

The Multidisciplinary Team (MDT) in Cancer Services: Improving Efficiency in Line with Increasing Workload

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Abstract

Introduction: Cancer Care in the UK and has seen an increase in workload since its inception. In order to maintain/improve care in a system with limited resource there is a need to monitor the efficiency of the MDT model. We aimed to characterize the workload and efficiency of a regional cancer MDT in the UK.

Methods: We analyzed the outcome of new patients discussed at a regional cancer MDT, discussing referrals for hepatobiliary malignancies, over a 6-month period. Each patient pathway through cancer services was mapped, including time lapses between each clinical contact

Results: 302 patients discussed over a 6-month period (132 new referrals). Median age was 70 (range=20-94) and median wait to discussion was 18 days (range=11-61). Over half of patients (56%) were discussed in relation to colorectal liver metastases. 35% (n=47) of patients were deemed palliative at discussion while 30% (n=40) were referred for surgery. A quarter of patients (n=32) required further investigation prior to treatment and 12 patients (9%) had benign disease. Median time to treatment was 77 days (range=3-406) and median time to surgery was 66 days (range=3-160). A quarter of patients (n=30) required more than one discussion prior to treatment. Patient management changed from initial MDT outcome in 14% (n=10) of cases.

Conclusion: Efficiency measures are important to ensure the MDT remains an effective way of organizing patient care.

Implications: With increasing financial/time pressures on cancer services, our study highlights several ways in which the efficiency of the MDT model can be monitored and improved.

Keywords: Cancer; Surgery; Multidisciplinary team

Introduction

The role of the multidisciplinary team (MDT) within cancer services has gained much momentum since its inception at the beginning of the century [1]. The use of the MDT, also been adopted elsewhere in the world [2-4], offers an integrated approach to cancer management, where members across a spectrum of specialties consider the relevant treatment options and prescribe appropriate management for individual patients.

Advantages of the MDT include better working relationships, increased opportunities for audit and education, and promotion of best practice. In addition this model may give rise to more efficient practice with better access to diagnostics and treatments, and ultimately improved care [5-9].

The aim of the MDT is firstly to discuss all patients with newly diagnosed cancer, reviewing all relevant surgical, radiological and pathological data, in order to recommend individualized treatment. In addition patients with recurrent disease may also be discussed, sometimes several years after initial treatment. This ensures optimal second line therapies are offered and that patients are considered for appropriate palliation of symptoms [10].

As a result individual MDTs require considerable organization, infrastructure and funding in order to allow personnel the appropriate setting, time and resources to manage an invariably high workload [11]. Central to this is the employment of a coordinator who can identify patients for discussion, orchestrate the meeting, record its outcomes and act as a bridge between all relevant specialties [12,13].

With increasing sub-specialization hepatobiliary (HB) cancers are now typically managed within a tertiary setting in the UK. Cases can often be complex and there can be an overlap in discussion with other

MDT bodies. Multi-modal imaging with CT, MRI and PET scanning are often necessary and their use have increased over time [14].

The South Wales Cancer Network (SWCN) HB MDT regional MDT is run on a weekly basis serving a population of approximately 2.3 million people [15]. It receives referrals from five local health boards within South and Mid Wales and typically discusses patients with cancer of the gallbladder, biliary tree and liver, including liver metastases.

Increasing workload and financial constraints [16,17] give rise to the necessity for efficiency improvements within the MDT model to manage demand placed on services. Some patients require multiple discussions and there may be the need to refer for an expert opinion outside the MDT in complex cases. Despite this patients must still be discussed in a timely manner to ensure fair discussion for all patients within an allocated timeframe. In order to achieve this there must be cohesive functioning between individual members, the number of cases planned for discussion must be reasonable, case selection must be appropriate, relevant information be made available and all relevant team members are needed to attend [18,19].

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Received April 04, 2018; **Accepted** April 23, 2018; **Published** April 30, 2018

Citation: Rees M, Winson D, Kaposztas Z, Kumar N. The Multidisciplinary Team (MDT) in Cancer Services: Improving Efficiency in Line with Increasing Workload. Journal of Surgery [Jurnalul de chirurgie]. 2018; 14(2): 71-74 DOI: [10.7438/1584-9341-14-2-4](https://doi.org/10.7438/1584-9341-14-2-4)

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Although guidance on effective functioning of the MDT exists [1], there remains no evidence to define how MDT efficiency can be measured and how standards within individual units may be audited. As a result direct comparison of MDT function and efficiency between units is difficult.

We aimed to characterize both MDT workload and efficiency of the SWCN HB MDT through a variety of measures, in order to define local standards and provide a framework that could be used to assess the performance of other cancer MDT's.

Methods

The management of all patients discussed at the MDT was analyzed during a six-month period (1st July 2013 and 31st December 2013).

The meeting itself occurs weekly and lasts for approximately one hour with all members attending at one site. The MDT is comprised of 2 HPB surgeons, 2 Oncologists, 5 cross sectional radiologists, 2 interventional radiologists, 3 hepatologists, one pathologist, one consultant in palliative care, one HPB clinical nurse specialist and MDT coordinator. The chair of the MDT ensures that outcomes are recorded correctly and all discussions are recorded in the Cancer Network Information System Cymru (CANISC), an all Wales information system that allows registered users to access information of cancer patients.

Data was collected retrospectively using data derived from CANISC and hospital records in order to map the pathway of each patient through the cancer services network from the time of referral to the service until the end of patient treatment. Data collection included patient demographics, indication for referral, number of MDT discussions and each MDT outcome including all diagnostic tests, investigations and treatments. The time lapse between each clinical contact was calculated in order to estimate the speed at which each patient travelled through the MDT pathway.

Measures used to assess MDT workload were number of patients discussed per meeting, weighting of new patient to follow-up discussions, indication for discussion and referral source. Measures used to assess MDT efficiency were median wait to first MDT discussion, number of discussions required prior to definitive treatment along with waiting times for investigations and treatments.

Patients were deemed to have entered the Cancer services pathway upon date of initial referral from referring clinician. Subsequently patients were deemed to have left/completed the pathway upon completion of definitive treatment, patient death or patient referral to palliative services in those unsuitable for other therapies. Definitive treatment was deemed as completion of all planned treatments necessary for clinical-pathological cure. For treatment methods that involve more than one clinical contact such as chemotherapy, trans-arterial chemo-embolization (TACE) and Radiofrequency Ablation (RFA) the date of first clinical contact for treatment was recorded for the purposes of time-lapse analysis.

Results

A total of 25 MDT meetings discussing a total of 302 patients took place over 6 months, giving a median number of 12 patient discussions per meeting (range=7-17). During this time 132 new patients were discussed (44% of all discussions), with a median number of 5 new patients per meeting (range=1-13).

Among the 132 new patients there were 92 males (70%) and 40 females (30%) with a median age of 70 years (range=20-94 years). The indication for referral was colorectal liver metastases (CRLM) in the majority (n=74, 56%) of cases (Table I). Discussion of patients

with hepatocellular carcinoma (HCC) was the second most common indication for referral (n=32, 24%), followed by cholangiocarcinoma (n=12, 9%) and gallbladder carcinoma (n=8, 6%).

New referrals were received from all 5 local health boards within the catchment areas (Table II), although the majority of cases were received from the high population density areas of Swansea (32 referrals, 24%) and Cardiff (31 referrals, 23%) respectively. The median wait from receipt of referral to time discussed at MDT was 18 days (range=11-61) (Table III).

A definitive management plan was made after a single MDT discussion in over three quarters of patients (n=102, 77%), while 27 patients (21%) required two discussions and 3 patients (2%) required 3 discussions prior to a definitive management plan. Reasons for patients requiring more than one discussion prior to definitive management was due to a combination of delay while further essential imaging is obtained (n=28) and/or the need for a specialist opinion (n=10).

Following discussion a significant proportion of patients required further radiological imaging prior to making a decision on management. The two most frequent additional investigations requested were MRI liver and PET CT. These were almost exclusively requested in cases of colorectal liver metastases to define resectability and exclude occult metastases. Waiting times were generally longer for MRI (median wait=26 days, range=7-29) compared to PET CT (median wait=15 days, range=7-45), although there was more variability in the wait for PET CT (Table III).

A significant proportion of patients discussed had palliative disease (n=47, 35%). These included 19 (25%) CRLM patients, 11(92%) patients with cholangiocarcinoma, 14 (44%) with HCC and 3 (25%) patients with gallbladder cancer. Forty patients (30%) were referred for surgery, including 26 patients with CRLM, 7 patients with gallbladder carcinoma, 3 patients with cholangiocarcinoma of the liver, 2 patients with HCC and 2 patients with benign disease (liver abscess, liver cyst). Eleven patients with HCC deemed unsuitable for surgery were referred for treatment with TACE (n=6, 5%) or RFA (n=5, 4%). Twenty-two

Table I: Indications for referral to MDT.

Parameter	Percentage
Colorectal Liver Metastases (CRLM)	74 (56%)
Hepatocellular Carcinoma (HCC)	32 (24%)
Cholangiocarcinoma	12 (9%)
Gallbladder Carcinoma	12 (9%)
Other	6 (4%)

Table II: Sources of referral to MDT.

Parameter	Percentage
Abertawe Bro Morgannwg University Health Board	32 (24%)
Cardiff and Vale University Health Board	31 (23%)
Cwm Taff University Health Board	24 (18%)
Aneurin Bevan Health Board	23 (18%)
Hywel Dda Health Board	22 (17%)

Table III: Median waiting times.

General	Time
MDT Discussion	18 days (11-61 days)
Investigations	
MRI	26 days (7-29 days)
PET	15 days (7-45 days)
Treatments	
Definitive Management	77 days (3-306 days)
Surgery (Overall)	66 days (3-160 days)
Surgery (with neoadjuvant therapy)	106 days (88-160 days)
Surgery (without neoadjuvant therapy)	39 days (3-77 days)

patients (17%) were given other outcomes, which included clinical and/or radiological surveillance, referral for ERCP and discharge back to referrer.

Twelve patients (9%) were found to have benign disease. These included 4 patients with radiological features of gallbladder carcinoma but with histologically benign disease following resection. The remaining benign cases included liver abscess (n=1), liver haematoma (n=1), Focal Nodular Hyperplasia (n=2), Liver adenoma (n=1), common bile duct calculi (n=1) and benign liver cysts (n=1).

Patients spent a variable amount of time within the MDT pathway depending on underlying diagnosis and the necessity for supplementary investigation or adjuvant/neoadjuvant therapies. As a result median wait to definitive management was 77 days (range=3-306 days). Definitive management was surgery in the majority of patients with curative disease. Median wait to surgery was 66 days in all cases (n=40), including patients receiving neo-adjuvant therapy (106 days, n=10) and those who proceeded straight to surgery (39 days, n=30).

A change in management occurred during the pathway in 10 cases (14%). These included 7 patients who had management changed from curative to palliative treatments following the finding of inoperable disease of MRI and/or PET imaging, 2 patients with HCC whose management changed to TACE from RFA and 1 patient with FNH whose management changed from surgical to clinical surveillance following MRI imaging.

Discussion

The MDT is now an established cornerstone of cancer management within the UK since its inception over 15 years ago [5,20]. HPB cancer patients are now typically discussed via referral to a tertiary center due increasing sub-specialization of services. Discussions can often be complex and management decisions difficult, which can place considerable time/work pressures on services. Improving the efficiency of MDT discussions in line with an increasing workload is important to help alleviate some of these pressures.

We aimed to evaluate the workload and efficiency of a tertiary MDT dealing with HPB cancers over a 6-month period to help define measures that would be useful as ongoing markers of MDT performance.

During this period a weekly MDT meeting took place in all but one week. In total 302 patient discussions took place, which extrapolates to over 600 discussions per annum, indicating a healthy workload for an MDT serving a population of 2.3 million people. In addition almost half (44%) of all discussions were in relation to newly referred patients, which gives an indication to the rate of patient turnover.

The majority of patient discussions were related to CRLM (Table I), which can be expected given the incidence of liver metastases in 40-50% of all patients with colon cancer [21] and the expansion of surgical and oncological therapies available for these patients [22]. Almost a quarter of discussions related to patients with hepatocellular carcinoma (HCC), the most prevalent of all primary malignant liver tumours [23] while the remainder of discussions were related to the rarer primary tumour types of cholangiocarcinoma and gallbladder carcinoma, with the prevalence consistent with that of others [14]. The SWCN covers 2.3 of the 3.1 million people that constitute the population of Wales (approximately 75%) [15] (SWCN 2014). The remaining patients with HB cancers are currently treated at centers outside of Wales located in Liverpool and Birmingham. In 2012 there were 2444 new cases of bowel cancer diagnosed throughout Wales [24], which would equate proportionally to around 1800 new cases per year diagnosed within the SWCN. Studies suggest that around 6% of all patients with colorectal cancer develop liver metastases suitable for surgery [25], which translates into a table of around 90 cases per year for our region. At

present we are performing on average around 70 resections per year, which falls below this table and may represent the generally poor socio-economic status and deprivation of the local population.

Median time to MDT discussion was 18 days and varied significantly (range=11-61 days), depending to some degree on the quality of information included within the referral. Referrals were sent via a posted letter and were screened prior to discussion by a lead clinician. If vital information was missing within the referral, such as radiological investigations or histological results crucial to discussion, additional information was requested from the referrer. A strict deadline for referrals was also enforced to in order to allow appropriate time for MDT members prepare for the meeting. Since this study improvements to the referral pathway have been made to avoid future delays with new referrals now sent electronically through completion of an online form, avoiding postal delays and omission of crucial data.

A definitive management plan was made following one discussion in 77% of newly referred patient, similar to that seen in other albeit non-HPB MDT's [26]. Although it may be reassuring that in most cases a decision was made at one meeting, the reasons for sequel discussions are potentially preventable in the majority.

The necessity for further imaging in the form of MRI or PET was the reason for a second discussion in 28 cases. With appropriate screening of referrals and better education of the referring centers, patients could potentially undergo imaging locally before or in the run-up to discussion, avoiding delays.

There were also ten patients who required further discussion due to the need for a specialist opinion. These included patients with a combination of CRLM and with pulmonary metastases, requiring additional discussion at a thoracic MDT to determine resectability of the lung lesions prior to treatment of the liver. In these cases repeat discussion can be avoided by better timing and co-ordination of the respective MDT's. Other cases that required further discussion included patients with HCC deemed unsuitable for surgical resection but possibly suitable for Trans-Arterial-Chemo-Embolization (TACE) or Radio-Frequency-Ablation (RFA). Two interventional radiologists usually provide these services but on occasions where neither is able to attend the MDT a further discussion is necessary. Again these situations could be avoided with a stricter attendance protocol where at least one interventional radiologist is always available to ensure an opinion can be given in these cases.

Radiology waiting-times varied with the median wait for MRI longer than that for PET-CT. Within our region PET-CT is provided at only one center, which has led to policy dictating strict criteria that needs to be met to limit inappropriate use. In contrast MRI is requested at the patients' local hospital, each of which has variable MRI resources, funding and waiting lists. Dedicated centralized scanning facilities would be one measure that may improve waiting times, and would also standardize image and reporting quality, but would undoubtedly require substantial additional funding.

A third of all new patients discussed were referred to palliative services, a significant proportion which reflects the general poor prognosis associated with many hepatobiliary malignancies. Within the subgroup of CRLM however this table still remains high at 25% (19/74 patients), despite this disease generally having a better overall prognosis. The patients that make up this subgroup consist of those referred with (1) widespread metastatic disease at presentation and (2) those with disease confined to the liver on initial imaging but subsequently deemed to be unresectable following MRI and/or PET. To reduce workload and improve efficiency, one can argue that patients with widespread metastatic disease need not be discussed as a decision on palliation can be made locally. This policy may however also inadvertently discourage referral of borderline cases and cases

where surgical/radiological/oncological palliation is appropriate, and therefore exercising such a policy would carry a caution.

The MDT is traditionally confined to discussing patients with a diagnosis of cancer but despite this almost 10% of new cases discussed were found to have benign disease. In the case of gallbladder carcinoma this can be unavoidable as suspected malignancy pre-operatively can often translate into benign histology following surgery. Similarly benign liver lesions such as adenomas and FNH can often be misinterpreted as malignant lesions, especially when imaged with CT alone. There are some cases however where MDT discussion can be avoided. In our series there was one patient referred with a liver haematoma following trauma and a second patient discussed with cholangitis secondary to CBD stones. In both these cases there was no question of malignancy raised and both should be discussed elsewhere.

Median waiting time for patients within the cancer network before treatment was 77 days. This table includes patients with a spectrum of problems from the relatively straightforward to complex and encompasses waiting times for MDT discussion, investigations and treatment. Surgery was the definitive management in the majority of patients with curative disease with a median waiting time of 39 days (range=3-77 days) for patients proceeding straight to surgery and 106 days (range=88-160 days) for those undergoing neoadjuvant chemotherapy. Although these waiting times fall below the 62 day standard set by the UK government [27], there remains scope for improvement. The unit employs two full time surgeons who perform all HB surgery within the region via two full day operating lists per week. The effects of limited theatre capacity, and in some cases the need for pre-operative cardiopulmonary exercise testing, are ongoing areas where improved resources and efficiency savings are being identified.

A change in management plan during the course of a patients' pathway through cancer services is inevitable in some cases and validates the need for MDT discussion. Change in management occurred in 14% of all cases and occurred following the availability of new imaging, where patients were switched from curative to palliative therapies upon the finding of previously unknown occult metastases/locally advanced disease.

Conclusion

MDT remains an effective and efficient way of discussing patient management on a case-by-case basis in the setting of cancer. Efficiency improvements are essential to deal with an increasing workload, and measures to assess ongoing performance are needed.

Here we suggest the use of several such measures, which locally have identified several areas for improvement, including better referral pathways, avoiding unnecessary discussion, and better access to radiological and surgical services.

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