

# Audit of an in-patient palliative care quality improvement process for patients with pancreatic ductal adenocarcinoma in a South African teaching hospital

UK Kotze,<sup>1</sup> R Krause,<sup>2</sup> M Bernon,<sup>1</sup> L Gwyther,<sup>2</sup> J Olivier,<sup>3</sup> E Jonas<sup>1</sup>

<sup>1</sup> Surgical Gastroenterology Unit, Department of Surgery, Faculty of Health Sciences, Groote Schuur Hospital, University of Cape Town, South Africa

<sup>2</sup> Division of Interdisciplinary Palliative Care and Medicine, Department of Family Community and Emergency Care, Faculty of Health Sciences, University of Cape Town, South Africa

<sup>3</sup> Department of Public Health, University of Cape Town, South Africa

Corresponding author, email: [eduard.jonas@uct.ac.za](mailto:eduard.jonas@uct.ac.za)

**Background:** Pancreatic ductal adenocarcinoma (PDAC) is an aggressive malignancy with poor survival rates. Timeously introduced palliative care (PC) improves the quality of life (QoL) for patients with terminal diseases. In 2020, an in-patient PC-quality improvement (QI) programme was implemented for PDAC patients. This study compared PC outcomes before and after the introduction of the PC-QI programme.

**Methods:** A focus group identified five critical intervention areas that could improve care. These were in-patient PC referral, pain and symptom control, shared decision-making, interdisciplinary collaborative care, and continuity of care. A hospital record audit of PDAC patients was conducted in pre- and post-implementation cohorts, and the results were compared.

**Results:** A total of 68 (2017 pre-PC-QI) and 39 (2022 post-PC-QI) patient records were audited. Demography, symptom duration, referral delay, and clinical findings were similar in both cohorts. In-patient PC referrals improved significantly from 54.4% in 2017 to 82.1% in 2022 ( $p = 0.0059$ ). Significant improvements were also recorded in shared decision-making, collaboration, and continuity of care, while the reassessment of pain and symptoms after treatment improved. Fewer invasive procedures were done in the 2022 cohort ( $p = 0.0056$ ). The delay from admission to an invasive diagnostic procedure decreased from a mean of 8.7 to 1.5 days ( $p = 0.0001$ ). The duration of hospital admission, overall survival (OS), and readmissions during the final 30 days of life were similar.

**Conclusion:** The QI programme resulted in improved use of the in-hospital PC service and made better use of scarce resources. Increasing patient and family participation and feedback will further inform the development of the quality of PC services.

**Keywords:** pancreatic ductal adenocarcinoma, palliative care, quality improvement

## Introduction

PDAC is an aggressive malignancy with poor survival.<sup>1</sup> The majority of patients with PDAC present late with advanced disease and often have debilitating symptoms, most notably pain and symptoms related to obstructive jaundice.<sup>2-4</sup> Between 10% and 15% of patients may be eligible for treatment with curative intent. The remainder has inoperable, locally advanced or metastatic disease requiring PC, notwithstanding any oncological treatment, with an expected OS of less than 12 months and 3–6 months, respectively.<sup>1,5</sup>

The World Health Organization (WHO) states that timeously introduced PC improves the QoL of patients and their families.<sup>6</sup> It is also generally accepted that invasive treatments in terminal disease have limited value and often cause unnecessary distress for the patient and family.<sup>7</sup> The rapid deterioration of patients diagnosed with advanced

PDAC underscores the need for prompt PC referral to optimise care.<sup>8,9</sup>

Before 2020, the management plans for patients with PDAC were formulated at a multidisciplinary (MDT) team meeting led by hepato-pancreato-biliary (HPB) surgeons and oncologists, who would follow up after specific disciplines enacted plans. In 2020, an in-patient PC-QI process was implemented to improve the care of patients diagnosed with PDAC in our unit. The objective of this study was to assess the effectiveness of the PC-QI by comparing the completeness of documentation relevant to PC in patients who were managed before and after the introduction of the PC-QI process. Furthermore, the impact of the interventions on patient management was assessed by comparing selected outcome parameters in the pre- and post-PC-QI groups.

## Methods

This study was conducted in the Surgical Gastroenterology Unit at Groote Schuur Hospital and the University of Cape

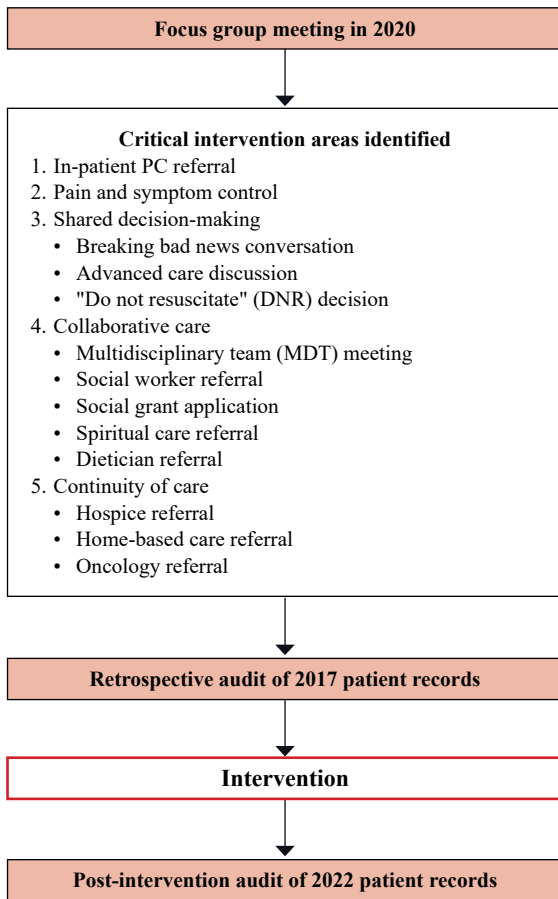


Figure 1

Town in Cape Town, South Africa. The flow of the QI process is detailed in Figure 1. A focus group consisting of HPB surgeons, PC personnel, oncologists, nursing staff, and

Table I: Completeness of documenting intervention areas and measurable variables in the pre- and post-implementation cohorts

	2017		2022		p-value
	n	%	n	%	
<b>In-patient PC referral</b>	37	54.4	32	82.1	0.0059
<b>Shared decision-making</b>					
Breaking bad news conversation	8	11.7	27	69.2	0.0001
Advanced care discussion	18	26.4	27	69.2	0.0001
Family discussion	34	50	31	79.4	0.0037
'Do not resuscitate' decision	7	10.2	10	25.6	0.0534
<b>Interdisciplinary collaborative care</b>					
Multidisciplinary team meeting	58	85.3	22	56.4	0.0022
Social worker referral	20	29	29	74.4	0.0001
Social grant application (financial aid)	12	18	27	69.2	0.0001
Spiritual care referral	1	1.5	25	64.1	0.0001
Dietician referral	31	45.6	13	33.3	0.22
<b>Continuity of care</b>					
Hospice care referral	28	41.7	29	74.3	0.0012
Home-based care referral	28	41.7	29	74.3	0.0012
Oncology referral	25	43.1	4	12.9	0.0043

social workers identified five critical intervention areas that should routinely be documented in patient records. These were in-patient PC referral, pain and symptom control, shared decision-making (four measurable variables), interdisciplinary collaborative care (five measurable variables), and continuity of care (three measurable variables), as detailed in Table I. Pain and symptom control addressed pain, jaundice, pruritus, nausea, constipation, vomiting and diarrhoea (Table II). The intervention centred on an active collaboration between HPB surgeons and the

Table II: Documented measurable variables for pain and symptom control, reassessment rates and outcomes in the pre- and post-implementation cohorts

	Present		Treated		Reassessed		Improved		Unchanged		Worsened	
	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022
Pain	44/68 (64.7%)	32/39 (80%)	44/44 (100%)	32/32 (100%)	6/44 (13.7%)	17/32 (53.1%)	3/6 (50%)	17/17 (100%)	3/6 (50%)	-	-	-
	$p = 0.0765$		$p = 1.0000$		$p = 0.0003^*$		$p = 0.0113^*$					
Jaundice	53/68 (77.9%)	30/39 (76.9%)	50/53 (94.3%)	28/30 (93.3%)	11/50 (22%)	28/28 (100%)	11/11 (100%)	25/28 (89.3%)	-	2/28 (7.1%)	-	1/28 (3.6%)
	$p = 1.0000$		$p = 1.0000$		$p = 0.0001^*$		$p = 0.5450$					
Pruritus	19/68 (27.9%)	14/39 (35.9%)	11/19 (57.9%)	12/14 (85.7%)	0/11 -	11/12 (91.7%)	-	10/12 (83.3%)	-	-	-	1/12 (8.3%)
	$p = 0.3951$		$p = 0.1408$		$p = 0.0058^*$							
Nausea	19/68 (27.9%)	13/39 (33.3%)	13/19 (68.4%)	9/13 (69.2%)	6/13 (46.2%)	9/9 (100%)	5/6 (83.3%)	8/9 (88.9%)	1/6 (16.7%)	1/9 (11.1%)	-	-
	$p = 0.3718$		$p = 0.6665$		$p = 0.0167^*$		$p = 1.0000$		$p = 1.0000$			
Constipation	14/68 (20.6%)	13/39 (33.3%)	11/14 (78.6%)	11/13 (84.6%)	1/11 (9.1%)	9/11 (81.8%)	1/1 (100%)	9/9 (100%)	-	-	-	-
	$p = 0.1689$		$p = 1.0000$		$p = 0.0019^*$		$p = 1.0000$					
Vomiting	13/68 (19.1%)	9/39 (23.1%)	7/13 (53.8%)	5/9 (55.6%)	7/7 (100%)	7/9 (77.8%)	6/7 (85.7%)	7/7 (100%)	1/7 (1.4%)	-	-	-
	$p = 0.6281$		$p = 1.0000$		$p = 0.4750$		$p = 0.0047^*$					
Diarrhoea	6/68 (8.8%)	0/39 -	3/6 (50%)	-	3/3 (100%)	-	3/3 (100%)	-	-	-	-	-

\* Statistically significant

PC team, with weekly PC ward rounds including guidance for junior surgeons and participation of the PC team in the weekly MDT meeting.

The Human Research Ethics Committee (HREC) of the University of Cape Town approved identifying patients with PDAC who were not candidates for treatment with curative intent from the Pancreatic Cancer Registry (HREC reference number R016/2016). Retrospective patient record audits were performed on PDAC patients who presented in 2017 (pre-PC-QI cohort) and patients who presented in 2022 (post-PC-QI cohort). The audit was approved by the HREC (HREC reference number 175/2020).

The completeness of intervention areas and documentation of measurable variables were compared for the two groups. For pain and symptom control, the number of patients in whom a specific symptom was documented was compared between the two groups. During the index visit, the impact of the QI process on pain and symptom control was assessed by comparing the reassessment rates for the specific documented symptoms and outcomes in the two patient groups. Furthermore, based on accepted PC principles, the use of invasive diagnostic and therapeutic procedures during index admission, duration of hospital stay, total and in-hospital mortality, survival, readmission to hospital during the final 30 days of life, oncological management, and outcomes were compared in the two patient cohorts.

### Statistical analysis

Study data were collected and managed using REDCap (Research Electronic Data Capture) tools hosted by the University of Cape Town.<sup>10</sup> SPSS (Statistical Package for the Social Sciences) software (IBM® SPSS® Statistics 27; SPSS, Inc., Chicago, Illinois, United States of America) was used to perform the statistical analyses. The two cohorts were compared, and statistical significance was determined by an unpaired t-test for continuous variables and Fisher's exact test for categorical variables. Survival was calculated from the date of the index hospital admission.

### Results

In total, 68 and 39 patients were included in the pre- and post-PC-QI groups, respectively. There were no differences in the demography, duration of symptoms before referral, and time from referral to admission for the two patient cohorts (Table III). More referrals were from rural Western Cape in the post-PC-QI group ( $p = 0.0189$ ). Clinical parameters on admission were similar in the two cohorts.

Documentation of in-patient PC referral, shared decision-making, interdisciplinary collaboration, and continuity of care in the two patient cohorts are compared in Table I. In-patient PC referrals increased significantly from 54.4% in 2017 to 82.1% in 2022 ( $p = 0.0059$ ). The areas of shared decision-making, breaking bad news conversations, advanced care discussions, and family discussions have

**Table III: Pre- and post-implementation cohorts' demography, geographic origin, symptom duration before referral, referral to admission time, and clinical presentation**

	2017		2022		p-value
	n = 68		n = 39		
<b>Male-to-female ratio</b>	32 : 36		18 : 21		1.000
	Mean	SD	Mean	SD	
<b>Age (years)</b>	62.2	± 11.18	64.3	± 11.32	0.35
<b>Origin of referral</b>	n	%	n	%	
Cape Town Metro	41	60.3	20	51.2	0.41
Western Cape rural	16	23.5	18	46.2	0.0189
Other provinces	11	16.2	1	2.6	0.0522
<b>Pre-referral symptom duration</b>	n	%	n	%	
≤ 14 days	10	14.7	7	17.9	0.78
14–30 days	9	13.2	6	15.4	0.77
≥ 31 days	48	70.6	22	56.4	0.14
Not recorded	1	1.5	4	10.3	0.0580
	Mean	SD	Mean	SD	
<b>Referral to admission time (days)</b>	3.5	± 7.38	3.2	± 4.82	0.82
<b>Clinical findings on admission</b>	n	%	n	%	
<b>ECOG</b>					
1	29	42.6	18	46.2	0.84
2	28	41.2	11	28.2	0.21
3	9	13.2	9	23.1	0.28
4	2	2.9	1	2.6	1.00
<b>Pain intensity</b>	44		32		0.57
Mild	9	20.5	7	21.9	0.50
Moderate	18	40.9	13	40.6	0.49
Severe	15	34.1	11	34.4	1.00
Not recorded	2	4.5	1	3.1	

SD – standard deviation

**Table IV: Invasive diagnostic and therapeutic procedures performed during index admission in the pre- and post-implementation cohorts**

	2017		2022		p-value
	n = 68		n = 39		
<b>Patients who had</b>	n	%	n	%	
an invasive diagnostic procedure	24	35.3	4	10.3	0.0056
<b>Time from admission (days)</b>	Mean	SD	Mean	SD	
to invasive diagnostic procedure	8.7	± 8.6	1.5	± 2.1	0.0001
<b>Patients who had</b>	n	%	n	%	
an invasive therapeutic procedure	54	79.4	30	76.9	0.80
multiple invasive therapeutic procedures	12	17.6	16	41	0.0117
<b>Time from admission (days)</b>	Mean	SD	Mean	SD	
to first invasive therapeutic procedure	5.1	± 4.9	3.7	± 3.1	0.10
to second invasive therapeutic procedure	12	± 9.3	8.7	± 7	0.0057

SD – standard deviation

improved significantly. Documented ‘do not resuscitate’ (DNR) decisions increased somewhat from 10.2% in 2017 to 25.6% in 2022. The areas of interdisciplinary collaboration, referrals to social workers and spiritual care, and social financial assistance applications improved significantly. However, referrals to a dietician and the number of patients discussed at the MDT meeting declined in the 2022 cohort. Continuity of care showed a significant increase, with both the hospice and home-based care referrals increasing from 41.7% in 2017 to 74.2% in 2022 ( $p = 0.0012$ ) and a significant decline in oncological referrals from 43.1% in 2017 to 12.9% in 2022 ( $p = 0.0043$ ).

Documented measurables for pain and symptom control, reassessment rates and outcomes in the pre- and post-implementation cohorts are shown in Table II. Pain ( $n = 44$  in 2017 and  $n = 32$  in 2022) and obstructive jaundice ( $n = 53$  in 2017 and  $n = 30$  in 2022) were the most frequently recorded symptoms in both cohorts. Of the patients, 50 (94.3%) in 2017 and 28 (93.3%) in 2022 required endoscopic biliary drainage to alleviate obstructive jaundice. Reassessment rates of patients with documented symptoms improved for all symptoms in the post-implementation cohort. High improvement rates of all symptoms were present in both groups.

Fewer patients underwent invasive investigative or diagnostic procedures in the 2022 cohort ( $p = 0.0056$ ), while

**Table V: In-hospital mortality, duration of hospitalisation, survival, readmission rates, and oncology management in the pre- and post-implementation cohorts**

	2017		2022		p-value
	n = 68		n = 39		
	n	%	n	%	
Index hospital admission mortalities	10	14.7	8	20.5	0.43
	Mean	SD	Mean	SD	
*Survival of index hospital admission deaths (days)	13.4	± 6.4	12.3	± 5.7	0.70
	n	%	n	%	
Discharged patients	58	85.3	31	79.5	0.43
Mortality	57	98.3	29	93.5	0.27
	Mean	SD	Mean	SD	
Duration of hospitalisation (days)	10.7	± 10.7	12.5	± 9.6	0.39
*Survival (days)	116.9	± 95.6	113.2	± 110.6	0.86
	Ratio <sup>1</sup>	%	Ratio <sup>1</sup>	%	
Lost to follow-up	1/58	1.7	0	0	1.00
Readmissions during final 30 days of life	28/58	48.3	14/31	45.2	0.43
Unavoidable readmissions	23/28	82.1	12/14	85.7	0.82
Avoidable readmissions	5/28	17.6	2/14	14.3	1.00
	Ratio <sup>1</sup>	%	Ratio <sup>1</sup>	%	
Patients attending oncology clinic after hospital discharge	25/58	43.1	4/31	12.9	0.0043
	Ratio <sup>2</sup>	%	Ratio <sup>2</sup>	%	
**Admission to oncology appointment deterioration	17/25	68	1/4	25	0.13
Palliative oncologic therapy commenced	11/25	44	3/4	75	0.32
	Mean	SD	Mean	SD	
Discharge to oncology appointment (days)	48.2	± 36.9	39.5	± 17.9	0.66
Survival after oncologic treatment discontinuation (days)	64.6	± 55.4	89.3	± 22.7	0.47

\* Survival from index hospital admission plus

\*\* Deterioration of ECOG performance status

Ratio<sup>1</sup> – number of patients discharged after index admission

Ratio<sup>2</sup> – number of patients attending oncology clinic

SD – standard deviation

the delay from the time of admission to invasive diagnostic procedure decreased from a mean of 8.7 to 1.5 days ( $p=0.0001$ ) (Table IV). However, 41% of patients underwent multiple invasive interventions in the 2022 cohort compared to 17.6% in 2017 ( $p=0.0117$ ).

There were no differences in the duration of hospital stay, total and in-hospital mortality, or survival in the two cohorts (Table V). Notably, readmissions during the final 30 days of life remained high, 48.3% and 45.2% ( $p=0.4365$ ) in the pre-PC-QI and post-PC-QI groups, respectively. The majority of readmissions, 82.1% and 85.7%, were assessed to be unavoidable. The most common causes of readmission were cholangitis, sepsis, and gastric outlet obstruction. Patients discharged from the hospital had a similar overall mean survival of 116.9 days in 2017 and 113.2 days in 2022 (Table V).

## Discussion

In this retrospective study, we report the outcome of five critical intervention areas identified after introducing a PC-QI programme for patients with PDAC. We compared a set of documented variables in patient records in a post-PC-QI patient cohort with a patient cohort managed before the intervention to determine the impact of integrating PC in patient management.

Many variables identified by the focus group and assessed in this study have been used by other authors in studies originating from high-income countries.<sup>7,11-14</sup> However, some variables, such as the delay in hospital admission, waiting periods for interventional and diagnostic procedures and oncology appointments, reflect the unique challenges related to resource-constrained environments, such as South Africa.<sup>15</sup>

The 57.4% decline of PDAC patients admitted to hospital during the post-PC-QI period could in part be explained by the effect of the COVID-19 pandemic, during which a general decrease in utilisation of cancer services occurred, and which was followed by a slow resumption post-COVID-19.<sup>16,17</sup> In addition, a newly introduced online referral system detailing patient information may have resulted in more appropriate referrals to our tertiary unit. The long interval from the start of symptoms before patients sought healthcare was observed in both cohorts and is often seen in resource-constrained environments. This has been reported as a general problem in cancer care in South Africa, where patients are not diagnosed or receive appropriate care timely.<sup>15,18</sup>

The audit showed a significant increase in in-patient PC referrals in the post-PC-QI group and an improvement in most measured variables in shared decision-making, interdisciplinary collaboration, and continuity of care. Other authors have reported similar improvements after intervention; however, these were mostly in general areas of PC, such as advanced care planning and shared decision-making.<sup>8,19</sup> The significant decline in the number of patients discussed at the MDT meeting is most likely a result of a combined bedside assessment with the PC team and early identification of patients who would benefit from the best supportive care only. In our study, 25.6% of patients in the 2022 cohort had a DNR decision recorded, compared to 10.2% in the 2017 cohort. While this outcome leaves room for improvement, an analysis from the United States of

America reported that only 15% of PDAC in-patients had a DNR order recorded.<sup>20</sup>

The treatment of symptoms is crucial to PC.<sup>7</sup> Pain, jaundice, and jaundice-related symptoms were the most common in our study. The impact of the intervention on patient pain and symptom control was evident in the increase in documented reassessment of symptoms, which invariably resulted in improved symptom control. A significantly lower proportion of patients underwent invasive investigative or diagnostic procedures in the latter cohort, which could be due to improved shared decision-making, interdisciplinary collaboration, and continuity of care. The more considered use of scarce resources could account for the shorter interval between the time of admission to invasive diagnostic procedures, which decreased from a mean of 8.7 to 1.5 days.

The PC-QI did not impact the duration of hospital stay, total and in-hospital mortality, or survival in the two cohorts. Readmissions during the final 30 days of life remained high in both groups. However, our readmission rates were less than the results from Australia, where 61.2% of patients were readmitted despite PC, and an American study reported that 71% of patients visited the emergency department in the final 30 days of life.<sup>21,22</sup>

The significant decrease in the proportion of patients who attended the oncology clinic was likely the result of more appropriate referrals due to shared decision-making in the MDT meetings where oncologists and PC specialists were present. The high number of patients who die in the hospital during the index admission in both cohorts is concerning. It is well recognised that, in general, patients prefer to die at home, and in-hospital deaths are considered poor outcomes.<sup>23</sup> Gomes et al.<sup>23</sup> reported that in countries where integrated PC is lacking, more cancer deaths occur in hospitals. Patients discharged from the hospital had a similar mean survival (116.9 days in 2017 and 113.2 days in 2022). This contradicts a recent Finnish study where the OS significantly improved after PC intervention.<sup>24</sup>

## Study limitations

Our study has several limitations. Although the number of patients included in this study is small compared to other PC and PDAC studies conducted in high-income countries, our results showed similar outcomes.<sup>1,8,13,14,19,22,24</sup> Secondly, the audit is based on documented measures only. The quality of interventions, such as breaking bad news and advanced care planning discussions, is difficult to measure objectively. Ideally, a QI programme should include patient and family feedback. However, we believe that the results of this study add to the limited body of evidence of PC-QI from low- and middle-income countries.

## Conclusion

The QI programme improved the use of the in-hospital PC service and possibly made better use of scarce resources. Additional improvements, such as increasing patient and family participation and feedback, should further optimise PC quality.

## Conflict of interest

The authors declare no conflict of interest.

## Funding source

No external funding was received for this study.

## Ethical approval

This study was formally reviewed and approved by the University of Cape Town Research Ethics Committee (HREC 175/2020).

## ORCID


UK Kotze  <https://orcid.org/0000-0003-1405-474X>

R Krause  <https://orcid.org/0000-0003-2394-500X>

M Bernon  <https://orcid.org/0000-0002-7967-8548>

L Gwyther  <https://orcid.org/0000-0001-7602-6168>

J Olivier  <https://orcid.org/0000-0001-9155-6896>

E Jonas  <https://orcid.org/0000-0003-0123-256X>

## REFERENCES

- Jang RW, Krzyzanowska MK, Zimmermann C, Taback N, Alibhai SMH. Palliative care and the aggressiveness of end-of-life care in patients with advanced pancreatic cancer. *J Natl Cancer Inst.* 2015;107(3):dju424. <https://doi.org/10.1093/jnci/dju424>.
- Kamisawa T, Wood LD, Itoi T, Takaori K. Pancreatic cancer. *Lancet.* 2016;388(10039):73-85. [https://doi.org/10.1016/S0140-6736\(16\)00141-0](https://doi.org/10.1016/S0140-6736(16)00141-0).
- Krige JE, Bornman PC. Palliating advanced pancreatic cancer--in search of the Holy Grail. *S Afr J Surg.* 2001;39(3):68-70, 73.
- Nipp RD. Palliative and supportive care for individuals with pancreatic adenocarcinoma. *Hematol Oncol Clin North Am.* 2022;36(5):1053-61. <https://doi.org/10.1016/j.hoc.2022.07.009>.
- Carrato A, Falcone A, Ducreux M, et al. A systematic review of the burden of pancreatic cancer in Europe: real-world impact on survival, quality of life and costs. *J Gastrointest Cancer.* 2015;46(3):201-11. <https://doi.org/10.1007/s12029-015-9724-1>.
- who.int [Internet]. Palliative care: key fact 2023. World Health Organization; 2020. Available from: <http://www.who.int/news-room/fact-sheets/detail/palliative-care>. Accessed 1 December 2023.
- Earle CC, Park ER, Lai B, et al. Identifying potential indicators of the quality of end-of-life cancer care from administrative data. *J Clin Oncol.* 2003;21(6):1133-8. <https://doi.org/10.1200/JCO.2003.03.059>.
- Anaka M, Lee M, Lim E, et al. Changing rates of goals of care designations in patients with advanced pancreatic cancer during a multifactorial advanced care planning initiative: a real-world evidence study. *JCO Oncol Pract.* 2022;18(6):e869-76. <https://doi.org/10.1200/OP.21.00649>.
- Agarwal R, Epstein AS. Palliative care and advance care planning for pancreas and other cancers. *Chin Clin Oncol.* 2017;6(3):32. <https://doi.org/10.21037/cco.2017.06.16>.
- Harris PA, Taylor R, Thielke R, ET AL. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42(2):377-81. <https://doi.org/10.1016/j.jbi.2008.08.010>.
- Bilimoria KY, Bentrem DJ, Lillemoe KD, Talamonti MS, Ko CY. Assessment of pancreatic cancer care in the United States based on formally developed quality indicators. *J Natl Cancer Inst.* 2009;101(12):848-59. <https://doi.org/10.1093/jnci/djp107>.
- Maharaj AD, Ioannou L, Croagh D, et al. Monitoring quality of care for patients with pancreatic cancer: a modified Delphi consensus. *HPB (Oxford).* 2019;21(4):444-55. <https://doi.org/10.1016/j.hpb.2018.08.016>.
- Ekström A, Brun E, Eberhard J, Segerlantz M. Integration of specialized palliative care with oncological treatment in patients with advanced pancreatic cancer. *J Pancreat Cancer.* 2022;8(1):2-8. <https://doi.org/10.1089/pancan.2022.0004>.
- Choi CC-H, Choi J, Houli N, et al. Evaluation of palliative treatments in unresectable pancreatic cancer. *ANZ J Surg.* 2021;91(5):915-20. <https://doi.org/10.1111/ans.16669>.
- Lubuzo B, Ginindza T, Hlongwana K. The barriers to initiating lung cancer care in low-and middle-income countries. *Pan Afr Med J.* 2020;35(38). <https://doi.org/10.11604/pamj.2020.35.38.17333>.
- Chu KM, Smith M, Steyn E, et al. Changes in surgical practice in 85 South African hospitals during COVID-19 hard lockdown. *S Afr Med J.* 2020;110(9):916-9. <https://doi.org/10.7196/SAMJ.2020.v110i9.15014>.
- Rine S, Lara ST, Bikomeye JC, et al. The impact of the COVID-19 pandemic on cancer care including innovations implemented in sub-Saharan Africa: a systematic review. *J Glob Health.* 2023;13:06048. <https://doi.org/10.7189/jogh.13.06048>.
- Lubuzo B, Hlongwana K, Ginindza T. Cancer care reform in South Africa: a case for cancer care coordination: a narrative review. *Palliative Support Care.* 2022;20(1):129-37. <https://doi.org/10.1017/S1478951521000432>.
- Tseng Y-L, Lin Y-C, Hsu W-J, et al. Shared decision making with oncologists and palliative care specialists (SOP) model help advanced pancreatic cancer patients reaching goal concordant care: a prospective cohort study. *Cancer Med.* 2023;12(19):20119-28. <https://doi.org/10.1002/cam4.6590>.
- Hao Q, Segel JE, Gusani NJ, Hollenbeak CS. Do-not-resuscitate orders and outcomes for patients with pancreatic cancer. *J Pancreat Cancer.* 2022;8(1):15-24. <https://doi.org/10.1089/pancan.2022.0006>.
- Michael N, Beale G, O'Callaghan C, et al. Timing of palliative care referral and aggressive cancer care toward the end-of-life in pancreatic cancer: a retrospective, single-center observational study. *BMC Palliat Care.* 2019;18(13). <https://doi.org/10.1186/s12904-019-0399-4>.
- Bevins J, Bhulani N, Goksu SY, et al. Early palliative care is associated with reduced emergency department utilization in pancreatic cancer. *Am J Clin Oncol.* 2021;44(5):181-6. <https://doi.org/10.1097/COC.0000000000000802>.
- Gomes B, Pinheiro MJ, Lopes S, et al. Risk factors for hospital death in conditions needing palliative care: nationwide population-based death certificate study. *Palliat Med.* 2018;32(4):891-901. <https://doi.org/10.1177/0269216317743961>.
- Rautakorpi L, Jyrkkio S, Löyttyniemi E, Hirvonen O. End-of-life care among patients with pancreatic cancer with or without palliative intervention: a retrospective single-centre study. *Acta Oncol.* 2021;60(1):106-11. <https://doi.org/10.1080/0284186X.2020.1806356>.