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2 Selected East and Southeast Asian Countries

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1 **ABSTRACT.**

2 Cancer is one of the key leading causes of deaths worldwide, with a disproportionately high burden in Asia in  
3 terms of incidence and mortality. Guidelines and recommendations published by the World Health  
4 Organization (WHO) state palliative care as an essential service for patients with cancer and other chronic  
5 diseases. Currently, there is extensive evidence regarding different models of palliative care delivery.  
6 However, development of palliative care services remains fragmented in Asia, and more research is needed  
7 to synthesize available models of care in this region and provide the latest evidence-based information for  
8 healthcare providers. This narrative review aims to identify peer-reviewed studies published after 2017 that  
9 reported both on models of palliative care service delivery and outcomes for adult patients with cancer in  
10 selected East and Southeast Asian countries. This review is beneficial by offering a detailed summary of the  
11 models of care adopted by these countries, and their impact on patient outcomes. It is hoped that the  
12 evidence will also create impetus for continued conversation around palliative care development in Asia.

13  
14 **Key Words:** Palliative care, neoplasm, home care services, caregivers, patient care team, home nursing, Asia  
15 (Source: MeSH-NLM).

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1 **INTRODUCTION.**

2 Palliative care (PC) has been defined by the World Health Organization (WHO) as an approach aiming to  
3 prevent and relieve suffering for patients and their families who are facing problems associated with life-  
4 threatening illness.<sup>1</sup> In 2017, the Lancet Commission on Global Access to Palliative Care and Pain Relief  
5 petitioned for a new working definition for PC in order to increase conceptual clarity and facilitate PC  
6 implementation. A consensus definition was then produced by the International Association for Hospice and  
7 Palliative Care (IAHPC) i.e. 'active holistic care of individuals across all ages with serious health related  
8 suffering due to severe illness and especially of those near the end of life' with the goal to 'improve the quality  
9 of life of patients, their families and their caregivers'.<sup>2</sup> Current guidelines and recommendations such as from  
10 the Enhanced Supportive Care (ESC) in the UK,<sup>3</sup> and the European Society for Medical Oncology (ESMO)<sup>4</sup>  
11 state that supportive and palliative care services should be initiated at cancer diagnosis until end-of-life or  
12 survivorship.

13  
14 Palliative care has been associated with positive outcomes, such as improved advanced care planning, higher  
15 satisfaction with care for both patients and caregivers, and reduced utilization of health services with a  
16 resulting decrease in costs.<sup>5</sup> Additionally, early palliative care has been shown to improve symptom  
17 management and patient mood.<sup>6</sup> Meta-analyses of studies regarding the effects of early palliative care on  
18 patients with incurable diseases found that more evidence is needed to establish the link between early  
19 intervention and improved patient quality of life due to the degree of high heterogeneity in pooled studies.<sup>5-6</sup>

20  
21 Multiple studies have been conducted on types of PC delivery models. These can be summarized based on  
22 location of care (embedded, independent free-standing clinic, home-based, telehealth) or referral method  
23 (oncologist clinical judgment, based on criteria, automatic referral).<sup>7</sup> Other models of integration such as  
24 conceptual (time based, provider based, issue based, system based) or clinical models also exist.<sup>8-9</sup> The  
25 attributes of a practical model of PC for a given patient with cancer are likely to be heavily dependent on the  
26 healthcare system, accessibility to PC services and availability of trained professionals.<sup>10</sup> Further discussions  
27 about models of PC delivery are imperative to facilitate the provision of efficient and effective PC care that  
28 matches the unique social and cultural needs of different countries.<sup>11</sup>

29  
30 Identifying such PC models for cancer patients is also vital as cancer remains a leading cause of death in the  
31 population below the age of 70 years in 112 out of 183 countries.<sup>12</sup> The burden of cancer incidence and  
32 mortality is disproportionately high in Asia.<sup>12</sup> About half of all cancer cases and 58.3% of cancer deaths are  
33 estimated to have occurred in the continent in 2020.<sup>12</sup> For example, malignant tumor was the leading cause of  
34 death in both urban and rural areas from 2000 to 2017 in China.<sup>13</sup> Unfortunately, the level of PC development  
35 in Asia remains largely fragmented, with only six countries/regions (China- including Hong Kong and Macao,  
36 Japan, Singapore, South Korea, Taiwan, and Thailand) classified under Category 4, denoting a certain degree  
37 of integration to health care services.<sup>14</sup> **Box 1** highlights key PC developments in the above six Asian  
38 countries/regions.

39  
40 Current research on models of care is mostly carried out in Europe and North American countries.<sup>15</sup> There is  
41 limited evidence comparing the effectiveness of different PC service delivery models in Asia.<sup>16</sup> More evidence

1 synthesizing the models of palliative care service delivery is imperative given the high burden of cancer  
2 patients in this region. Therefore, this narrative review aimed to synthesize such evidence for selected East  
3 and Southeast Asian countries/regions: Mainland China, Hong Kong, Taiwan, Macao, Japan, Singapore,  
4 South Korea and Thailand.  
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1 **METHODS**

2 **Search Strategy and Selection Criteria**

3 **Methods**

4 We conducted a systematic literature search on Ovid-Medline and Google Scholar in July 2022. Medical  
5 subject headings (MeSH) and keywords used for the search on Ovid-Medline are shown in **Appendix I**.  
6 Search terms conducted in Google Scholar are available in **Appendix I**.

7  
8 We also searched the following palliative care journals: Asia-Pacific Journal of Oncology Nursing (APJON),  
9 BMC Palliative Care and BMJ Supportive and Palliative Care (Appendix I for search terms). In order to  
10 provide context about levels of palliative care development in the investigated countries/regions, evidence  
11 identified during literature searches was also used to create **Box 1** in the Introduction.

12  
13 We selected studies published in English between the years 2017-2022 (latest 5 years) to include the most  
14 up-to-date evidence following groundbreaking developments in palliative care in Asia. In 2017, The National  
15 Health and Family Planning Commission of the People's Republic of China (NHFPC) stipulated guidelines for  
16 health providers and standards for the structure, environment, and human resources aspects of hospice care  
17 services in China.<sup>17</sup> Furthermore, member countries of Asia Pacific Hospice Palliative Care Network  
18 (APHPCN), including Japan, Singapore, South Korea, Taiwan, and Thailand, met in Singapore in July 2017 to  
19 discuss shared concerns, and offer support to countries and groups which were interested in developing  
20 hospice and palliative care in the region.<sup>21</sup>

21  
22 We included primary studies (descriptive, quantitative, qualitative and mixed-methods) published in peer-  
23 reviewed journals. Reference lists of identified relevant systematic reviews were also checked. Identified  
24 studies were first screened by title and abstract, followed by full-text screening by the two authors. Full  
25 inclusion and exclusion criteria are shown in **Table 1** below.

26  
27 A data extraction template (**Table 2**) was developed; data were retrieved on country, author, year, type of  
28 study, participants and diagnosis, professionals involved and setting of providing care, comparator, and  
29 patient outcomes.

30

## RESULTS.

The results yielded by the searches are presented in the PRISMA flow chart (**Figure 1**). The search in Ovid-MEDLINE yielded 127 results. After title and abstract screening and full text screening, six eligible publications were included. The search in Google Scholar yielded 537 results, two were included after screening. Finally, additional searches through lateral searching palliative care journals and reference lists of relevant systematic reviews resulted in additional three eligible publications. A total of 11 publications corresponding to nine studies were included in this narrative review, and their content is summarized in **Table 2**.

### Characteristics of Included Studies

The included papers were from China (n=5), Singapore (n=2), South Korea (n=2) and Taiwan (n=2). No eligible papers from Macao, Japan nor Thailand were identified in the searches. The two papers from Singapore were about a single study on the development of a co-rounding model<sup>32-33</sup>. The two papers from South Korea form part of a single study on the development of a home-based community-led PC service delivery model in Busan.<sup>40-41</sup> The majority of the studies adopted a quantitative approach (n=10); one was a qualitative study<sup>41</sup> (interview).

The most frequently investigated patient outcomes were Quality of Life (QoL) (n=4)<sup>31, 34, 39, 40</sup> and severity of symptoms (n=4)<sup>35,36,39,40</sup> (**Table 2**). Inventories used to measure QoL, and severity of symptoms varied across different countries and studies.

A multidisciplinary team provided care in all included studies (as specified by our inclusion criteria), although the type of healthcare professionals involved differed (**Table 2**). Most studies included a specialist PC physician as well as another physician providing oncology or primary care (n=5)<sup>31-34,37</sup>. With regards to the setting of PC service delivery, most papers evaluated inpatient hospital-based PC Models (n=5).<sup>31-34,39</sup> Other papers evaluated home-based community led PC Models (n=3)<sup>36,40-41</sup> an outpatient PC Model (n=1)<sup>35</sup>, and a home-based PC Model that is not community led (n=1).<sup>38</sup> One study mentioned a "hybrid" service across different care settings as part of a standardized national model.<sup>37</sup> The identified PC service delivery models are further described below.

### Inpatient Hospital-based PC Models

These models refer to PC services delivered within a hospital setting for hospitalized patients. We identified five papers evaluating models in hospitals across China, Singapore, and Taiwan.<sup>31-34,39</sup> Even within hospitals, the setting and the way in which PC services were delivered varied greatly. In Taiwan, inpatient PC services can be provided within specialized palliative care units (PCU) or in general wards in the format of palliative consultation services (PCS).<sup>34</sup> Care by the multidisciplinary team is provided directly to patients in PCU, while patients in PCS often receive visits by the multidisciplinary team once or twice per week.<sup>34</sup> The PCS model offered in Taiwan is similar to the "consultative service with oncologist-driven referral" model currently offered in Singapore.<sup>33</sup> A new form of service provided for inpatients in Singapore is the "co-rounding model" which offers the same content but differs with regards to the degree of integration between oncologist and the PC team.<sup>32</sup> The "co-rounding model" involves joint morning rounds, and produces a coordinated decision with inputs from both oncology and palliative team, which is in contrast to the "consultative model" in which

1 communication occurs in the form of written referrals with no direct communication between the oncology and  
 2 palliative team. The model evaluated in China is situated within a "Palliative Care and Oncology Department"  
 3 which is described as involving two relatively independent units in which oncologists manage patients and  
 4 refer patients to PC supportive care in a specialized palliative ward when the patient has a predicted  
 5 remaining lifespan of 6-12 months.<sup>31</sup>

6  
 7 In terms of the type of healthcare professionals involved in the delivery of PC services, the study in Taiwan  
 8 involves "hospice palliative care (HPC) specialists, HPC nurses, social workers and a chaplain".<sup>34</sup> The  
 9 integrated team in the co-rounding model from Singapore includes doctors and nurses specializing in  
 10 palliative care.<sup>32-33</sup> The study conducted in China involves a multidisciplinary team involving "surgeon,  
 11 radiotherapist, interventional radiologist, interventional sonographer, pain physicians, psychologists,  
 12 nutritionist, and nurse specialists".<sup>39</sup>

13  
 14 The study in Taiwan comparing PCU and PCS found no statistically significant differences in quality of life  
 15 (QoL) between those who received PCU and those who received PCS care.<sup>34</sup> However, there was a  
 16 statistically significant improvement of QoL in both groups of patients who received either PCU or PCS  
 17 compared with pre-care levels ( $p < 0.001$ ).<sup>34</sup> The two papers from Singapore evaluated length of hospital stay  
 18 and difference in proportion of patients readmitted within 7 and 30 days of discharge.<sup>32-33</sup> The length of hospital  
 19 stay was found to be 0.85 days shorter for patients with advanced cancer if they received the co-rounding  
 20 model (95% CI 0.05 to 1.65 days,  $p = 0.038$ ). There was no significant difference between the proportion of  
 21 patients readmitted between patients receiving the consult model and those receiving care via the co-rounding  
 22 model (OR 1.03, 95% CI 0.79-1.35,  $p = 0.822$ ). One paper from China focused on QoL and pain control<sup>39</sup> and  
 23 the other focused on QoL.<sup>31</sup> An inpatient hospital-based PC model involving a multidisciplinary team reported  
 24 a statistically significant improvement in QoL ( $p < 0.001$ ) but not in pain<sup>39</sup> compared to before intervention. The  
 25 second paper involving a team situated within "Palliative Care and Oncology Department" found a statistically  
 26 significant improvement in QoL compared to anti-cancer treatment ( $p < 0.05$ ).<sup>31</sup>

### 28 29 30 **Outpatient PC Models**

31 These models referred to provision of PC services for non-hospitalized patients in a healthcare setting such  
 32 as in clinics or hospitals. One paper from Hong Kong was included.<sup>35</sup> The model described involves the  
 33 establishment of an outpatient clinic Hematology Comprehensive Care Clinic (Hema-CCC) for patients ( $n = 38$ )  
 34 with hematological malignancies such as myelodysplastic syndrome (66%), acute myeloid leukemia (26%),  
 35 and others (8%)

36  
 37 Patients were referred to Hema-CCC when there was refractory symptom control or symptoms were  
 38 associated with poor prognostic factors. The provision of PC services in this model occurs over a few  
 39 standardized steps. First, patients with hematological cancer are prioritized remotely over the phone to  
 40 evaluate severity of symptoms, psychological or social needs and availability of support at home. The initial  
 41 visit to the clinic is expected to take an hour, and the patient can receive inputs from an oncologist regarding  
 42 curative treatments followed by consultations with the PC team in the same setting. Depending on the needs



1 of the patient, subsequent visits can be arranged, and regular communication is maintained with the PC  
 2 nurses in between visits. The study reported a statistically significant improvement in pain ( $p=0.017$ ),  
 3 depression ( $p=0.023$ ), anxiety ( $p=0.003$ ), and appetite ( $p=0.007$ ) compared to baseline values.<sup>35</sup>

#### 5 **Home-based PC Models**

6 We identified two variations of service delivery models providing home-based PC. The first type refers to PC  
 7 services for non-hospitalized patients in a home setting which involve healthcare professionals visiting  
 8 patients. One paper from Taiwan was included.<sup>38</sup> Two models were described, and both included a team  
 9 including family doctors, nurse practitioners specializing in home care, social workers and chaplains aimed at  
 10 reducing dyspnea in cancer patients. The paper included patients ( $n=762$ ) with cancer (in situ lung cancer  
 11 (22%), metastatic lung cancer (24%), other cancer (54%)) in emergency department who received home  
 12 palliative care during the final 6 months of life. The nurse practitioner provided house visits once or twice per  
 13 week while the doctor visited once per month along with the nurse. Both models provided the same service  
 14 and differed by the service time and training of the home care nurse. One model involved the provision of care  
 15 from Monday to Friday and the other model was in the form of enhanced care including services provided  
 16 during weekends and implemented with a set of protocols outlined for nurses to be completed during visits.  
 17 The model with enhanced care was found to be effective in reducing the number of emergency department  
 18 visits due to dyspnea by 30.7% ( $p<0.05$ ). Effective home palliative care significantly reduced emergency  
 19 department visits related to controllable dyspnea.

20  
 21 The second variation of service delivery model aimed at providing community led home-based PC services to  
 22 patients requiring care at home. These patients were referred to a team of professionals from decentralized  
 23 setting such as the community hospital, public health centers or community health sectors. We identified three  
 24 papers evaluating models in community hospitals across South Korea and Hong Kong.<sup>36,40-41</sup> Two papers from  
 25 South Korea form part of a single study on the development of a community led home-based PC service  
 26 delivery model in Busan.<sup>40-41</sup> The community care model in Hong Kong was provided for patients in a home  
 27 setting and involved an experienced nurse and social worker.<sup>36</sup> The model proposed in Busan, South Korea  
 28 involves care for home-based cancer patients requiring PC services and a multidisciplinary service team  
 29 including a physician, palliative nurse, officer in charge of family health, officer in charge of home-based  
 30 cancer patients, officer managing home visit nurses, social worker, chaplain, and volunteer, all based in or  
 31 affiliated with public health centers in Busan.<sup>41</sup> Both models aimed to provide care in the comforts of home  
 32 and reduce hospitalizations.

33  
 34 The study conducted in Hong Kong was interested in the severity of symptoms experienced by patients  
 35 evaluated using the Integrated Palliative Care Outcome Scale (IPCOS), which evaluates physical symptoms,  
 36 emotional symptoms, and communication or practical issues. There was a statistically significant improvement  
 37 in emotional symptoms, which includes patient anxiety and depression, one month after receiving the  
 38 community care model ( $p<0.001$ ).<sup>36</sup> There was also a statistically significant improvement in communication or  
 39 practical issues, which includes sharing feelings, information, and practical matters, one month ( $p<0.001$ ) and  
 40 two months ( $p=0.005$ ) after receiving the community care model.<sup>36</sup> The community model adopted in Busan  
 41 looked at patient symptom changes using Edmonton Symptom Assessment Scale (ESAS) and QoL evaluated  
 42

1 using the short form version of the Good Death Index. There was statistically significant improvement between  
2 palliative care and non-palliative group for the items “trusting medical staff” ( $p=0.009$ ), “having left behind what  
3 I wanted to leave with my loved ones” ( $p<0.001$ ), “having been told in detail what will happen in the future”  
4 ( $p<0.001$ ) and “being able to share my difficulties related to the illness with others” ( $p<0.001$ ), which are part  
5 of the QoL evaluation.<sup>40</sup> With regards to symptom control, there was a significant reduction in pain, anxiety,  
6 and depression, and improvement in appetite both three- and six-months post-intervention compared to pre-  
7 intervention levels ( $p\leq 0.05$ ).<sup>40</sup>

#### 8 9 **Hybrid Standardized Model**

10 One paper described a model that provided PC services irrespective of the setting of care. It referred to the  
11 establishment of a standardized model across all medical and healthcare institutions and at home. This paper  
12 from Hong Kong adopted a retrospective study design to evaluate the integrated territory-wide PC model.<sup>37</sup>  
13 Despite a difference in settings, the service was described to be consistent across these, with a  
14 multidisciplinary team led by a dual qualified specialist oncologist. The model demonstrated an improvement  
15 in medium survival outcomes. In addition, statistically significant results were reported for all aspects of end-  
16 of-life care outcomes including a decrease in CPR performance ( $p\leq 0.001$ ), increase in use of strong  
17 opioids ( $p<0.001$ ), decrease ICU admission within 30 days of death ( $p\leq 0.001$ ), decreased chemotherapy within  
18 30 days of death ( $p\leq 0.001$ ), and decreased systemic anticancer treatment within 30 days of death ( $p\leq 0.001$ ).<sup>37</sup>

**DISCUSSION.**

This review of palliative care service delivery models in selected countries/regions in East and Southeast Asia identified four different models in four countries/regions. A range of outcomes were reported for patients, with mixed results.

*PC delivery models*

Results indicate an increased recognition of the importance of cooperation and multidisciplinary intervention for PC service delivery in the countries presented. We find this trend reassuring: PC should focus on all aspects of the patient's well-being such as psychological, social, and spiritual health in addition to physical health.<sup>4</sup> There seems to be a movement towards integrating oncology and PC services in Singapore where patients can receive PC care in early stages of cancer (Stage I and II)<sup>32</sup>, though most patients receiving PC services had advanced cancer (Stage III and IV). This movement towards early PC provision is encouraging. The recognition of early PC is corroborated by a set of policy briefs prepared by the Lien Centre for Palliative Care (LCPC) that highlighted the use of high-cost and invasive treatments near the end-of-life in patients with advanced cancer in Singapore.<sup>42</sup> Out of the recommendations provided, two focused on improving awareness of PC among the community and to incentivize physician referrals to PC services, so essential care can be provided as early as possible.<sup>42</sup>

We believe the model described by Yang et al<sup>39</sup> in China regarding inpatient hospital-based PC care is similar to the PCS model in Taiwan outlined by Chang et al<sup>34</sup> and consultative model in Singapore by Yang and colleagues.<sup>32</sup> All three models involved referring patients in oncology wards to specialist care provided by a separate PC team, hence there is no integration of services (i.e. the PC team works in conjunction with oncology team in evaluating and providing care together for patients).

The outpatient model in Hong Kong for patients with non-solid tumors described by Chan et al<sup>35</sup> is a study we found of particular importance as patients with hematological malignancies or those receiving hematopoietic stem cell transplant have been described as "special populations" who benefited less from models integrating specialist PC services and oncology care due to a focus on solid tumors<sup>8</sup>. Although there is limited evidence on incidence and survival rates of patients of blood related malignancies in Asia-Pacific, the incidence of lymphoma is shown to be increasing in the region.<sup>43</sup> Similar to services delivered for hospitalized patients, the outpatient model described in this study also involves a multidisciplinary team including doctors, nurses, social workers, and psychologists. An outpatient model seems to improve accessibility to services and demonstrate positive outcomes for patients with hematological cancer in Hong Kong. With misconceptions involving hematological cancer common in the Asia-Pacific region, this model is of a high value to engage healthcare professionals in Asia for more in-depth studies.

For the Lam et al paper (included under the hybrid standardized model)<sup>37</sup>, we were aware that the provision of services across multiple settings might have concealed variations in the care provided, potentially confounding results. However, this paper was valuable in attempting to evaluate the effectiveness of a model that is rolled out nationally and can provide beneficial insights for smaller Asian countries that are planning to adopt similar models of care.

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We anticipate that more studies on community care models or home care models that move away from a centralized, hospital-based PC delivery will emerge in the future. This fits in with WHO's framework on "integrated, people-centered health service" adopted by the 79th World Health Assembly in 2016, where PC is integrated in primary health care (PHC) systems and services are made accessible in communities and in the comfort of the patient's home.<sup>19</sup> We believe that more studies evaluating home-based PC services, outpatient PC care and community-based service delivery models will emerge in the future.

#### *Patient Outcomes*

There was a statistically significant improvement in QoL in all the studies included in this review that assessed this outcome, be it in an inpatient hospital-based PC model<sup>31,34,39</sup> or through a home-based community led model.<sup>40</sup> This is reassuring as it seems to demonstrate that palliative care is effective in improving the quality of life in patients with cancer despite the model of care or country in which the services are provided, or the measures used to assess quality of life.

For symptoms, pain was the most frequently investigated outcome in the included studies. However, the effect of different PC service delivery models on pain were inconsistent. A statistically significant decrease in pain was reported in one study from Hong Kong<sup>35</sup> by Chan et al. (outpatient PC model) and another from South Korea<sup>40</sup> by Choi et al. (home-based community led model) after receiving care. However, there were mixed responses for the control of pain in different groups of patients in the study evaluating pain management by a multidisciplinary inpatient hospital-based care in China<sup>39</sup> highlighted by Yang et al., and outlined in a study by Chan et al. in Hong Kong<sup>36</sup>. Hence, we are unable to make a conclusion about which models of PC service delivery are best suited to reduce pain or whether PC is effective in the reduction of pain.

Since dyspnea is a common symptom<sup>44</sup> seen in cancer patients, we believe the paper by Hsu et al. evaluating a home-based non community led model focused on alleviating dyspnea<sup>38</sup> is important to provide useful evidence for the development of models of care that address this symptom – even though it was only one study, with significant results for patients.

We also found studies that provided valuable information on PC models but did not provide any information on patient outcomes or meet our inclusion criteria. The information can be found in the supplementary file.

#### **Strengths and limitations**

This narrative review provides some of the most up-to-date evidence published in English in peer-reviewed journals on models of care in selected Asian countries. This paper also systematically lists these models in detail, based on setting of provision as well as team members involved in each service, with a brief overview of how each service is run and the outcomes measured. By doing so, we aimed to enhance reproducibility across settings. To our knowledge, this is the first review to do so for the selected countries/regions in Asia. We hope this paper continues the much-needed conversation on the importance of developing palliative care service delivery models that fit with the unique health settings and patient needs in each country. The Scale

1 for the Assessment of Narrative Review Articles (SANRA) tool was utilized to ensure rigor and quality of this  
2 narrative review.

3  
4 This review also has some limitations. First, we only included two databases in this study as this paper was  
5 written as part of an intensive one-month research program at Pembroke College, University of Cambridge,  
6 with limited time availability and logistic constraints. For a more comprehensive search on the models of PC  
7 service delivery, we could have included more databases. However, we performed searches in palliative care  
8 journals and APJON, a major journal focused on oncology issues in Asia to identify further evidence. We also  
9 checked reference lists of two relevant reviews.<sup>47,48</sup>

10  
11 Second, due to time and resource limitations we restricted the searches to papers written in English. This  
12 might have resulted in missing papers published in other languages and may help to explain why we did not  
13 identify any evidence from Macao. However, PC development in Macao is still in its nascent stage, with  
14 limited advancements since 2000 when the first hospice was established<sup>45</sup>. Future reviews should aim to  
15 include evidence published in other languages if feasible. Searches performed identified papers published  
16 in Thailand and Japan, but these were not included because they did not meet the inclusion criteria.  
17 Nonetheless, **Box 1** summarizes some key evidence regarding PC delivery in these two countries.

#### 18 **Conclusion**

19  
20  
21 This narrative review describes the significance of cancer in Asia and the role of PC in ensuring the  
22 psychological, spiritual, and physical well-being of patients. It then outlines different models of care adopted in  
23 the selected Asian countries/regions. Models of care showing statistically significant improvement in QoL  
24 include inpatient hospital-based PC model and a home-based community led model. The effect of different  
25 models of PC service delivery model on pain is inconclusive due to mixed results. As PC development in Asia  
26 varies greatly, a focus on the selected countries allowed us to go in-depth by considering the unique  
27 challenges facing each country as seen in **Box 1**. We documented the models of service delivery  
28 comprehensively and focused on the setting as well as team members involved. By doing so, we hope that  
29 this much needed information is more readily available, and reproducibility/adaptability of models can be  
30 considered in the future. We anticipate that this article can continue conversations around models of care in  
31 palliative care in Asia and draw attention to the importance of more research in this area.

1 **SUMMARY - ACCELERATING TRANSLATION**

2 **Title**

3 A Review of Palliative Care Service Delivery Models and Patient Outcomes for Adults with Cancer in Selected  
4 East and Southeast Asian Countries

5  
6 **Main problem to solve**

7 There is limited evidence comparing the effectiveness of different palliative care (PC) service delivery models  
8 in Asia. More evidence synthesizing the models of PC service delivery is imperative given the high burden of  
9 cancer patients in this region.

10  
11 **Aim of study**

12 This narrative review aimed to synthesize evidence for selected East and Southeast Asian countries/regions:  
13 Mainland China, Hong Kong, Taiwan, Macao, Japan, Singapore, South Korea and Thailand. By doing so, we  
14 hope the study can contribute to conversations about PC models in this region and help to encourage new  
15 research on the development and adaptations of models relevant to Asian contexts.

16  
17 **Methodology**

18 We conducted a systematic literature search on Ovid-Medline and Google Scholar in July 2022. The following  
19 palliative care journals: Asia-Pacific Journal of Oncology Nursing (APJON), BMC Palliative Care and BMJ  
20 Supportive and Palliative Care were also searched. We selected studies published in English between the  
21 years 2017-2022 (latest 5 years) to include the most up-to-date evidence following groundbreaking  
22 developments in palliative care in Asia.

23  
24 **Results**

25 This review of PC service delivery models in selected countries/regions in East and Southeast Asia identified  
26 four different models: inpatient hospital-based, outpatient, home-based, and hybrid standardized PC model. A  
27 range of outcomes were reported for patients, with mixed results.

28  
29 **Conclusion**

30 Models of care showing statistically significant improvement in QoL include inpatient hospital-based PC model  
31 and a home-based community led model. The effect of different models of PC service delivery model on pain  
32 is inconclusive due to mixed results.

33

**Comentado [博會1]:** To streamline scientific knowledge translation, write a summary of your research in the language where the study was conducted and written for a non-scientific audience. In this way, participants, researchers, practitioners, and decision-makers can have easier access to your research/results and use them where they see adequate.  
◦ A summary must include the title, main problem to solve, aim of study, methodology, results, and conclusion (no references are required). The summary should have a maximum of 1000 words and must be located before the references.

**Comentado [博會2R1]:** I've checked that this criteria is met

**Comentado [CN3R1]:** Great, thanks

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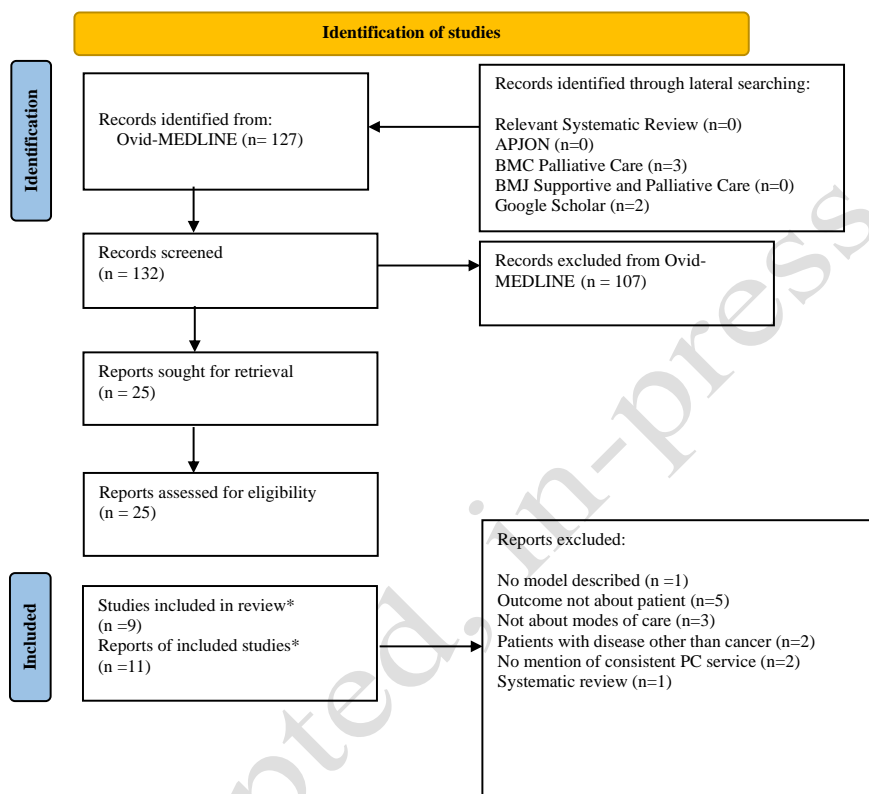
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Accepted, in-press

1 **FIGURES AND TABLES.**

2 **Figure 1. PRISMA flow chart of search strategy <sup>1</sup>**



<sup>1</sup> No duplicates were identified in Ovid-MEDLINE

\*A total of 9 studies were included in this review; and the study by Yang et al. includes two separate reports<sup>32,33</sup>. Similarly two separate reports by Choi et al.<sup>40</sup> and Kim et al.<sup>41</sup> constitute one single study.

1 **Box 1. Key Palliative Care Development in Selected East and Southeast Asian Countries/ Region**

*Mainland China:* PC development remains crucial, with an expected 87% increase by the year 2060 in serious health-related suffering at the end of life<sup>53</sup> The majority of hospice and PC services are provided in secondary and tertiary hospitals, and a top priority in the future is to expand services beyond formal hospice or hospital settings by establishing community-based hospice and PC services across different settings and facilities so that preferences for dying at home can be respected.<sup>17</sup>

*Hong Kong:* Integrated territory-wide palliative care services were available since 2006.<sup>37</sup> Health service delivery is associated with a high degree of hospital resource utilization in Hong Kong, with 90% of deaths occurring in hospitals<sup>18</sup>, necessitating an improvement in community care in aspects such as day care, home care and residential care.

*Singapore:* The country recognized palliative medicine as a medical subspecialty in 2006.<sup>20</sup> As Singapore slowly integrates PC services into the community, the first community hospital Bright Vision Hospital, commenced in 2003. The Singapore Ministry of Health (MOH) commissioned the drafting of a national strategy for palliative care delivery models based on best clinical evidence, and the National Strategy for Palliative Care was formulated in 2014 (Singapore).<sup>21</sup> There is a study investigating the needs of cancer patients receiving PC and caregivers in Singapore, and models of care specifically addressing these needs in the unique Singaporean cultural context are likely to be tested in the future.<sup>22</sup>

*Japan:* PC specialty was established in 2009 in this country.<sup>20</sup> Currently, hospice/ palliative care units (PCU) and hospital palliative care consultation teams are available.<sup>23</sup> There is currently a lack of home-based services<sup>20</sup> and there is a need to increase the number of community palliative care teams, which remains a challenge.<sup>24</sup> More establishment of home-based models is imperative as up to 44% of participants in a population based nationwide survey revealed home as their preferred place for end-of-life care.<sup>25</sup>

*South Korea:* Hospice and PC services are mainly available in hospital settings, in the form of specialized PCUs.<sup>26</sup> PCUs remain the most common setting where PC services are delivered for terminal cancer patients. Currently, challenges for PC development in South Korea include raising awareness of end-of-life care and improving accessibility. A study analyzing death registration databases revealed that hospitals remained the most common place of death in South Korea and unnecessary hospitalization nearing end-of-life needs to be avoided through more comprehensive non-hospital-based PC centers.<sup>27</sup>

*Taiwan:* PC was recognized as a specialty in Taiwan in 2000.<sup>20</sup> PC services in Taiwan include inpatient PCUs, hospital based palliative care teams and hospice home care programs.<sup>28</sup> Despite the expansion of various forms of PC services, one challenge that Taiwan faces is the lack of infrastructure for home care as well as high rates of readmission to hospitals after discharge.<sup>29</sup> Greater collaboration between hospitals as well as community health service providers is expected as there is currently a lack of day palliative care centers in Taiwan.<sup>20</sup> There is also a lack of long-term facilities, and hospital based palliative care services are the predominant model.

*Thailand:* Current study suggests there is a need for services provided to be more structured.<sup>30</sup> Generally, there is good accessibility to PC services as majority of hospital settings in provide interdisciplinary palliative care consultation services. Home based PC services are also available for discharged patients across all levels of healthcare services.<sup>20</sup> However, there seems to be a lack of inpatient hospital-based PC services in the form of specialized PC units and hospices<sup>20</sup>, with a single tertiary level hospital and religious organization providing a "private space" dedicated for PC services.<sup>30</sup>

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1 **Table 1. Inclusion and Exclusion Criteria**

Criteria	Inclusion	Exclusion
Population	<p>Adults: defined as individuals above 18 years old</p> <p>AND</p> <p>Patients described as having cancer or advanced/metastatic cancer</p> <p>AND</p> <p>Receiving PC in Mainland China, Hong Kong, Taiwan, Macao, Japan, Singapore, South Korea or Thailand.</p>	<p>Non-adult population described as children, adolescents or below the age of 18</p> <p>OR</p> <p>Patients with end-stage or debilitating non-malignant chronic diseases such as COPD, heart failure, emphysema, dementia, among others.</p> <p>OR</p> <p>Receiving PC in other countries</p>
Intervention	<p>Intervention describing a service delivery model that is focused on or provides information on location of delivery (embedded, independent freestanding clinic, home-based, telehealth, community based etc.).</p> <p>AND</p> <p>Service delivery model that comprises a multidisciplinary team with more than one healthcare professional delivering the PC service.</p> <p>National models carried out in a consistent and standardized manner across different settings met criteria if standardization was clearly stated by the authors.</p>	<p>Intervention describing a service delivery model that is not focused or without information on the location of delivery.</p> <p>OR</p> <p>Service delivery model that does not comprise a multidisciplinary team or comprises a single healthcare professional.</p> <p>OR</p> <p>Models focusing on post death intervention/bereavement studies.</p> <p>OR</p> <p>Large national database studies without description of service models, i.e. there was no explicit mention that PC service provided was consistent or standardized or similar across settings.</p>
Outcome	<p>Outcomes focused on patients including Quality of Life (QoL), Quality-adjusted life year (QALY), length of hospitalization, hospital admission, readmission, severity of symptoms, reasons for emergency department visits, degree of pain, and use of aggressive treatments.</p>	<p>Outcomes focused on caregivers, family members, or services provided as part of palliative care (such as uptake of do not resuscitate (DNR) orders, recording of advanced-care planning, rehabilitation, inclusion of additional healthcare professionals, etc.), health economic evaluations that did not include quality of life or preference of place of death<sup>2</sup></p>

<sup>2</sup> Recent discussions elaborate on how preference of place of death on its own should not be considered a good indicator of end-of-life quality measure.<sup>46</sup> Therefore, we opted for not including this outcome in this review

1 **Table 2: Evidence of Palliative Care Service Delivery Models and Outcomes in Selected East and Southeast Asian Countries**

Country or Region/Author (Year)	Type of Study	Participants and Diagnosis	Clinicians involved and setting of palliative care	Comparisons	Results
China/ Wu et al. (2021) <sup>31</sup>	Quantitative Retrospective	Patients (n=248) hospitalized and diagnosed with advanced cancer (Stage IV with estimated lifespan between one to 12 months) such as breast, prostate, lung, colorectal and other malignancies.	<i>Inpatient hospital based Interdisciplinary PC team:</i> PC doctor and specialist nurse work with the oncologist to provide consultative and assessment according to patient's situation. PC doctors make supportive intervention plans, including analgesic treatment, symptom management, palliative sedation, spiritual support, and acupuncture. Specialist nurses provide patients with lymphedema massage, psychosocial and spiritual support, comfort care, health education and other supportive care services.	Patients receiving conventional anticancer treatment (CAT) such as chemotherapy, immunotherapy, targeted and radiation therapy.	QoL assessed using Chinese Quality of Life Questionnaire (CQLQ) scale: PC patients reported significant increases in QoL (p<0.05). PC had significant improvements in all sub items, while CAT had improvements only in items of Pain (p<0.05) and side effects (p<0.05). No significant difference in QoL between the two groups.  Quality-adjusted life year (QALY): For patients in PC, the QALY (days) increased by 55.9 days, and for patients in CAT, the QALY increased by 24.0 days.
Singapore/ Yang et al. (2021) <sup>32</sup>	Quantitative Open-label, cluster-randomized trial with stepped-wedge design	Patients (n=3167) admitted to the oncology inpatient service of acute hospitals with Cancer stage I, II, III and IV. Cancer type: Lung and pleura, Lip, oral, pharynx, Male genital organs, Urinary tract, Colorectal, Hepatobiliary, Upper GI, Pancreas, Others	<i>Inpatient hospital-based Consult model:</i> Consultation services with oncologist driven referrals. Oncologist provides general palliative care to address common problems and initiates a referral to specialist palliative care doctor and nurses for patients with complex symptoms not adequately managed by general palliative care.  <i>Co-rounding model:</i> Specialist care doctors and nurses manage	Consult model	Co-rounding model: shorter hospital length of stay of 0.70 days than consult model but not statistically significant (95% CI -0.04 to 1.45 days, p=0.065) . In patients with stage III to IV cancer subgroup, length of stay was 0.85 days shorter than the consult model(95% CI 0.05 to 1.65 days, p=0.038). No statistically significant difference in the proportion of patients who were readmitted within 30 days

			patient's issues collaboratively with oncology healthcare professionals. Includes weekly combined ward round and daily discussion of all patients by integrated oncology-specialist palliative care team before joint decision reached whether specialist palliative care was required.		of discharge in patients with Stage III to IV cancer and among all admissions of cancer (OR 1.03, 95% CI 0.79-1.35, p=0.822).
Singapore/ Yang et al. (2017) <sup>33</sup>	Quantitative Pre-post intervention Study	<p>Patients received consult model (n=352): Lung and pleura (55.97%), Genitourinary (19.32%), Head and Neck (17.05%), Others (7.67%).</p> <p>Patients received co-rounding model (n=243): Lung and pleura (51.03%), Genitourinary (20.16%), Head and Neck (18.52%), Others (10.29%).</p>	<i>Inpatient hospital-based Co-rounding model</i> where oncology and palliative teams engage in morning rounds together and make a joint decision of which patients require direct palliative input. Palliative team includes a 0.5 full time specialist palliative care physician and one full time advanced practice nurse (APN).	Consult model	<p>Length of hospital stay: Duration of hospital stay was significantly shorter for the co-rounding group (median 3 days, interquartile range 2-7 days) compared to the consultative group (median 4 days, interquartile range 2-7 days)(p=0.025).</p> <p>Proportion of patients readmitted within 7 and 30 days of hospital discharge: No significant difference in proportion of patients readmitted within 7 and 30 days of hospital discharge (consultative model 29.78%, co-rounding model 28.90%, p=0.773).</p> <p>Differences in place of death: No significant difference in place of death between patients who received co-rounding model and those who received consultative model (p=0.601).</p>

Taiwan/ Chang et al. (2021) <sup>34</sup>	Quantitative Prospective Longitudinal Study	Patients (n=105) Terminal Cancer with life expectancy less than 6 months, >20 years old	Inpatient hospice <i>palliative care unit (PCU)</i> and Inpatient hospice <i>palliative consultation services (PCS)</i> include a multidisciplinary team: Hospice Palliative Care specialist, nurses, pharmacists, social workers, psychologists, chaplain. PCU is received in a special hospice palliative care unit while PCS is received in the general ward. PCU team directly provides care and assess patients' and their families' conditions directly. PCS team visits patients once or twice per week.	NA	Comprehensive Quality of Life Outcome (CoQoLo) which measures good death: No differences in the levels of CoQoLo between the PCU and PCS groups.  CoQoLo levels of terminally ill cancer patients significantly improved in both PCU group and PCS group over time following care (p<0.001).
Hong Kong/ Chan et al. (2021) <sup>35</sup>	Quantitative Retrospective study	Patients (n=38) with advanced hematological cancer referred to Hematology Comprehensive Care Clinic (H-CCC). Myelodysplastic syndrome (66%), Acute myeloid leukemia (26%), Others (8%)	<i>Palliative Outpatient Service</i> : team consists of a palliative care physician, hematologist, nurse, and clinical psychologist. Patients can be referred to a clinical psychologist, social worker, physiotherapist, and pain clinic. Hema-CCC provides on-site palliative care consultation and can allow patients to have earlier advance care planning (ACP) discussions while the hematologist is mainly responsible for the disease treatment in the clinic sessions. Subsequent clinic visit appointments are based on the patient's needs, wishes and prognosis.	NA	Edmonton Symptom Assessment Scale (ESAS) uses an 11-point Numerical Rating Scale and assesses <ul style="list-style-type: none"> <li>● Pain</li> <li>● Fatigue</li> <li>● Depressed mood</li> <li>● Anxiety</li> <li>● Somnolence</li> <li>● Anorexia</li> <li>● Decreased sense of well-being</li> <li>● Insomnia</li> </ul> After 4th follow-up, the mean symptoms scores for pain (p=0.017), depression (p=0.023), anxiety (p=0.003), and appetite (p=0.007) were significantly improved.
Hong Kong/ Chan et al. (2021) <sup>36</sup>	Quantitative Prospective	Patients (n=48) with predominance of cancer	<i>Community interdisciplinary palliative care program</i> . Team	NA	Integrated Palliative Care Outcome Scale (IPOS) used



	cohort Study	diagnosis. Cancer (95.8%) and chronic renal failure (4.2%) Cancer include lung (n=9), colorectal (n=5), liver (n=5) and breast (n=4)	consists of registered nurses and social workers who are experienced in case management, medical and community care. Team liaises with hospital healthcare team if urgent medical follow up or medical investigation was needed. Services provided include medication review, various non-pharmacological strategies for symptom management and health maintenance such as aromatherapy, massage, oral supplements, home-based occupational therapy, and dietician consultation		for assessing symptoms monthly via home visits or phone contacts in three domains: physical, emotional, and communication/practical issues.  Rating on a five-point Likert scale was also done for 13 physical symptoms, 4 emotional symptoms and 3 items about communication or practical problems. There was a decrease in subscale in the three domains, but only emotional and communication/practical issues domain saw significant improvement at one month follow up ( $p < 0.001$ ) and both one ( $p < 0.001$ ) and two months follow up ( $p = 0.005$ ) respectively.
Hong Kong/ Lam et al. (2021) <sup>37</sup>	Quantitative Retrospective Cohort Study	Patients (n=2800) who died from cancer in all local hospitals managed by Hospital Authority (HA) of Hong Kong from 4 years (2006, 2009, 2012, 2015). Lung (32.2%), Colorectal (17%), Liver (13%), Pancreas (4%), Stomach (5.7%), Breast (5%), Prostate (2.6%), Lymphoma (0.1%), Leukemia (0.05%), Nasopharyngeal (2.3%), Head and Neck (1.5%), Esophagus (3.1%), Others (13.3%)	<i>Oncology and palliative service integrated model (National Model)</i> across palliative wards, hospice, outpatient ambulatory palliative care clinic or palliative care home team. Multidisciplinary team led by consultant oncologists with dual specialist qualifications of oncology and palliative medicine. Palliative care teams also under the same administration department of oncology team, enabling smooth transition of patients from active oncological treatment clinics to palliative care services. The combined oncology	Patients who did not receive any form of specialist palliative care	End-of-life care outcomes indicated by: <ul style="list-style-type: none"> <li>● Performance of CPR</li> <li>● Strong opioids use</li> <li>● ICU admission within 30 days of death</li> <li>● Chemotherapy within 30 days of death</li> <li>● Systemic anticancer treatment within 30 days of death</li> </ul> Significant results were obtained for the following: less CPR done ( $p \leq 0.001$ ), more likely to be prescribed strong opioids to control pain

			service with integrative palliative service is characterized by close cooperation between oncologists and palliative care physicians.		( $p \leq 0.001$ ), less likely to be admitted to ICU within 30 days of death ( $p \leq 0.001$ ) and less likely to receive chemotherapy or systemic cancer treatment within 30 days of death ( $p \leq 0.001$ ).  Overall survival: Median overall survival was significantly better for patients who received palliative service (5.10 months, 95% CI 4.52-5.68 months) compared to those without (1.96 months, 95% CI 1.66-2.27 months) ( $p \leq 0.001$ ).
Taiwan/ Hsu et al. (2021) 38	Quantitative Retrospective Cohort Study	Patients (n=762) with cancer in emergency department who received home palliative care during the final 6 months of life. In situ lung cancer (22%), metastatic lung cancer (24%), other cancer (54%)	<i>Home palliative care team:</i> family physicians, home care nurses, social workers, chaplains. 24-hour call line available for phone consultations. Depending on clinical requirements and clinical conditions, home care nurse visits once or twice a week and the family physician will visit with a nurse once a month. Nurses provide consciousness assessment, vital sign check, pain assessment, adjustment of drug, respiratory tract symptom assessment, gastrointestinal symptom assessment, urinary tract symptom assessment, nutritional status and assess IV fluid supplement, catheter renewal, wound or ostomy nursing and blood test.	NA	Reasons for emergency department visits: percentage of ED visits for dyspnea was significantly reduced by 30.7% in Group B ( $p < 0.05$ ) compared to patients receiving basic home palliative care services in Group A. Effective home palliative care significantly reduced ED visits related to controllable dyspnea.

			<p>Group A: Basic home palliative care occurred for 5 days a week</p> <p>Group B: Enhanced home palliative care extended service time to 7 days a week with trained nurses in standard operating procedures for dyspnea care.</p>		
China/ Yang et al. (2020) <sup>39</sup>	Quantitative Prospective study	Patients (n=438) aged 18 years or above scheduled for cancer pain management. Liver (31.5%), Lung (30.4%), Gastric (8.7%), Colorectal cancer (7.6%), Pancreatic cancer (6.5%), Others (15.2%), Metastasis (53.3%)	<p>Inpatient hospital based multidisciplinary palliative care interventions from inter-professional team including surgeon, radiotherapist, interventional radiologist, interventional sonographer, pain physicians, psychologists, nutritionist, and nurse specialists.</p> <p>Oncology management was done by physician, surgeon, radiotherapist, interventional radiologist, and interventional sonographer. The pain physician mainly focused on pain assessment, analgesic prescription, evaluation of responses, and drug adjustment. Nutrition assessment was performed by nutritionists according to the nutritional risk screening tool 2002 (NRS-2002). Nutrition support was offered for patients with an NRS Score <math>\geq 3</math>. Treatment plans were proposed and discussed by the specialists, and the definitive treatment plans were then decided and performed</p>	NA	<p>Brief Pain Inventory (BPI) used to calculate pain response and changes in pain intensity score.</p> <p>MD Anderson Symptom Inventory (MDASI) a validated 19 item questionnaire to rate symptoms and functional interference on an 11-point scale was used: Both pain (<math>p=0.017</math>) and symptom severity (<math>p=0.03</math>) were improved, as demonstrated by lowered BPI worst and average pain scores, as well as symptom severity score (<math>p=0.011</math>). The pain and symptom interference scores were also found to be lower after treatment with the multidisciplinary team, however, the data did not reach statistical significance.</p> <p>European Organization for Research and Treatment of Cancer Quality of Life Core 30 (EORTC QOL-C30) used to measure QoL: Function and</p>

			by a multidisciplinary team.		symptom scores in the individual scales were significantly improved after interventions by multidisciplinary team ( $p < .001$ ), although there was no obvious improvement in the global QoL scores of the cancer patients during study ( $p = 0.749$ ).
South Korea/ Choi et al. (2018) <sup>40</sup>	Quantitative Longitudinal and cross-sectional	Patients (n=65) who received continual service for at least 6 months and were newly registered between January and March 2015 to analyze symptom change. Patients (n=50) who continuously received palliative care services for a minimum of 3 months who were registered at 2 PHCs and n=50 patients with terminal cancer without receiving palliative care services. Digestive cancer (44.6%), Lung (16.9%), genitourinary (15.4%), breast (9.2%)	<i>Community interdisciplinary palliative care project.</i> Service provision teams comprised a public health center (PHC) manager, physician, palliative nurse, social worker, chaplain, and volunteers. Service provision team members carried out palliative care services concurrently with other health affairs at the PHCs. Team meetings were conducted on a quarterly basis, and palliative nurses reported on the patient status and discussed various important issues. The service teams used community networks to maximize resources and manpower. Palliative nurses and social workers were responsible for case management. Palliative nurses visited patients based on the initial assessment forms and symptom scores. After assessing patients' symptoms and needs, nurses provided palliative care, including pain and symptom management, comfort care, psychological support, counseling, and education. Social workers	Patients in non-palliative care group	QoL measured using the Korean version of the Good Death Index, short form: BCPCP patients had higher QoL compared with a control group ( $p = 0.039$ ): "trusting medical staff" ( $p = 0.09$ ) and "receiving help in all areas where I need it" ( $p = 0.003$ ) were noted areas.  Patients' symptoms were measured using the Edmonton Symptom Assessment Scale which measures pain, nausea, loss of appetite, constipation, shortness of breath, fatigue, sleep disorder, anxiety and depression. Pain, appetite, anxiety, and depression were significantly improved at 3 and 6 months compared with the baseline ( $p \leq 0.05$ ). There were no statistically significant results for the other outcomes.

			provided community socioeconomic support, resource development, and bereavement services.		
South Korea/ Kim et al. (2017) <sup>41</sup>	Qualitative description	NA	Community interdisciplinary palliative care project. Teams consist of public health center manager, physician, palliative nurse, social worker, chaplain, and volunteers. Public health center managers oversee administration. Physicians provided medical services, while officers responsible for family health performed administrative tasks. Staff working on the project for home-based cancer patients planned and executed the budget, handled the business aspects of palliative care provision in public health centers, and managed volunteers. Manager of the healthcare home-visit team and home-visiting nurses identified and referred home-based cancer patients requiring palliative care to the palliative care team, and a chaplain provided spiritual support. Palliative nurses and social workers were in charge of case management.	NA, see Choi et al. (2018) for outcomes	NA, see Choi et al. (2018) for outcomes.

**Supplementary File***Relevant developments not included in this narrative review*

We also found studies that provided valuable information on PC models but did not provide any information on patient outcomes such as ENABLE-SG Model<sup>1</sup>, which attempts to make the ENABLE model (originally developed in Canada<sup>2</sup>) more culturally relevant for patients with advanced cancer and their caregivers by considering their inputs using a qualitative formative evaluation approach.

Another relevant study that did not meet our inclusion criteria was the protocol for the Outreach Palliative care Trial of Integrated Model (OPTIM Study) by Morita et al.<sup>3</sup> Published prior to 2017, it describes the development of a regional palliative care model in Japan that can be adapted from current systems such as establishment of a “regional palliative care center”, and guidelines to direct community-based models, including what outcomes to measure. Therefore, it provides a comprehensive structure for evaluation of a region-based palliative care intervention program.

Another relevant but ineligible study was a paper by Sakashita et al on the development of guidelines for hospital-based PC consultation teams (PCCT) using a modified Delphi approach.<sup>4</sup> Even though the paper did not evaluate patient outcomes of a hospital based PCCT model, it methodically detailed the process of formulating guidelines to evaluate and safeguard the quality of PC services for patients and their families. The comprehensive list provided is likely to benefit healthcare institutions and countries/ region in Asia looking to develop, improve and evaluate hospital based PCCT models.

As described in our exclusion criteria, we excluded papers analyzing large national healthcare databases without describing models, and papers that did not explicitly specify that PC services were carried out in a consistent setting or with standardized services. This was necessary as it would have been difficult to draw any conclusions on the effectiveness of the models of care provided. One example was a paper from Taiwan by Chiang et al. evaluating the impact of hospice care on aggressiveness of end-of-life care in advanced ovarian cancer patients.<sup>5</sup> We also identified a paper by Pitanupong et al. providing information on PC development and knowledge advancement in Thailand<sup>6</sup> that had to be excluded as it did not mention any models of care.

Both the paper by Yang et al on the ENABLE-SG Model<sup>1</sup> in Singapore and the study by Sakashita et al. in Japan reporting on the modified Delphi method<sup>4</sup> emphasized the importance of cultural relevance in models of care – this was not highlighted in any of the included studies. We believe that given the diverse cultural and social conditions in Asia, future papers need to consider this aspect when assessing models of care.

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## Appendix 1

### I: Search Strategy for Ovid-Medline

Line	Search Term
1	exp Palliative Care/
2	exp Palliative Medicine/
3	Palliative treatment.mp
4	(End-of-life or End-of-life care).tw
5	Terminal care.tw
6	(Hospice care or Hospice).tw
7	1 or 2 or 3 or 4 or 5 or 6
8	hospitals/ or exp hospitals, community/ or exp hospitals, general/ or exp hospitals, high-volume/ or exp hospitals, low-volume/ or exp hospitals, private/ or exp hospitals, public/ or exp hospitals, rural/ or exp hospitals, teaching/ or exp hospitals, urban/ or exp secondary care centers/ or exp tertiary care centers/
9	exp Home Care Services/
10	exp Caregivers/
11	exp Hospices/
12	exp Nursing Services/
13	exp Patient Care Team/
14	exp Home Nursing/
15	Service delivery.mp
16	Multidisciplinary team.mp
17	integrated care.mp
18	nursing home.mp
19	community?based.tw
20	Home visit*.tw
21	community health worker*.tw
22	8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
23	Exp Neoplasms/
24	Tumor.mp
25	Malignant*.mp
26	oncolog*.mp
27	cancer*.tw
28	23 or 24 or 25 or 26 or 27
29	exp Hong Kong/
30	exp Macau/
31	exp China/
32	Macao.mp



33	Mainland China.mp
34	Western Pacific.mp
35	Greater China.mp
36	Chinese.mp
37	Peoples Republic of China.mp
38	asia, southeastern/ or exp singapore/ or exp thailand/
39	Thai*.mp
40	Japan*.mp
41	(Taiwan* or Formosa).mp
42	Singapore*.mp
43	exp "Republic of Korea"/
44	(Korea* or South Korea).mp
45	29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44
46	7 and 22 and 28 and 45
47	limit 46 to (english language and yr="2017 - 2022" and english and last 5 years)

## II: Search Strategy on Journals and Google Scholar

Summary Table		
Database/ Journal/ Paper	Search Terms	Number of Hits (n= included articles)
Palliative Care in the Greater China Region: A Systematic Review of Needs, Models, and Outcomes.	N/A	20 (n=0)
A systematic review and meta-analysis of randomized controlled trials of palliative care for pain	N/A	10 (n=0)

among Chinese adults with cancer.		
Asia-Pacific Journal of Oncology Nursing (APJON) APJON	China OR "Hong Kong" OR Macao OR Taiwan OR Singapore OR "South Korea" OR Korea OR Thailand OR Japan	281 (n=0)
	palliative OR hospice OR "terminal care" OR "palliative care" or "end of life care"	40 (n=0)
	"hospice" OR "hospital" OR "community" OR "home" OR inpatient OR outpatient OR	444 (n=0)
BMC Palliative Care	China OR Hong Kong OR Macao OR Macau OR Chinese OR Greater China	75 (n=1)
	Singapore OR Singaporean	45 (n=0)
	Japan OR Japanese	126 (n=0)
	Taiwan OR FORMOSA OR Taiwanese	70 (n=2)
	Korea OR Republic of Korea OR South Korea OR Korean	60 (n=0)
	Thailand OR Thai	15 (n=0)

BMJ Supportive and Palliative Care (ProQuest)	China OR "Hong Kong" OR Macau OR Macao OR Greater China OR Chinese OR Taiwan OR Formosa OR Taiwanese OR Singapore OR Singaporean OR "South Korea" OR Korea OR "Republic of Korea" OR Thailand OR Thai OR Japan OR Japanese	215 (n=0)
Google Scholar	palliative OR hospice OR end-of-life OR terminal care China OR "Hong Kong" OR Macao OR Macau OR Chinese OR Taiwan OR Formosa OR Taiwanese OR Singapore OR Singaporean OR "South Korea" OR Korea OR Thailand OR Japan OR "Republic of Korea" OR Thai	537 (n=2)

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