fit the actual data, with its respective formula. We then used each of the formulas to predict how behaviour would have followed in the next 2 years (2020 and 2021) had COVID-19 not emerged. Finally, we created graphs comparing the predicted behaviour versus the actual one to try to isolate the role of COVID-19 in the number of publications about PC and each of the different disease groups.

### PC and COVID-19

We extracted from Scopus the 10 most frequent authors, countries, affiliations and publication type for the papers about PC and COVID-19. The analysis of the data was done using the analyse tool function on the Scopus website and used it to extract the top 10 of the above-mentioned categories. Additionally, we extracted the authors' keywords for each paper, it is, the keywords that were given by the authors when they submitted each article.

### Analysis of keywords

The records about PC and COVID-19 were exported in VOSviewer (V.1.6.18) for further bibliometric analyses. We included in the analysis only keywords that were found in at least 0.5% of all papers.<sup>9</sup> Furthermore, the words related to the pandemic, such as

COVID-19, pandemic, coronavirus, SARS-CoV-2 and pneumonia, were excluded in order to have more clarity in the map and to avoid noise. In the obtained map, the different sizes of the circles represent the frequency in which each keyword appeared: the bigger the circle size, the more commonly the keyword was found. The lines and their length represent the co-occurrence and the frequency with which these keywords were found in the same paper: the shorter the lines, it is, the closest the circles were, the more commonly the keywords were found in the same paper.<sup>10</sup> The clusters and their colours were automatically assigned from the programme using artificial intelligence. We named each cluster trying to find a logical umbrella term that would cover or encompass the terms included in each cluster.

#### Analysis of the authors' cooperation network

We used VOSviewer to create a map of the scientific interaction between the countries. We included in this analysis only countries that appeared in at least 0.5% of all the papers, as has been previously done in other bibliometric analyses.<sup>9</sup>

## RESULTS

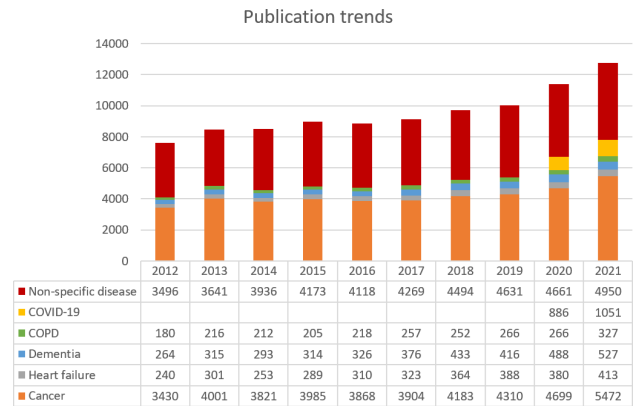
Overall, we found 95 391 PC publications in Scopus between 2012 and 2021. Of those, 43.7% (n=41 673) were about PC in patients with cancer, 3.9% about PC in patients with dementia, 3.4% about PC in patients with HF, 2.5% about PC in patients with COPD and 2.0% about PC in patients with COVID-19. The remaining 44.5% of the papers were about PC in other diseases or in no specific disease. Since COVID-19 appeared, the total number of PC publications related to COVID-19 represents 8% of the total number of publications in the last 2 years.

#### Publication trends

In the last 10 years, the average percentage change in the number of total PC publications was 5.4% of increase compared with the previous year. The maximum increase in the number of total PC publications was 13.7% and occurred in 2020 (figure 1 and online supplemental material 2). This maximum increase was followed by 12% in 2021.

The functions that best fitted to each of the disease categories' publication trends were: power (for the graph about total PC publications), parabola (for publications about PC and cancer, HF, dementia and COPD) and linear (for publications about PC in no specific disease) (online supplemental material 3).

The total number of publications about PC was irregular with an upward trend. However, from 2020, this upward trend was more marked, which is graphically observed in as a break in the curve in 2019, from where it began to grow at a faster rate, faster than predicted.



**Figure 1** Publication trends in palliative care in the last 10 years (from January 2012 to December 2021). COPD, chronic obstructive pulmonary disease.

Although the trend of publications on PC and cancer had been increasing, a more marked increase in the number of publications is observed from 2020 (which is observed in the curve as a break in 2019, from where it began to grow at a faster rate). When comparing the graph of the actual data with that of the predicted data, a marked difference is observed (online supplemental material 4).

The number of publications about PC and HF, COPD, and dementia was stable over time, because, although the function that best fitted these trends was parabola, the graphs show parabolas of very low curvature (online supplemental materials 5–7).

The number of publications about PC in no specific disease (or in a mix of diseases) was progressively increasing over time (online supplemental material 8). According to the graph predicting the evolution of the trend without COVID-19, the publications about PC and HF, COPD, dementia or no specific disease were not affected by the arrival of COVID-19.

As observed in the graphs, the above-predicted increase in the total number of publications on PC in the last 2 years was both due to the publications on PC and COVID-19, as well as PC and cancer (figure 2).

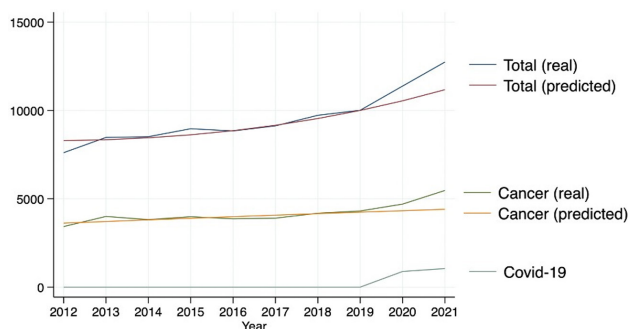
#### PC and COVID-19

Including the years 2020 and 2021, we found 1937 papers about PC and COVID-19.

The majority of the publication about PC and COVID-19 come from the USA 32.8%, (n=636), followed by the UK (16.7%, n=323), Italy (8.0%, n=155) and India (6.6%, n=127) (figure 3). Other geographical regions were represented in the 8th place with Australia (Oceania), 12th place for Brazil (South America) and 15th place for Nigeria (Africa).

The 10 authors with the higher number of publications about PC and COVID-19 are mainly affiliated to institutions from India, the USA and the UK (online supplemental material 9).

The King's College in London was the institute with the higher number of publications about PC and



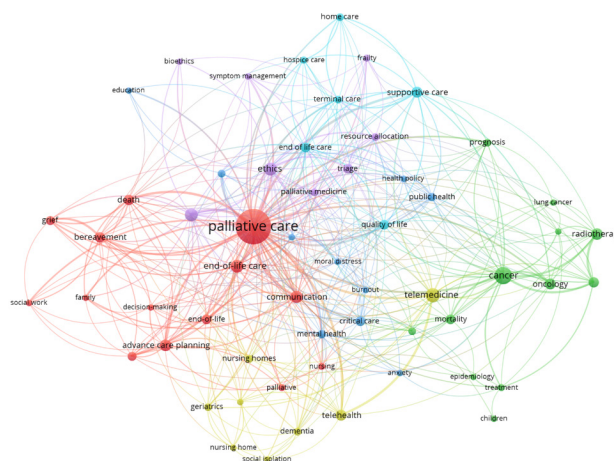
**Figure 2** Predicted and real publication trends about palliative care between 2012 and 2021. This graph shows the actual trend (blue line, first from top to bottom) versus the predicted trend (red line, second from top to bottom) of the total number of publications on palliative care. It also shows the real trend (green line, third from top to bottom) versus the predicted trend (yellow line, fourth from top to bottom) of palliative care and cancer publications. Finally, it shows the real trend (grey line, fifth from top to bottom) of palliative care and COVID-19 publications.

COVID-19, with 55 documents (2.8%), followed by Harvard Medical School (51, 2.6%) and the University of Toronto (42, 2.2%). Half of the top 10 institutions involved in the publications were from the USA; 2 were from the UK and then each one was from Canada, India and France (online supplemental material 10).

Regarding the publication type, the majority of the publications (62%) were original articles, followed by reviews (12.4%) and letters (10%) (online supplemental material 11).

**Analysis of keywords**

As explained in the methods section, we only included keywords that appeared in at least 0.5% of the papers, it is, keywords that appeared on at least 10 different papers. Of the 2774 keywords that were initially found, 74 met this threshold. The keywords were divided through artificial intelligence into six main clusters, which we named as follows: “bioethics” for the purple, “cancer” for the green, “nursing home/telemedicine” for the yellow, “public health” for the dark



**Figure 4** Network visualisation of the authors’ keywords.

blue, “caring” for the light blue and ”PC following the WHO definition” for the red (figure 4).

The purple cluster included terms such as ‘ethics’, ‘triage’ and ‘resource allocation’. The green cluster included the terms ‘cancer’, ‘lung cancer’, ‘oncology’, ‘radiotherapy’ and ‘prognosis’. The yellow cluster included ‘telehealth’, ‘telemedicine’ and ‘social isolation’. Additionally, this cluster also included geriatric-related terms such as ‘nursing homes’ and ‘dementia’. The dark blue cluster included public health terms such as ‘health policy’ and ‘public health’ but also included mental and emotional terms such as ‘moral distress’, ‘anxiety’, ‘mental health’ and ‘burn-out’. The light blue cluster included terms such as ‘supportive care’, ‘end-of-life care’ and ‘quality of life’. The red cluster included ‘advance care planning’, ‘decision making’, ‘communication’, ‘family’, ‘bereavement’, ‘grief’ and ‘social work’.

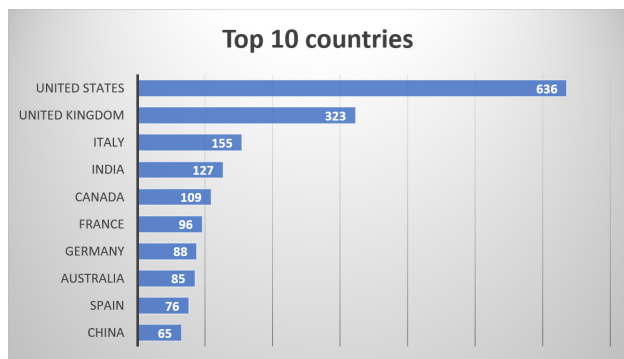
**Analysis of the authors’ cooperation network**

This analysis revealed that the majority of the interactions occurred within the same continent or geographical region. Four clusters resulted from this analysis: a green cluster, representing collaborations within European countries; a blue cluster, showing collaborations mainly among Latin American countries but also among Mediterranean countries such as Greece, Spain and Turkey; a red cluster, involving countries from the eastern part of the world such as India, China, Japan, Singapore and Australia; and a yellow cluster, comprising three countries in Africa and one in North America. Spain represents a bridge between Latin American countries and Europe, it is, between the green and the blue clusters. The more frequent collaboration occurred between the USA and the UK (figure 5).

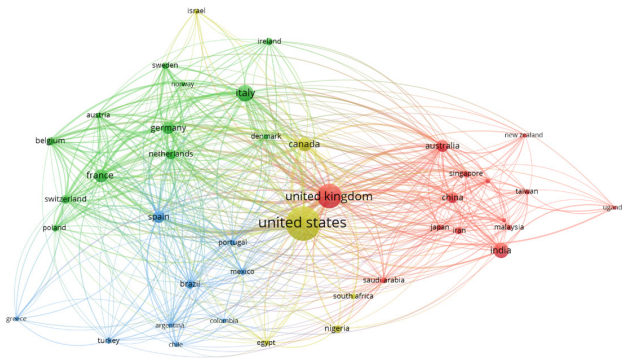
**DISCUSSION**

**Key findings**

This study was carried out to assess the impact of COVID-19 on the PC publications since its appearance



**Figure 3** The 10 countries with more papers found in our search about palliative care and COVID-19.



**Figure 5** Network visualisation of cooperation among countries.

to 2021, not only in the number but also in the main clusters (keywords) and in collaboration between countries. Our study showed that overall, PC research activity had a clear increase in the last 2 years and it was only partly due to COVID-19-related publications. Furthermore, the increase of publications about PC in the context of a specific disease was stable over the last 10 years for HF, dementia and COPD. Opposite to that, the publications about PC and cancer increased faster in the last 2 years, therefore, leading to an increase on the overall PC publications.

#### PC publication trends

Non-oncological publications (HF, COPD, dementia, no specific disease) did not seem to have been altered by the pandemic. The concern<sup>7</sup> that due to COVID-19 there would be less space for non-COVID-19 PC publications had not prevailed in reality.

The fact that PC research focused primarily on patients with cancer is not surprising given the previous literature, although there are national publications that would disprove this trend, with an increment of non-cancer research focus.<sup>11</sup> The global trend of cancer predominance could be attributed to the fact that oncology is still in many countries the driving force behind the development of new PC services.<sup>8</sup> Although the clinicians are more and more focusing also on patients with no malignant-disease it remains a lack, especially in the research in this field. Additionally, difficulties in the prognosis of non-cancer-disease could explain this phenomenon<sup>12–14</sup> In many patients with chronic non-oncological diseases, the perception of disease severity and prognosis is not congruent with the real one, decreasing the likelihood that patients will ask for PC or that the physician will offer it to them.<sup>15</sup> Furthermore, physicians report other barriers to providing PC that are accentuated in non-oncological diseases.<sup>12–14</sup> This, despite the exhortation in doing more research about those conditions even beyond the end of life.<sup>13 16</sup> In the clinical practice patients with cancer are more prompt to be referred to PC than non-oncological one. We showed in our study that research is a mirror of clinical practice, since

we show that the main research on PC is conducted involving people living with cancer.

#### Clinical and research implications

There continue to be hopes that the use of PC will increase across the different diseases and their stages. More pandemics are likely to occur in the coming years,<sup>17</sup> so it is necessary to analyse in retrospect what was missing or failed in the delivery of PC to patients and families with COVID-19 in order to create contingency plans for future pandemics. For this to happen, it is not only essential to raise awareness of PC importance, as happened in the pandemic, but also to increase the PC training of nurses, physicians and other healthcare personnel.<sup>1 3 4 6</sup>

In a past review, it was found that there is a correlation between the development of PC services and research in this field.<sup>18</sup>

This study could also be a stimulus for the international scientific community to promote research in the field of PC, which had an increase also thanks to COVID-19.

#### Key-words COVID-19-related findings

The analysis showed the relations in the keywords in the clusters, which were automatically generated by the software, reflecting the main challenges in COVID-19-time. For example, a cluster appeared related to the main challenge of physician–patient communication in times of lockdown and isolation. It is not surprising that ‘telemedicine’ and ‘telehealth’ appeared as keywords tightly connected with the words ‘geriatrics’ and ‘social isolation’ but also to ‘cancer’. There is clear evidence that telemedicine has become more and more important during the pandemic to overcome the barrier of the COVID-19 restrictions for patients.<sup>19 20</sup> Often, patients with advanced disease have difficulties due to mobility issues, high symptoms burden and dependency on caregivers for in-patient visits. Telemedicine, and in particular video conferences, brought an advantage for these people, despite technical burdens.<sup>19</sup> Telehealth was also crucial for elderly people in general in COVID-19 time, due to isolation.<sup>21</sup> Although the two terms are sometimes used indifferently, according to the American Academy of Family Physicians, ‘Telehealth is different from telemedicine in that it refers to a broader scope of remote health care services than telemedicine. Telemedicine refers specifically to remote clinical services, while telehealth can refer to remote non-clinical services’.<sup>22</sup>

Another interesting finding in the keywords clusters was seen in the public health (dark blue) cluster: words like ‘moral distress’, ‘anxiety’ and ‘burn-out’ are strictly connected with ‘public health’ and ‘critical care’. This seems to be a relevant theme in the literature about COVID-19. If it was expected for the general practice and the intensive care units, this was also observed for the PC teams. Although PC teams

were more expected to be able to deal with suffering and dying, the pandemic changed the ‘how’ of dying and how to deliver support. Due to that, many health workers experienced moral distress which could lead to burn-out.<sup>23 24</sup>

### Countries' production and collaborations

It was interesting to see the connections between countries and institutions. Especially interesting is that, in spite of globalisation and exchange between different countries, the greatest connections occurred between countries geographically close to each other and sharing the same native language. Low international collaboration was already observed in the past among certain countries, especially between high-income and low-middle income countries.<sup>8 18</sup> Another possible explanation for the collaborations that were seen between countries could be that geographically close countries had COVID-19 waves close in time. In addition, these countries may have similarities in culture, healthcare, medical and economic resources that favored collaborations and the exchange of evidence.

Some interesting discrepancies were also found: for instance, Italy is in the top three countries for the number of publications about PC and COVID-19, but no Italian institution was in the top 10.

The fact that the UK and the USA were the countries and institutions with the highest number of publications, added to the fact that these countries had the closest collaboration, may be partially explained by a language advantage these countries have which represents also a language barrier or disadvantage for other non-English-speaking countries.<sup>8</sup> Historical connections between these two countries might also play a role.

Similar, probably to the historical and language connection, Spain acted as a bridge in relations between Europe and Latin America.

### Strengths and limitations

A strength of this study is that we did not limit the results only to English literature, to be as representative as possible.

One of the limitations is that we could not distinguish between study designs (eg, cross-sectional, prospective and retrospective). In addition to that, the search was limited only to publications available on Scopus. Furthermore, it would be interesting to prove the correlation between COVID-19 waves and scientific production in different countries.

### CONCLUSION

Very little was published on PC and COVID-19 during the pandemic. We showed an increase in the number of PC publications in the last 2 years that was only partially explained by COVID-19-related publications. Most of the publication increase was due to cancer-related publications, since, during the time of the

pandemic, publications on cancer and PC increased markedly, while those on HF, COPD and dementia, remained constant. Additionally, we showed that that the main academic collaboration for PC and COVID-19 publications occurred among high-income countries and that, as in clinical practice, PC research is still mainly focused on cancer.

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