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cancer patient in home care setting**

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Review

Usefulness of the Palliative Prognostic Index for advanced cancer patients in the home care setting

Introduction

Prognostic prediction is necessary for advanced cancer patients, especially those in the home care setting, in order to determine treatment goals, the content and location of provided care, and indications for hospital referral.¹⁾ An appropriate prognostic prediction tool is therefore essential not only for patients and their families, but also for the healthcare professionals who support their decision making.²⁾ Previous studies have examined several prognostic prediction tools for cancer patients, for example the Palliative Prognostic Index (PPI),³⁾ Palliative Performance Scale,³⁾ Cancer Prognostic Scale,³⁾ Palliative Prognostic Scale,⁴⁾ Japan Palliative Oncology Study-Prognostic Index (J-POS-PI),⁵⁾ and Prognosis in Palliative Care Study model,⁶⁾ and each was properly validated. These tools are intended for use in assessing inpatient and ambulatory patients, and the appropriateness of their application to advanced cancer patients in the home care setting is uncertain. Only Stone et al. prospectively studied the usefulness of the PPI in 194 cancer patients in a variety of settings: 73.7% of patients were hospitalized, 25.8% were in the home care setting, and 0.5% were in hospice.⁸⁾

The PPI was defined based on performance status assessment using the Palliative Performance Scale (PPS), oral intake, and the presence or absence of dyspnea, edema, and delirium (Table 1). The PPI does not require blood tests or radiological evaluation, and would therefore be very useful for cancer patients in the home care setting as compared to other validated prognostic prediction tools. Each PPI component is assigned an individual score, and these are added to derive the overall score. The final

PPI score classifies patients into 1 of 3 groups: those with survival predicted to be shorter than 3 weeks ($PPI \geq 6$), shorter than 6 weeks ($PPI \geq 4$), or more than 6 weeks ($PPI < 4$).

The PPI was developed and successfully validated for cancer patients in palliative care units by Morita et al. in Japan,⁷⁾ but the usefulness of the PPI for advanced cancer patients in the home care setting has not been established. The aims of this study were thus to clarify the sensitivity and specificity of the PPI for this particular population.

Methods

Our study population included all advanced cancer patients who received home visiting services regularly from Yamato Clinic between April 2007 and June 2009, and who died at home or in the hospital. Yamato Clinic provides ambulatory care and home visiting services for community residents, with 3 doctors specialized in family medicine and palliative care. We assessed the components of the PPI during the first home visit, as is our usual practice. In June 2010, one researcher (JH) then used medical records from patients' first home visits to determine actual survival time as well as each component of the PPI: PPS score, oral intake, and the presence or absence of dyspnea, edema, and delirium. The PPI score was calculated for each patient, along with overall sensitivity and specificity. Survival predictions were defined as mentioned above: less than three weeks for $PPI \geq 6$, and less than 6 weeks for $PPI \geq 4$.

This study was conducted in conformity with the Declaration of Helsinki and was carried out with special regard for the protection of individual data.

Results

Sixty-five patients (41 males) were included in this study. Table 2 shows patient background information in detail. The mean patient age was 73.5, with 25 patients (38.4%) in their 70s and 14 patients (21.5%) in their 80s. The primary cancer site was the stomach/esophagus in 12 patients (18.4%), the lung in 11 patients (16.9%), and the colon/rectum/anus in 11 patients (16.9%). The mean survival time after the first home visit was 55 days. Survival time was shorter than 3 weeks in 22 patients (33.8%) and shorter than 6 weeks in 35 patients (53.8%) (Table 2).

Twenty-one patients (32.3%) had PPI scores ≥ 6 , while 29 (44.6%) had PPI scores ≥ 4 (Table 3). The distribution of performance status and clinical symptoms is indicated in Table 4. Twelve patients with PPI scores ≥ 6 survived for less than 3 weeks, while 22 patients with PPI scores ≥ 4 survived for less than 6 weeks (Tables 5, 6). Three-week survival was predicted with a sensitivity of 55% (95% CI, 33–75), a specificity of 79% (95% CI, 66–91), a positive predictive value of 57%, and a negative predictive value of 77%. Six-week survival was predicted with a sensitivity of 63% (95% CI, 46–78), a specificity of 77% (95% CI, 61–91), a positive predictive value of 77%, and a negative predictive value of 64% (Table 7).

Discussion

The most important finding of this study was that the sensitivity of the PPI for advanced cancer patients in the home care setting was lower than for advanced cancer patients in palliative care units as previously reported.⁷⁾ To the best of our knowledge, this study is the first to clarify the usefulness of the PPI for advanced cancer patients in the home care setting. It demonstrated the sensitivity and specificity of the PPI as a prognostic prediction tool for 3- and 6-week survival. Our findings suggest limitations of the PPI in

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6 this population and setting.
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8 One possible reason for the discrepancy in PPI sensitivity between advanced cancer
9 patients in palliative care units and those in the home care setting is the differential
10 prevalence of delirium, which is the most heavily weighted score in the PPI scoring
11 system. In our study, the prevalence of delirium in the home care setting was 9.2%,
12 whereas Morita et al.⁷⁾ reported a prevalence of 23% in the hospice setting. This
13 discrepancy suggests 2 possibilities: 1) The prevalence of delirium in the hospice setting
14 may in fact be higher than that in the home care setting,^{9,10)} or 2) we might have
15 underestimated the prevalence of delirium because we diagnosed it only by
16 retrospective chart review.
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29 In addition to the results above, we found the specificity of PPI for advanced cancer
30 patients in the home care setting to be nearly 80% in our study for both 3- and 6-week
31 survival. These results suggest that the PPI might not be useful as a screening tool for
32 poor prognosis in the home care setting because of its low sensitivity, but might be
33 useful with PPI scores <4, predicting survival longer than 6 weeks, and with PPI scores
34 <6, predicting survival longer than 3 weeks.
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43 This study has several limitations. First, it was carried out in one institution and the
44 study population was small, restricting the generalizability of our results. Second, one
45 researcher (JH) was aware of each patient's prognosis before performing the medical
46 chart review, making it impossible to confirm the absence of bias during data collection.
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48 However, because the PPI score is defined based on objective indicators, this limitation
49 most likely had only a relatively small effect on the study outcome. Third, since this
50 study was carried out retrospectively, we cannot be certain that patients' symptoms and
51 signs were recorded correctly at the first home visit.
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In conclusion, this study showed that the PPI had a lower sensitivity for advanced cancer patients in the home care setting than for those in palliative care units. Further research is needed to develop more accurate prognostic prediction tools for use in the home care setting.

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Table 1. Palliative Prognostic Index

		score
Palliative Performance Scale	10%–20%	4
	30%–50%	2.5
	60%	0
Oral intake	Severely reduced	2.5
	Moderately reduced	1
	Normal	0
Edema	Present	1
	Absent	0
Dyspnea at rest	Present	3.5
	Absent	0
Delirium	Present	4
	Absent	0

Overall PPI score was calculated by adding each component score

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Table 2. Patient background information (n = 65)

			n	(%)
Gender	Male		41	(63.0)
	Female		24	(37.0)
Mean age (years) †			73.5	(35–96)
Mean survival duration (days) †			55.0	(1–344)
Age distribution	35–49		2	(3.1)
	50–59		7	(10.8)
	60–69		11	(16.9)
	70–79		25	(38.4)
	80–89		14	(21.5)
	90–		6	(9.2)
Primary cancer site	Stomach/Esophagus		12	(18.4)
	Lung		11	(16.9)
	Colon/rectum/anus		11	(16.9)
	Pancreas		7	(10.8)
	Prostate		4	(6.2)
	Kidney/bladder		4	(6.2)
	Liver		3	(4.6)
	Breast		3	(4.6)
	Biliary system		3	(4.6)
	Unknown		3	(4.6)
Survival duration	Others		4	(6.2)
	0≤ week<1		11	(16.9)
	1≤ week<2		8	(12.3)
	2≤ week<3		3	(4.6)
	3≤ week<4		7	(10.8)
	4≤ week<5		2	(3.0)
	5≤ week<6		4	(6.2)
	6≤ week<7		7	10.8
	7≤ week<8		0	(0.0)
	8≤ week<9		3	(4.6)
	9≤ week		20	(30.7)

† Mean (range)

Table 3. Distribution of PPI scores (n = 65)

score	n	(%)
0	3	(4.6)
$1 \leq \text{PPI} \leq 2$	4	(6.2)
$\text{PPI} = 2.5$	6	(9.2)
$3.5 \leq \text{PPI} < 4$	23	(35.4)
$4 \leq \text{PPI} < 6$	8	(12.3)
$6 \leq \text{PPI} \leq 8$	13	(20.0)
$8.5 \leq \text{PPI} \leq 10$	3	(4.6)
$10.5 \leq \text{PPI} \leq 12$	5	(7.7)
$\text{PPI} \geq 12.5$	0	(0.0)

Table 4. Patient performance status and symptoms (n = 65)

		n	(%)
Palliative Performance Scale	10%–20%	6	(9.2)
	30%–50%	51	(78.5)
	60%	8	(12.3)
Oral intake	Severely reduced	11	(16.9)
	Moderately reduced	36	(60)
	Normal	15	(23.1)
Edema	Present	22	(33.8)
	Absent	43	(66.2)
Dyspnea at rest	Present	14	(21.5)
	Absent	51	(78.5)
Delirium	Present	6	(9.2)
	Absent	59	(90.8)

Table 5. PPI score and 3-week survival

	<3-week survival	≥3-week survival	Total
PPI≥6	12□	9	21
PPI<6	10	34	44
Total	22	43	65

□ Number of patients surviving <3 weeks with PPI scores >6

Table 6. PPI score and 6-week survival

	<6-week survival	≥6-week survival	Total
PPI≥4	22□	7	29
PPI<4	13	23	36
Total	35	30	65

□ Number of patients surviving <6 weeks with PPI scores >4

Table 7. Accuracy of the PPI for advanced cancer patients in the home care setting

	<3 weeks (%)	<6 weeks (%)
Sensitivity	54.5	62.8
Specificity	79.0	76.6
Positive Predictive Value	57.1	75.8
Negative Predictive Value	77.2	63.8

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