National Institute for Health and Care Excellence

Final

Pancreatic cancer in adults:

diagnosis and management

Appendix K

Health economics evidence profiles

February 2018

Final

Developed by the National Guideline Alliance, hosted by the Royal College of Obstetricians and Gynaecologists

Disclaimer
The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or service users. The recommendations in this guideline are not mandatory and the guideline does not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or their carer or guardian.

Local commissioners and/or providers have a responsibility to enable the guideline to be applied when individual health professionals and their patients or service users wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with compliance with those duties.

NICE guidelines cover health and care in England. Decisions on how they apply in other UK countries are made by ministers in the Welsh Government, Scottish Government, and Northern Ireland Executive. All NICE guidance is subject to regular review and may be updated or withdrawn.

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Appendix K: Health economics evidence profiles

K.1 Staging

What is the most effective investigative pathway for staging adults with newly diagnosed pancreatic cancer or a non-definitive diagnostic result as resectable, borderline resectable, locally advanced and metastatic disease?

References to Included Studies:

Morris S, Gurusamy KS, Sheringham J et al. 'Cost-effectiveness of diagnostic laparoscopy for assessing resectability in pancreatic and periampullary cancer'. BMC Gastroenterol. (2015)

Ghaneh, P, Wong, WL, Titman, A et al. PET-PANC: Multi-centre prospective diagnostic accuracy and clinical value study of PET/CT in the diagnosis and management of pancreatic cancer. Pancreatology. (2016)

Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
Ghaneh 2016 UK	Adults with potential PDAC	Usual diagnostic work-up with MDCT	Disaggregated costs not reported	Disaggregated effects not reported	Reference			Probability sensitivity analysis: In the base case analysis the addition of PET/CT has a 64% probability of being dominant and 82% probability of being cost effective at a willingness to pay of £20,000 per QALY. The probability of cost	Directly Applicable	Minor Limitations.
		PET/CT following usual diagnostic work-up with MDCT.	Disaggregated costs not reported	Disaggregated effects not reported	-£645	0.0157	PET/CT dominant			

Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
								effectiveness increases when lower cost estimates for PET-CT are used. When an alternative structural assumption is made around that not all patients indicated for resection receive a resection the probability of cost effectiveness reduces substantially to between 18% and 50% depending on assumptions around PET-CT costs.		
	Comments: Given the way costs and outcomes were calculated between competing interventions only incremental values were reported by the study.									

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Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
Morris	People with pancreatic or	Direct Laparotomy	£7480	0.337	Reference					

Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
2015 UK	periampullary cancer which has been identified as resectable through CT scanning.	with no further diagnostic work up.						Deterministic Sensitivity Analysis The preferred option is sensitive to the probability of non-resectable disease being identified and the post test probability of unresectable disease. The preferred option changes to direct laparotomy when laparoscopy is schedule prior to surgery.	Directly Applicable	Minor Limitations.
		Diagnostic laparoscopy, to assess resectability of tumour, prior to laparotomy.	£7470	0.346	-£10	0.009	Diagnostic Laparoscopy dominant			

K.2 Biliary Obstruction

What is the optimal treatment of biliary obstruction in adults with newly diagnosed or recurrent pancreatic cancer?

References to included studies:

Arguedas MR, Heudebert GH, Stinnett AA et al. 'Biliary stents in malignant obstructive jaundice due to pancreatic carcinoma: a cost-effectiveness analysis' AM J Gastroenterol 97(4) (2002) p898-904

Morris S, Gurusamy KS, Sheringham J et al. 'Cost-effectiveness of preoperative biliary drainage for obstructive jaundice in pancreatic and periampullary cancer. J Surg Res 193(1) (2014) p202-209

Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
Arguedas 2002 US	Hypothetical cohort of people with pancreatic cancer and obstructive jaundice presenting for palliative biliary stenting.	Initial Plastic Stenting	$13,879	1.799 QALMs	Reference			Deterministic Sensitivity Analysis: The preferred intervention is sensitive to overall survival with shorter survival favouring plastic stenting. Metal stenting is dominant under the majority of assumptions	Partially Applicable	Very Serious Limitations.
		Initial Metal Stenting	$13,446	1.832 QALMs	-$433	0.033	Dominant			
	Comments:									

Morris 2014 UK	People with pancreatic or periampullary cancer and obstructive jaundice who are potential candidates for resection.	Preoperative Biliary Drainage	£10,775	0.337	Reference			Deterministic Sensitivity Analysis Deterministic sensitivity analyses were performed around all variables with Direct Surgery always dominant. Probabilistic Sensitivity Analysis At a willingness to pay per QALY of £20,000 and £30,000 PBD only had a 9.5% and 8.9% probability of being cost effective.	Directly Applicable	Minor Limitations.
		Direct Surgery	£8,221	0.343	£2554	0.006	Direct Surgery Dominant			
	Comments:									

K.3 Neo-adjuvant treatment

Is neoadjuvant therapy for people with resectable and borderline resectable pancreatic adenocarcinoma an effective treatment?

References to included studies:

Abbott DE, Tzeng CW, Merkow RP et al. 'The cost-effectiveness of neoadjuvant chemoradiation is superior to a surgery-first approach in the treatment of pancreatic head adenocarcinoma.'Ann Surg Oncol 20 (2013): Suppl 3: s500-503

Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
Abbott et al. 2013 USA	People with resectable pancreatic head cancer.	Surgery First	$46,830	0.73 QALYs	Reference			One-way Sensitivity Analysis One-way sensitivity analyses were performed around a range of clinical variables impacting upon the surgery first approach. Neoadjuvant therapy remained dominant in all scenarios.	Partially Applicable	Potentially Serious Limitations.
		Neoadjuvant Therapy	$36,538	1.60 QALYs	-$10,292	0.87 QALYs	Dominant (Neoadjuvant therapy both more effective and less costly)			
	Comments:									

K.4 Follow up for people with resected pancreatic cancer.

What is the optimal follow-up protocol for people with resected pancreatic adenocarcinoma?

References to included studies:

1 Tzeng CW, Abbott DE, Cantor SB et al. 'Frequency and intensity of postoperative surveillance after curative treatment of pancreatic cancer: a cost-
2 effectiveness analysis.' Ann Surg Oncol 20 (2013): Suppl 3: 2197-203

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Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
Tzeng et al. 2013 USA	People who completed neoadjuvant therapy and pancreaticoduodenectomy for pancreatic ductal adenocarcinoma (PDAC).	1. No scheduled surveillance, patient-initiated clinical evaluation for symptoms with computed tomography (CT) of the abdomen/pelvis and posterior-anterior/lateral chest X-ray (CXR).	$3,837	24.6 Life Months (LM)	Reference			Deterministic Sensitivity Analysis Deterministic sensitivity analyses were performed around the proportion of patients receiving chemotherapy and the effectiveness of chemotherapy following recurrence. Whilst the sensitivity analyses changed the absolute life time costs it did not impact upon the ranking of the interventions in terms of cost effectiveness.	Partially Applicable	Potentially Serious Limitations.
		2. Scheduled clinical evaluation every 6 months with carbohydrate antigen (CA) 19-9 assay	$7,496	32.8LM	$3,659	8.2LM	$5,364 per Life Year (LY) gained			
		3. Scheduled clinical evaluation every 6 months with CA 19-9	$10,961	32.8LM	$3,465	0.0LM	Dominated			

		and routine CT/CXR								
		4. Scheduled clinical evaluation every 3 months with CA 19-9	$18,523	33.8LM	$11,027	1.0LM	$127,680 per LY Gained			
		5. Scheduled clinical evaluation every 3 months with CA 19-9 and routine CT/CXR	$24,775	34.1LM	$17,279	1.3LM	$294,696 per LY Gained			
	Comments:									

K.5 Management of metastatic pancreatic cancer.

What are the most effective interventions (excluding relevant NICE TAs) for adults with newly diagnosed or recurrent metastatic pancreatic cancer (chemotherapy, surgery, biological therapy, immunotherapy, radiotherapy, ablative techniques, low molecular weight heparin)?

References to included studies:

Tam VC, Ko YJ, Mittmann N, Cheung MC, Kumar K, Hassan S, Chan KK. 'Cost-effectiveness of systemic therapies for metastatic pancreatic cancer' Curr Oncol 20 (2013) e90-e106

Attard CL, Brown S, Alloul K et al. 'Cost-effectiveness of folfirinox for first-line treatment of metastatic pancreatic cancer' Curr Oncol 21 (2014) e41-51

Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
Tam 2013 Canada	People with metastatic pancreatic cancer undergoing chemotherapy	Gemcitabine	CA$29,423	0.487	Reference			Deterministic Sensitivity Analysis Deterministic sensitivity analyses were performed around the majority of variables. The decision appeared most sensitive to chemotherapy drug costs. Probabilistic sensitivity analysis estimated that there was less than a 5% probability of FOLFIRINOX being cost effective at a WTP threshold of CA$100,000.	Partially Applicable	Potentially Serious Limitations.
		Gemcitabine and Capecitabine	CA$33,572	0.536	CA$4,329	0.049	CA$84,299			
		Gemcitabine and Erlotinib	CA$41,239	0.564	CA$11,816	0.077	CA$153,631			
		FOLFIRINOX	CA$58,243	0.703	CA$28,820	0.216	CA$133,184			
	Comments:									

Study	Population	Comparators	Costs	Effects	Incr costs	Incr effects	ICER	Uncertainty	Applicability	Limitations
Attard 2014 Canada	People with metastatic pancreatic cancer undergoing chemotherapy with an ECOG performance score of 0 or 1	Gemcitabine	CA$7,207	0.670	Reference			Deterministic Sensitivity Analysis Deterministic sensitivity analyses were performed around the majority of variables with the results of the analysis being robust to all changes. Probabilistic sensitivity analysis estimated that there was a greater than 85% probability of FOLFIRINOX being cost effective at a WTP threshold of CA$100,000.	Partially Applicable	Potentially Serious Limitations.
		FOLFIRINOX	CA$21,103	0.974	CA$13,896	0.324	CA$57,858			
	Comments:									

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