

Understanding clinical decision-making in mesothelioma care: a mixed methods study

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ABSTRACT

Introduction Malignant pleural mesothelioma is a rare, incurable cancer arising from previous asbestos exposure; patients have a poor prognosis, with a median survival rate of 8–14 months. Variation in mesothelioma clinical decision-making remains common with a lack of multidisciplinary knowledge sharing, leading to inconsistencies in treatment decisions. The study aimed to explore which factors impacted on clinicians' decision-making in mesothelioma care, with a view to optimising the mesothelioma care pathway.

Methods This mixed methods study consisted of documentary analysis of local and national guidelines, policies or documents pertaining to mesothelioma care pathways, secondary analysis of mesothelioma patient data, and interviews with clinicians attending lung cancer and/or mesothelioma-specific multidisciplinary team meetings. The study took place at three National Health Service trusts in England. Documentations relating to patients' treatment pathways were collated and reviewed qualitatively. Records of patients with mesothelioma were extracted from hospital patient records and data collected on diagnosis date, treatment, mortality rates, survival postdiagnosis, age and clinical care team. Data were statistically analysed. Interviews with clinicians explored influences on clinical decision-making, including challenges or barriers involved. Data were thematically analysed. The Strengthening the Reporting of Observational Studies in Epidemiology reporting checklist was used.

Results There were differences in the structure and delivery of mesothelioma treatment and care between trusts. Four main themes were identified: 'collaboration and communication', 'evidence base and knowledge', 'role of the clinician' and 'role of the patient'. Two cross-cutting themes relating to the role of the mesothelioma nurse specialist and the impact of COVID-19 were identified.

Discussion There is a need to review the structure of mesothelioma multidisciplinary team meetings to ensure patients are reviewed by clinicians with appropriate knowledge, expertise and understanding of how, why and when decisions should be made. There is a need for expert clinicians in mesothelioma care to promote an up-to-date evidence and knowledge base within the wider multidisciplinary team.

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Little is known about the factors influencing clinicians' decision-making in mesothelioma care; however, this information is crucial to ensuring that patients with mesothelioma are provided with optimal advice and support to make informed decisions about their follow-up care.
- ⇒ This study aimed to explore which factors impacted on clinical decision-making in mesothelioma care.

WHAT THIS STUDY ADDS

- ⇒ The study has identified that malignant pleural mesothelioma multidisciplinary team meetings require a different structure and format from lung cancer multidisciplinary team meetings, with a greater focus on the supportive care needs of patients required.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Policymakers and healthcare professionals can consider the benefits of a revised multidisciplinary team structure and format for patients with mesothelioma to promote patient-centred clinical decision-making, with input from specialist mesothelioma clinicians being crucial to achieving optimal patient care outcomes.

INTRODUCTION

Malignant pleural mesothelioma (MPM) is a rare, incurable cancer mainly arising from previous occupational or environmental asbestos exposure.¹ Despite worldwide asbestos regulation, MPM has a latency period of 20–50 years, with its prevalence rising due to previous asbestos exposure.^{1–3} With 2700 new diagnoses each year, the UK has the highest global MPM incidence⁴ and patients have poor diagnostic prognoses, with a median survival rate of 8–14 months.² The care needs of patients with MPM differ from patients with advanced lung cancer, requiring specific treatment pathways.⁵ Treatment options are limited, resulting in high symptom burden,



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often characterised by progressive dyspnoea, chest wall pain, weight loss, sweating and fatigue.^{6–9} The care needs of patients with MPM can cause complex psychological distress, with depression, anxiety, fear, hopelessness, uncertainty and anger reported.^{3 5 10 11} Unmet informational and psychosocial care needs relating to legal and financial challenges and issues of blame are common.^{2 5}

Due to these complex physical, psychological and social issues, variation in MPM clinical decision-making is common across National Health Service (NHS) trusts in England.¹² A relative lack of multidisciplinary knowledge sharing around MPM due to case numbers being small (~2700 per annum)^{4 13} can lead to variation in clinicians' awareness of MPM evidence, leading to inconsistencies in treatment decisions. In addition, challenges communicating non-curative MPM diagnoses, prognoses and treatment options can be difficult. Resultantly, patients with MPM cannot always access the most up-to-date information¹⁴; this impacts on their treatment and supportive care choices, affecting quality of life and survival outcomes.

The British Thoracic Society (BTS) guidelines advise that, as part of their treatment plans, patients with MPM should receive three to four monthly follow-ups with an oncologist, respiratory physician or mesothelioma clinical nurse specialist (MCNS).^{2 15} However, no national recommendations specifically focus on patients' supportive care needs. A recent study exploring experiences of follow-up care of patients with MPM¹² found MPM and lung cancer pathways were not always distinct and that variable information existed on how to access support groups, research or clinical trials. Coproduced recommendations outlined the need for patients with MPM to access consistent, specialist, streamlined care. MCNS and respiratory consultants at the top of a 'pyramid of care'¹⁶ were underpinned by input, expertise and resources from the wider multidisciplinary team (MDT). The pyramid of care emphasised the importance of iterative communication between clinical and support services to promote patient-centred coordinated care.^{12 16} This paper builds on this and reports a study that aimed to explore factors which affected clinicians' MPM decision-making, with a view to optimising the care pathway.

METHODS

Study design

This mixed methods study consisted of three phases: (1) documentary analysis of local and national guidelines, policies or documents pertaining to mesothelioma care pathways; (2) secondary analysis of MPM patient data; and (3) interviews with clinicians attending lung cancer and/or mesothelioma-specific MDT meetings. The Strengthening the Reporting of Observational Studies in Epidemiology reporting checklist was used.

The study took place at three participating NHS trusts in South England between March 2019 and March 2021. One trust was a tertiary centre with a cancer centre (TC1), a teaching hospital that offers pioneering diagnostic,

treatment, supportive and palliative care services for people living with cancer; the other two were district general hospitals (DGH1 and DGH2), non-teaching, non-specialist hospitals offering a range of diagnostic and therapeutic services.

Phase 1: documentary analysis

Local and national documentations relating to treatment pathways of patients with MPM were collated. Key documents include reports, guidance and policies and had previously been collected by the researchers; these were accessed via mesothelioma or lung cancer nurse specialists at each participating trust.¹² These documents were rereviewed and any additional documents were sourced by rechecking with staff members at the participating sites, contacting Mesothelioma UK representatives and searching the National Institute for Health and Care Excellence guidelines to identify published national policies, standards or guidance documents relating to mesothelioma treatment pathways.

The documents were reviewed qualitatively using thematic analysis: a 'summary template' was completed for each document reviewed. Summarised text was entered in a framework matrix to allow comparison of findings across domains and between trusts. This established which MPM pathways existed, how they were structured, resourced and managed. Any key enablers or barriers to accessing different care pathways were identified.

Phase 2: secondary data analysis

Records of patients with MPM treated between August 2014 and August 2019 (N=232) were extracted from hospital patient records by clinicians at the participating trusts. Anonymised data were securely transferred to the research team, in line with participating trusts' data protection policies. Data were collected on diagnosis date, treatment type, mortality rates, survival post diagnosis, age and clinical care team. Data were deidentified, transferred to the research team and inputted into SPSS V.27. Descriptive statistics summarised the sample and identified the most common care pathways. χ^2 analysis, one-way analysis of variance (ANOVA) and Kaplan-Meier survival analysis were used to compare treatment, care pathways and patient outcomes across trusts.

Phase 3: interviews with MDT healthcare professionals

Online interviews with mesothelioma and/or lung cancer MDT clinicians were undertaken at each trust, including clinicians who attended the regional, monthly mesothelioma MDT at the tertiary centre. The interview topic guide was informed from the phase 1 and 2 findings and the wider literature and explored influences on clinicians' MPM decision-making, including challenges and barriers. Questions included 'to what extent is research embedded within clinical decision-making processes?' and 'how do local lung cancer and regional mesothelioma MDTs influence

Table 1 Demographic profile of interview participants by participating trust, n (%)

Trust		DGH1	DGH2	T1	Total
Profession	Specialist nurse	2 (28.6)	1 (16.7)	1 (12.5)	4 (19.0)
	Respiratory physician	3 (42.9)	3 (50.0)	4 (50.0)	10 (47.6)
	Oncologist		2 (33.3)	1 (12.5)	3 (14.3)
	Radiologist	1 (14.3)		1 (12.5)	2 (9.5)
	Occupational therapist			1 (12.5)	1 (4.8)
	Surgeon	1 (14.3)			1 (4.8)
Years working with patients with MPM*	1–5	2 (28.6)		2 (25.0)	4 (19.0)
	5–10			2 (25.0)	2 (9.5)
	>10	4 (57.1)	6 (100)	4 (50.0)	14 (66.7)
Attendance at lung MDT*	Regular	5 (71.4)	4 (66.7)	3 (37.5)	12 (57.1)
	Occasional	1 (14.3)	2 (33.3)	3 (37.5)	6 (28.6)
	Rare			2 (25.0)	2 (9.5)
	Never				
Attendance at mesothelioma MDT†	Regular			6 (75.0)	6 (28.6)
	Occasional			1 (12.5)	1 (4.8)
	Rare				
	Never	6 (85.7)	3 (50.0)	1 (12.5)	10 (47.6)

*Missing n=1.

†Missing n=4.

DGH, district general hospital; MDT, multidisciplinary team; MPM, malignant pleural mesothelioma; TC1, tertiary centre.

decision-making?'. Interviews explored clinicians' awareness and engagement with current mesothelioma research and the extent this informed their practice. Clinicians were asked how to optimise regional, collaborative, evidence-based, clinical decision-making.

Sampling, access and recruitment

Twenty clinicians were recruited for interview until data saturation was reached. Participants were sampled purposively according to profession to ensure widespread representation of respiratory physicians, surgeons, oncologists, radiologists, MCNS and occupational therapists. All professionally registered clinicians actively involved in MPM patient care at a participating trust who regularly attended the lung cancer and/or mesothelioma MDT were eligible. Demographics of interview participants are presented in [table 1](#).

Participants were recruited through research team members with clinical roles at the trusts. At the MDT meetings members were given participant information leaflets. A week later contact details of colleagues willing to take part were collected. The research teams then emailed the individuals to organise a suitable date and time for the interview.

Data collection and analysis

Interviews were held via telephone or online platforms and were audio-recorded. Written informed consent and demographic forms were returned to the researchers

prior to the interviews, which lasted 30–60 min. Data were transcribed by a local transcription company with appropriate confidentiality agreements in place. Data were thematically analysed using the framework method.¹⁷ All transcripts were single-coded and a selection double-coded. A working analytical framework was established from coded scripts, enabling patterns of codes, categories and group characteristics to be identified and developed into themes. This allowed assessments and interpretations of relationships between developing themes to be made.¹⁸ All subsequent transcripts were indexed using the categories and codes contained within the framework. Following this, transcript data were inserted into a framework matrix to enable ordering and synthesis of the data, while retaining the meaning and feeling of participants' words.¹⁷ This allowed data to be compared across and within interview cases.¹⁸ Regular research team meetings to discuss themes emerging from the data added rigour to the process.

Patient and public involvement

Patient and public involvement (PPI) was central throughout the study process, with patients involved in its design and process and invited members of the study's Steering Group Committee. This meant that their views and perspectives influenced the research questions formulated, recruitment, data collection and analysis process from the outset. Examples include providing feedback on study documentation and contributing their

views on the interpretation of the study findings. A PPI meeting with four patients and carers was held to explore the quantitative and qualitative findings and the extent to which these resonated with their own experience of clinical decision-making in mesothelioma treatment and care. PPI members have been involved in the dissemination of findings through involvement in discussions about the most appropriate outlets for dissemination.

RESULTS

Phase 1: documentary analysis

While the BTS guidelines¹⁵ provide national recommendations for mesothelioma treatment and care, no new non-COVID-19 national policies were found. No documentation relating to MPM treatment pathways was found in addition to documents already collated in an earlier study.¹² Findings identified different service structures and varied treatment and follow-up pathways across the region. Each trust had clearly defined mesothelioma treatment and follow-up pathways in place, but these pathways were not always distinct from the lung cancer care pathway. Many MDT members were involved in MPM pathways at each trust; however, patient care at the tertiary centre was led by respiratory teams, whereas at the

DGHs it was led by oncology teams. One mesothelioma specialist nurse covered all three trusts, but the majority of their case load fell under the tertiary trust at which they were based. Across the trusts there was variation in the level of information provided to patients about research and clinical trials, as well as how to access local support groups. The two DGHs treated 15–20 newly diagnosed patients per year, while the tertiary centre treated 30–40 per year; all trusts covered large geographical areas and had primary and satellite clinic sites for patient treatment and follow-up visits. All three sites offered surgery as a treatment option. The tertiary centre hosted a regional mesothelioma MDT; this had limited attendance from clinicians from the two DGHs, with most attendees based at the tertiary centre.¹²

Phase 2: secondary data analysis

Descriptive statistics, including number of patients diagnosed per year, year of diagnosis, mortality, age at diagnosis, treatment received, current clinical care team(s) and mean survival post diagnosis, are presented in [table 2](#).

A one-way ANOVA indicated that there is a significant difference in the average number of patients diagnosed per year by trust ($F(2,12)=16.19$, $p<0.001$). Bonferroni

Table 2 Summary of patient records by trust

Demographics	DGH1 (n=46)	T1 (n=139)	DGH2 (n=47)	Total (N=232)	
Patients diagnosed per year, M (SD)	9.2 (5.63)	27.8 (7.16)	9.4 (4.77)	46.40 (9.24)	
Year of diagnosis, n (%)	2015/2016	1 (2.2)	17 (23.3)	13 (27.7)	31 (13.4)
	2016/2017	8 (17.4)	32 (23.0)	8 (17.0)	48 (20.7)
	2017/2018	8 (17.4)	28 (20.1)	10 (21.3)	46 (19.8)
	2018/2019	14 (30.4)	26 (18.7)	14 (29.8)	54 (23.3)
	2019/2020	15 (32.6)	36 (25.9)	2 (4.3)	53 (22.8)
Mortality, n (%)	Alive	15 (32.6)	37 (26.6)	6 (12.8)	58 (25.0)
	Deceased	31 (67.4)	102 (73.4)	41 (87.2)	174 (75.0)
Age at diagnosis (years), M (SD)	75.80 (7.75)	76.65 (8.84)	73.02 (11.50)	75.75 (9.31)	
Treatment, n (%)	Chemotherapy	14 (30.4)	54 (38.8)	8 (17)	76 (32.8)
	Radiotherapy	3 (6.5)	27 (19.4)	3 (6.4)	33 (14.2)
	Surgery	8 (17.4)	27 (19.4)	2 (4.3)	37 (15.9)
	Trial	4 (8.7)	18 (12.9)	2 (4.3)	24 (10.3)
	Immunotherapy	0	12 (8.6)	0	12 (5.2)
	Best supportive care only*	24 (52.2)	50 (36.0)	29 (61.7)	103 (44.4)
	No treatment	1 (2.2)	5 (3.6)	5 (10.6)	11 (4.7)
Clinical care team(s), n (%)	Respiratory only	0	24 (17.3)	4 (8.5)	28 (12.1)
	Oncology only	12 (26.1)	5 (3.6)	1 (2.1)	18 (7.8)
	Palliative only	29 (63.0)	5 (3.6)	34 (72.3)	68 (29.3)
	Shared care	4 (8.7)	97 (69.8)	4 (8.5)	105 (45.3)
	Other or no care team recorded	1 (2.2)	8 (5.8)	4 (8.5)	13 (5.6)
Survival time (months), M (SD)	13.19 (2.26)	18.64 (1.86)	12.67 (2.08)	16.60 (1.36)	

*Includes pleural management.

DGH, district general hospital; TC1, tertiary centre.

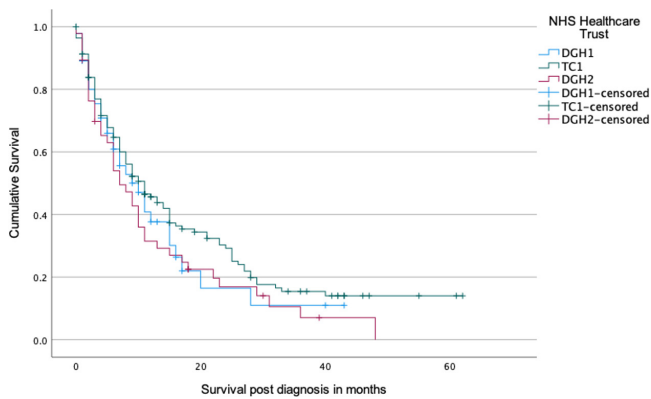


Figure 1 Kaplan-Meier survival curves. DGH, district general hospital; NHS, National Health Service; TC, cancer centre.

post-hoc tests show that TC1 diagnosed significantly more patients on average per year than DGH1 ($p=0.001$, 95% CI 8.17 to 29.03) and DGH2 ($p=0.001$, 95% CI 7.97 to 28.83). There were no significant differences in age at diagnosis by trust ($F(4,227)=2.16$, $p=0.075$). Similarly, χ^2 tests found no significant difference in mortality by trust ($\chi^2=5.37$, $p=0.068$). Kaplan-Meier survival analysis found no significant difference in survival post diagnosis ($\chi^2=3.12$, $p<0.21$). Survival curves are presented in [figure 1](#). χ^2 analysis did find a significant difference in treatment received when comparing active treatment (eg, chemotherapy, radiotherapy, surgery, trial, immunotherapy) with best supportive care only/no treatment ($\chi^2=15.72$, $p<0.001$). Analysis of residuals indicates that more patients received best supportive care only/no treatment at DGH2 ($p<0.001$) and more patients received active treatment at TC1 ($p<0.001$). There was also a significant difference in current clinical care teams when comparing shared care with single clinical care teams (eg, respiratory only, oncology only, palliative only, other/no team) ($\chi^2=84.18$, $p<0.001$). Analysis of residuals indicates that shared care is more common in TC1 ($p<0.001$) and less common in DGH1 ($p<0.001$) and DGH2 ($p<0.001$).

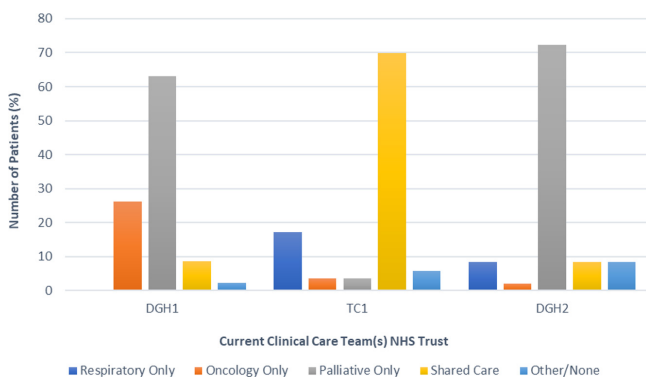


Figure 2 Current clinical care teams by NHS trust (%). DGH, district general hospital; NHS, National Health Service; TC, cancer centre.

The proportion of patients under different clinical care teams by trust is presented in [figure 2](#).

Phase 3: interviews with MDT healthcare professionals

Four main themes were identified from the interview data: 'collaboration and communication', 'evidence base and knowledge', 'role of the clinician' and 'role of the patient'. Two cross-cutting themes relating to the role of the MCNS and the impact of COVID-19 were identified. These themes are discussed in the following sections. Illustrative quotes relevant to each theme are presented in [table 3](#).

Collaboration and communication

Participants highlighted the importance of communication between and within trusts in informing clinical decision-making. A shared care approach that used the regional mesothelioma MDT for continuity and consistency was generally supported. However, there were also reports of more fragmented decision-making pathways. Despite participants from DGHs commonly recognising the limits of their MPM expertise and the benefits of forming hub and spoke models with tertiary centres, there was uncertainty around the extent to which the shared care model was embedded. This was evidenced by patients not being consistently referred to the regional mesothelioma MDT. Varying models of care and team structures were also reported to impact on clinical care and treatment decisions.

Participants identified local and regional MDTs as core to the referral and care pathway process for patients with MPM. However, the ways MDTs were used differed. Most participants cited dedicated, regional mesothelioma MDTs as appropriate forums for discussing treatment and care. Participants who regularly attended regional mesothelioma MDTs highlighted benefits such as seeking consensus, pooling expertise, discussing cases in open, multidisciplinary forums, providing opportunities to learn about clinical trials, and revisiting patients' care plans. However, despite these perceived benefits, regional MDT was recognised as being underutilised and poorly attended, particularly by participants from the DGHs. This is confirmed in the data on MDT attendance collected from participants ([table 2](#)). Proposed reasons included the MDT timing and location and uncertainty of its role and purpose. Some participants commented that many patients discussed at the regional MDT had already been discussed at the local MDT, as they had their own local decision-making processes in place.

Evidence base and knowledge

Many participants commented on key differences in clinical decision-making processes between patients with mesothelioma and patients with lung cancer. These included less mesothelioma research leading to less published guidance and any recommendations from

Table 3 Quotes relating to themes from qualitative interviews with clinicians

Collaboration and communication	“The nice thing about the meso MDT is that you do have the luxury of time. We probably discuss six to eight cases in that one hour slot...you will have a meso specialist nurse, you’ll generally have a palliative care physician. The radiologist that attends may have a better understanding of progression criteria in mesothelioma...I think a meso MDT, you do have a focus towards meso trials. Whereas if you just got meso cases in a lung cancer MDT, that sometimes gets missed.” (HCP1, Respiratory, TC1)
Evidence base and knowledge	“I think some of the needs are met well, some of the needs are not met well...In my view it’s a Cinderella cancer because it’s less common and there’s less research that goes into it than other types of cancer...But there is an unmet need in the sense that no treatments for mesothelioma are thought of as curative treatments, so there’s an unmet need to cure patients. There’s an unmet need to prevent the disease and there’s an unmet need to treat it and to cure it, yes. There are lots of unmet needs.” (HCP9, Oncology, DGH2)
Role of the clinician	“Within oncological, respiratory circles, there’s historically been a lot of nihilism in mesothelioma. That is slowly reversing with the many clinical trials that are going on...[But] there’s definitely nihilism outside of our specialist area...there’s a lack of knowledge and a historical sense of this is the worst diagnosis ever.” (HCP2, Respiratory, TC1)
Role of the patient	“I generally ask them to go away and think about it. They are aware there’s no cure. They’re aware of non-surgical options. They’re aware of surgical options...They’re all big undertakings in patients who are usually in their 70s. I think they really need to gather as much information as they can before they make that decision.” (HCP6, Surgery, DGH1)
Role of the specialist nurse	“I think that [the mesothelioma nurse] is one of the biggest beneficial roles to patients...Because the meso nurses can, not only keep an eye on all the meso patients, but they link in with the other nurses in the region. So, that’s another route for referral or knowledge of patients...Because sometimes the nurses know so much about what’s going on. They might not have an engaged clinician at the other end, they may. But that gives them another avenue to discuss patients who then can potentially be referred in or discussed...Our meso nurse keeps an eye on all the national trials, which are open, which are recruiting, which are not. And she’s really the advocate for the patient and pushing forward...The role is often not as appreciated as it should be.” (HCP, Oncology, TC1)
Impact of COVID-19	“The trial options...have not been open. And we had a few patients that came back to us because everything came to a standstill for them. And it was a very hard thing, because this was a cancer that’s complex for patients from the start. And actually of course, when you’re under a trial team, the input and the energy is quite high. And so, to then come back from that to a service that is much more focussing on the palliative element of their situation has been a contrast for them.” (HCP17, Nursing, DGH1)

DGH, district general hospital; HCP, healthcare professional; TC1, cancer centre.

published guidance being inconsistently implemented. The lack of a substantial evidence base led to participants reporting frustration at the treatments offered to patients. Offering additional treatments through clinical trials was regarded by many participants as a fundamental component of MPM pathways. However, knowledge of trial options, their eligibility and access routes appeared variable.

Role of the clinician

Most participants reported that clinical judgement, particularly in complex cases, was key in influencing decision-making due to limited options and the evidence-based guidance. Some participants who saw few patients with MPM each year described feeling hopeless due to their patients’ poor prognoses and symptom burden. This contrasted with participants who described ‘therapeutic optimism’ due to supporting and generating incremental improvements in patient outcomes and quality of life. These participants tended to have specialist MPM interest and expertise and saw patients regularly; they felt

this allowed them to take a nuanced and tailored view when making clinical decisions.

Role of the patient

Having an adequate patient performance status was identified by participants as key to accessing available treatments and entry into clinical trials. Participants also commented that patient preferences for care options, often formed through a therapeutic clinician–patient relationship, were central to informing decision-making. Patient understanding and how information was communicated to them were viewed by many participants as key to this process.

Cross-cutting themes

The MCNS was viewed as crucial to improved, patient-centred treatment and care due to their specialist knowledge and expertise, clinical trial awareness and links to health service partners, such as community and palliative and social care teams, as well as the continuity of care

they provided patients. At the regional MDT, MCNS substantially contributed to the clinical decision-making process, with other clinicians drawing on their expert knowledge of research and clinical trials, patient performance statuses and understanding of treatment options. Participants also highlighted the impact of COVID-19 on accessing clinical trials and treatments. Temporary, limited NHS access to immunotherapies for MPM treatment impacted on decision-making, particularly given the uncertainty around whether the decision might be reversed. Conversely, the suspension of clinical trials was challenging, curtailing treatment options for many.

DISCUSSION

Although not directly comparable, the study findings have identified inconsistencies in the structure and delivery of treatment within MPM care pathways between different trusts, particularly when comparing tertiary centres with DGHs. This is underscored by differences in clinical decision-making processes across settings and emphasises the need for a more integrated approach incorporating a well-defined operational mesothelioma MDT. Although the study data are drawn from a relatively small sample, which limits our confidence in the generalisability of the findings, the findings do identify a need for the role and function of mesothelioma MDT meetings to be reviewed to ensure that clinicians can contribute appropriately to MPM care pathways. Patients with MPM require alternative approaches to decision-making than is currently available at lung cancer MDTs, where expert opinion diagnoses patients and confirms their treatment suitability, alongside multidisciplinary management plans.¹⁹ Despite conflicting views on their added value,^{19–21} MDTs generally follow published guidelines to inform decision-making.²² However, no curative treatments are available to patients with MPM, so the focus needs to shift towards reaching consensus on the best supportive care options available. This may mean clinicians revisiting patients during MDT meetings, as symptoms flux and require creative management approaches. Specialist mesothelioma MDTs can accurately assess prognosis and clinical trial eligibility and have access to on-site support from MCNS.^{23 24}

The study has reinforced previous findings,^{12 16} citing the crucial role of MCNS as expert practitioners who inform decision-making²⁰ and are central to the MDT process. They possess up-to-date knowledge of care pathways, including clinical trial opportunities, and have working knowledge of individual patients and links to other healthcare sectors, including primary, community and palliative care.²⁰ Our study builds on this, emphasising the central role of MCNS in coordinating and leading the oversight of the MPM pathway, while providing continuity of care and a breadth and depth of knowledge and experience in this specialist area. Findings also indicate that the timing and duration of mesothelioma MDTs need consideration, as well as how often

patients are reviewed and which clinicians should attend. An international study²⁵ exploring MDTs in breast cancer management found that clinician respondents felt MDTs improved treatment quality, coordinated care and evidence-based treatment decisions. However, few respondents reported an increase in patient survival as a result of the MDT and most respondents reported a lack of guidance on how MDTs should function or govern.²⁵ The study findings provide an opportunity for mesothelioma MDT members to review the structure, function, purpose and working processes of MDTs to ensure they align with patients' care needs. The threshold and entry point for referring patients with MPM to specialist MDT meetings also need consideration so that patients with a straightforward diagnosis and treatment plan do not lose out should their condition worsen and become more complex.

A recent international study found that healthcare professionals reported multiple benefits from MDTs, with support for patient management and competence development rating highly.²⁶ This highlights the need for the value, scope and purpose of specialist mesothelioma MDTs to be promoted widely to ensure members know what they can contribute and gain from them. This is particularly true in regional MDTs where healthcare professionals from numerous hospitals may be invited, especially when working across integrated care systems. If the purpose of the MDT as a forum for providing best supportive to patients is not clearly stated, then clinicians from neighbouring hospitals may not attend if they have already agreed the diagnostic and treatment pathways of their patients. Indeed, our study findings indicated that many clinicians from DGHs did not understand the purpose of the regional MDT, as they had their own established local MPM decision-making processes in place. Better communication and a coordinated approach to care at regional level, with a collaborative, patient-centred focus, are essential. This may mean relabelling the term 'MDT' to ensure that specialist mesothelioma meetings are not confused with more traditional MDT structures. Consideration of more accessible approaches to joining regional MDTs could also be considered, such as through online formats or rotational site meetings. In addition, more coordinated interactions between DGHs and tertiary centres would help ensure that patients with MPM experience better continuity of care when they are referred to tertiary centres from DGHs for specialist input and alternative treatment options.

Findings have highlighted clinical judgement in informing decision-making, widely cited as a tenet of good healthcare practice.²⁷ However, findings revealed that individual clinicians' perceptions of best care for patients with MPM are likely affected by the regularity with which they see and treat them. Attitudes of clinicians who see few patients with MPM every year may be largely informed by the absence of curative treatment options and poor prognosis rates, resulting in seemingly nihilistic attitudes towards clinical decision-making,



due to their apparent futility. However, clinicians with specialist MPM knowledge who care for patients frequently have more in-depth, nuanced understanding of how to optimise patients' supportive care needs and which approaches add or detract from best care provision. This specialist knowledge can engender a more optimistic approach to decision-making, with patients' needs central and achievements in their condition celebrated. This highlights the need for specialist MPM doctors and MCNS to work with clinical colleagues to ensure positive aspects of care are not diminished due to a preoccupation with prognostics.

Findings suggest clinicians have mixed awareness of MPM best care practices, evidence-informed guidance and appropriate decision-making considerations. This is unsurprising as many lung cancer doctors and nurses see few patients with MPM and knowledge and awareness of practice can be limited, with opportunities to develop specialist knowledge or become familiar with current guidance limited. This contrasts with MCNS, who have widespread knowledge of MPM care pathways and can rapidly adapt and respond to patients' requirements.^{2,20} Our findings indicate that the degree of MPM expertise a clinician has can influence their clinical decision-making; as such efforts must be made to share knowledge and cascade best practice to colleagues with less MPM experience. This might be through organising rotational MPM clinical placements or secondments to tertiary centres, teaching sessions and guest lectures, disseminating up-to-date evidence on MPM at a regional level, or by closer working and regular communications with clinical experts such as MCNS. More funded MCNS and specialist medical leads are required in cancer centres to align with the 'pyramid of care' approach¹⁶ of providing holistic, comprehensive, consistent patient care. A revised mesothelioma MDT function can sit behind the pyramid of care to ensure clinicians and MPM care services are adequately supported.

Clinically there is a need to review mesothelioma MDT structures to ensure patients with MPM are reviewed appropriately by clinicians with appropriate knowledge and expertise. The study has shown that factors influencing MPM clinical decision-making differ from lung cancer due to patients' poor prognoses, high symptom burden and nuanced care needs. A revised MDT structure can underpin the multidisciplinary pyramid of care,^{12,16} promoting patient-centred clinical decision-making. The need for expert clinicians in mesothelioma care is vital for procuring an up-to-date evidence base that can be shared with MDTs; this may require policymakers and funders to invest in improvements to MPM care pathways.

The study was carried out in only one region of England, from a relatively small sample population, posing a potential study limitation in terms of the generalisability of the findings. In addition, the organisational, structural and functional aspects of DGHs

and tertiary centres are not directly comparable, which must be acknowledged when considering the implications of the phase 2 findings. However, the study included widespread representation of clinician participants' views across three NHS trusts, including a wide range of professional backgrounds and increasing the transferability of findings to other settings. Furthermore, the mixed methods study design allowed added to the breadth and depth of data collected and analysed, as the findings from phase 1 and 2 could be unpicked and explored further in the qualitative phase 3 component. Future research can measure the effectiveness of interventions aimed at improving MPM decision-making to improve patient outcomes at the national and international level.

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