

## Enhancing the Quality of External Referrals to Thoracic Surgery in a Tertiary Referral Centre

M.G. Davey<sup>1,2</sup>, J. McLoughlin<sup>1,2</sup>, R. Brown<sup>1</sup>, T. S. Nugent<sup>1,2</sup>,  
S. Ahern<sup>1</sup>, R. Fleck<sup>1,2</sup>, D. G. Healy<sup>1,2</sup>, H. Javadpour<sup>1</sup>, K. C. Redmond<sup>1</sup>,  
D. A. Eaton<sup>1</sup>

1. Department of Thoracic Surgery, Mater Misericordiae University Hospital, Eccles Street, Dublin 7, Ireland.
2. Royal College of Surgeons in Ireland, 123 St. Stephen's Green, Dublin 2, Ireland.

### Abstract

#### *Aim*

To perform a closed loop audit and quality improvement initiative to improve the quality of referrals to our local Thoracic Surgery Department.

#### *Methods*

A pre-intervention cycle was performed evaluating the quality of referrals (as compared to the York University Thoracic Surgery Referral Proforma) in consecutive patients referred over an 8-week period. A Departmental Thoracic Surgery Referral Proforma was then designed and approved by senior members of our Department. Thereafter, a post-intervention cycle was then performed over the subsequent 8-week period, where the referral proforma was shared with the referring doctor at the time of referral. Data analytics was performed using Fisher's Exact test using the Statistical Package for Social Sciences (SPSS version 26.0).

#### *Results*

In the preintervention cycle, 30 referrals were evaluated, compared to 21 in the post-intervention cycle. Overall, there was significant improvement in the quality of referrals made in the post-intervention cycle, where 93.2% (411/441) of York University criteria were included versus 63.0% (416/660) in pre-intervention referrals ( $P < 0.001$ ). A significant improvement was observed in recording referral date ( $P = 0.001$ ), patient's addresses ( $P = 0.007$ ), patient's location ( $P < 0.001$ ), the urgency of referrals ( $P < 0.001$ ), details regarding patient imaging ( $P < 0.001$ ), dates of relevant imaging ( $P = 0.013$ ), other investigation details ( $P < 0.001$ ), general practitioner names ( $P < 0.001$ ) and contact numbers ( $P < 0.001$ ).

### *Discussion*

This closed loop audit demonstrates the value of using a standardised thoracic Surgery Referral Proforma to improve the quality of referrals to our service. We recommend our colleagues in other units adopting a similar template to improve the quality of prospective referrals to their service.

### **Introduction**

The centralisation of complex surgical procedures and specialised healthcare has long been demonstrated as a pragmatic way to deliver the highest quality care, in an economically viable and cost-effective fashion to a large proportion of patients<sup>1,2</sup>. There have subsequently been several studies which have demonstrated the inverse relationship between surgical volume and adverse surgical outcomes and mortality<sup>3-6</sup>, which further supports the centralisation of several surgical specialties to tertiary referral centres. Accordingly, complex oncological resections, trauma services, and cardiothoracic surgery are now centralised across all regions in the island of Ireland, which has translated to enhanced clinical and survival outcomes<sup>7</sup>, as observed in other countries worldwide<sup>8,9</sup>.

Notwithstanding these important improvements in patient care, there are several challenges associated with the centralisation of surgical practice<sup>10</sup>; in such incidences, there is an increased expectancy for patients to travel long distances to receive treatment, healthcare professionals may be subject to a depreciation of previous skills for those working in peripheries<sup>11</sup>, and unfortunately, poor or inaccurate communication may interfere with referral information, which may subsequently have negative implications on the quality of care received<sup>12</sup>.

The Department of Thoracic Surgery at our Tertiary Referral Centre in the Mater Misericordiae University Hospital in Dublin is responsible for receiving referrals from greater than 1,000,000 people in Inner City Dublin and the Greater Dublin area<sup>13</sup>. The members of our Department previously anecdotally noted discrepancies and inconsistencies in the information provided in the referrals received by our service from external hospitals. Accordingly, the aim of the current study was to perform a closed loop audit and quality improvement initiative to enhance the quality of referrals from external hospitals to the Department of Thoracic Surgery at our Tertiary Referral Centre.

## Methods

### *Literature Review and Audit Registration*

A formal literature review was performed by two independent reviewers (M.G.D and J.M) to identify whether a 'gold standard' referral proforma existed for use by healthcare professionals when sending referral to thoracic surgeons was performed. It was noted that there is no 'gold standard' proforma in the literature, however the the York University Thoracic Surgery Referral Proforma from Southlake Regional Medical Centre (Ontario, Canada) was identified as a suitable standard for referrals <sup>14</sup>. Thereafter, this clinical audit was prospectively registered and approved by the local institutional audit committee at the Mater Misericordiae University Hospital (Dublin, Republic of Ireland) (clinical audit registration number: CA23-045).

### *Pre-Intervention Cycle*

Thereafter, a pre-intervention cycle was performed evaluating the quality of external referrals from other hospitals to the thoracic surgery department were reviewed and compared with the York University Thoracic Surgery Referral Proforma. Referrals relevant to consecutive patients referred to the service over an 8-week period (February and March 2023) were included. Patient, clinical, and referral information included in these referrals were recorded in a password protected database using Microsoft Excel© (Redmond, Washington), which was subsequently stored on an institutional computer. Patient data was anonymised to ensure compliance with European Union General Data Protection Regulations (GDPR) (2018) <sup>15</sup>.

### *Intervention - Design of Referral Proforma*

Thereafter, a Department of Thoracic Surgery Referral Proforma specific to the Mater Misericordiae University Hospital (Dublin, Republic of Ireland) was designed and approved by senior members of our Department (HJ, KCR, DAE). Healthcare professionals responsible for receiving patient referrals from external hospitals were then educated in relation to the new proforma and the intended application of this into current practice of the department; this would involve the healthcare professional receiving the external patient referral to record all relevant information as previously, with the addition of sending a blank Institutional Thoracic Surgery Referral Proforma to the email address of the referring healthcare professional to be completed in detail (**Figure 1**). Thereafter, the referring healthcare professional would return the completed proforma to the institutional email address associated with the department of thoracic surgery ([ctsreg@mater.ie](mailto:ctsreg@mater.ie)).

### *Post-Intervention Cycle and Statistical Analysis*

Next, a post-intervention cycle was performed relevant to consecutive patients referred to the service over the following 8-week period (April and May 2023). As previously outlined, referral information were once again recorded in a password protected Microsoft Excel® (Redmond, Washington) database in a GDPR (2018) compliant manner<sup>15</sup>. Thereafter, data analytics comparing the quality of pre- and post-intervention relative to the York University Thoracic Surgery Referral Proforma was performed using Fisher's Exact test (†). Comparison of basic patient and referral information were assess using Chi-Squared ( $\chi^2$ ) and Student's unpaired t-test (t) tests, as deemed appropriate<sup>16-18</sup>. Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 26.0 (Chicago, Illinois).

## **Results**

### *Overall Audit Information*

In total, 51 referrals Department of Thoracic Surgery were evaluated (100.0%). Of these, 30 referrals occurred the preintervention cycle (58.8%), compared to 21 in the post-intervention cycle (41.2%). There were no difference observed with respect to patient age (t), gender (†), and urgency of referrals ( $\chi^2$ ) to the service (all  $P>0.050$ ).

### *Impact of the Referral Proforma on the Quality of Referrals*

Overall, there was significant improvement in the quality of referrals made in the post-intervention cycle, where 93.2% of York University criteria were adhered to in the post-intervention cycle (411/441) compared to 63.0% of referrals in pre-intervention cycle (416/660) ( $P<0.001$ , †).

Following the introduction of the referral proforma, there was a significant improvement observed in the recording of the referral date (30.0% (10/30) vs. 100.0% (21/21),  $P=0.001$ , †), patient's addresses (60.0% (18/30) vs. 95.2% (20/21),  $P=0.007$ , †), patient's current location (i.e.: home, inpatient in referring hospital, intensive care unit, etc.) (16.7% (5/30) vs. 95.2% (20/21),  $P<0.001$ , †), the urgency of the referral (26.7% (8/30) vs. 76.2% (16/21),  $P<0.001$ , †), details regarding patient imaging (i.e.: radiological investigations performed, the timing of such investigations, and the relevant results) (76.6% (23/30) vs. 95.2% (20/21),  $P<0.001$ , †), the timing and dates of relevant radiological investigations (63.3% (19/30) vs. 76.2% (16/21),  $P=0.013$ , †), other investigations performed and the relevant results (73.3% (22/30) vs. 100.0% (21/21),  $P<0.001$ , †), general practitioner (GP) names (30.0% (9/30) vs. 90.5% (19/21),  $P<0.001$ , †) and contact numbers (23.3% (7/30) vs. 76.2% (16/21), ( $P<0.001$ , †). Relevant parameters evaluated in are outlined in full in **Table 1**.

## Discussion

This study highlighted the importance of utilising a standardised referral proforma to improve the quality of external thoracic surgery referrals received at a large tertiary referral centre, serving a population of greater than 1 million patients in the Republic of Ireland. Overall, the results coherently demonstrate that the utility of a standardised referral proforma is a simple, yet effective means of ensuring transparency when receiving referring from another service or institution.

It is important to note that our extensive literature review of the literature failed to identify any recommended standard referral proforma or checklist for Thoracic Surgery which had been previously endorsed by expert consensus panels or guidelines. Thus, the utility of the York Thoracic Surgery may be scrutinised or brought into question. Notwithstanding this limitation, the authors would refute this on the basis that there are currently no guidelines with respect to the expected referral information required to ensure a 'high quality' referral, in particular when our results demonstrate a more than satisfactory improvement in the information shared with our service by our colleagues in referring hospitals. Moreover, the novel practice whereby the referring healthcare provider must email the completed referral proforma to our departmental email leaves an accurate and traceable 'paper trail' which ensures referrals are dealt with full transparency. Therefore, we would encourage our colleagues who deal with large volume external referrals to their service to consider adopting a similar approach to enhance the overall quality of prospective referrals to their service.

This study suffers from limitations. Firstly, while the anecdotal experience from the authors of this study suggests that the referral proforma has improved time efficiency within our department, this performance metric has not been formally assessed. Secondly, the cost effectiveness of this referral proforma is challenging to evaluate and thus has not been formally evaluated in this study. Finally, while authors considered the creation and adoption of an electronic application to be completed by the referring healthcare professional to ensure 100.0% compliance with the referral proforma, we were unable to design and trial this concept within the remit of the current study. Future ambitions for our department may include to pursue this quality improvement initiative.

In conclusion, this closed loop audit and quality improvement initiative demonstrates the value of using a standardised Thoracic Surgery Referral Proforma to improve the quality of external referrals received by our service. We recommend that our colleagues working in other surgical specialities working responsible for receiving high volume surgical referrals to adopt a similar proforma and approach to external referrals in order to improve the quality of the prospective referrals received by their service.

**Declarations of Conflict of Interest:**

None declared.

**Corresponding author:**

Matthew Davey,  
Department of Thoracic Surgery,  
Mater Misericordiae University Hospital,  
Eccles Street,  
Dublin 7,  
Ireland.  
E-Mail: matthewdavey21@rcsi.com

**References:**

1. Subramanian MP, Yang Z, Chang SH, Puri V. Regionalization for thoracic surgery: Economic implications of regionalization in the United States. *J Thorac Cardiovasc Surg.* 2021;161(5):1705-1709.
2. Wolford D, Westcott L, Fleshman J. Specialization improves outcomes in rectal cancer surgery. *Surg Oncol.* 2022;43:101740.
3. McDermott AM, Wall DM, Waters PS, et al. Surgeon and breast unit volume-outcome relationships in breast cancer surgery and treatment. *Ann Surg.* 2013;258(5):808-813; discussion 813-804.
4. Gonzalez AA, Dimick JB, Birkmeyer JD, Ghaferi AA. Understanding the volume-outcome effect in cardiovascular surgery: the role of failure to rescue. *JAMA Surg.* 2014;149(2):119-123.
5. Morche J, Mathes T, Pieper D. Relationship between surgeon volume and outcomes: a systematic review of systematic reviews. *Systematic Reviews.* 2016;5(1):204.
6. Huo YR, Phan K, Morris DL, Liauw W. Systematic review and a meta-analysis of hospital and surgeon volume/outcome relationships in colorectal cancer surgery. *J Gastrointest Oncol.* 2017;8(3):534-546.
7. Ireland NCR. Cancer care and survival in relation to centralisation of Irish cancer services: an analysis of National Cancer Registry data 1994-2015. <https://www.ncri.ie/publications/statistical-reports/cancer-care-and-survival-relation-centralisation-irish-cancer>. Published 2019. Accessed.
8. Sheetz KH, Dimick JB, Nathan H. Centralization of High-Risk Cancer Surgery Within Existing Hospital Systems. *J Clin Oncol.* 2019;37(34):3234-3242.
9. Offodile AC, 2nd, Lin YL, Shah SA, et al. Is the Centralization of Complex Surgical Procedures an Unintended Spillover Effect of Global Capitation? - Insights from the Maryland Global Budget Revenue Program. *Ann Surg.* 2023;277(4):535-541.

10. Ansari D, Dervenis C, Friess H, Andersson R. The challenges of centralization with HPB resectional surgery. *HPB (Oxford)*. 2017;19(11):1034-1035.
11. Hardwick RH. Centralisation of Upper Gastrointestinal Surgical Services. *Cirugía Española (English Edition)*. 2011;89(9):563-564.
12. Wright B, Lennox A, Graber ML, Bragge P. Closing the loop on test results to reduce communication failures: a rapid review of evidence, practice and patient perspectives. *BMC Health Services Research*. 2020;20(1):897.
13. Mater T. <https://www.mater.ie/about/about-the-mater/>. Published 2023. Accessed.
14. Surgery YT. York Thoracic Surgery Referral Form. <https://chestweb.ca/wp-content/uploads/2020/07/YORK-THORACIC-SURGERY-REFERRAL-FORM.pdf>. Published 2023. Accessed.
15. Union E. General Data Protection Regulation (GDPR). <https://gdpr-info.eu>. Published 2018. Accessed 10.06.2023, 2023.
16. Lin Y, Lipsitz SR, Sinha D, Fitzmaurice G, Lipshultz S. Exact Bayesian p-values for a test of independence in a  $2 \times 2$  contingency table with missing data. *Stat Methods Med Res*. 2018;27(11):3411-3419.
17. Xu Y, Gao X, Wang X. Nonparametric Clustering of Mixed Data Using Modified Chi-Squared Tests. *Entropy (Basel)*. 2022;24(12).
18. Mishra P, Singh U, Pandey CM, Mishra P, Pandey G. Application of student's t-test, analysis of variance, and covariance. *Ann Card Anaesth*. 2019;22(4):407-411.

**Figure 1.**

The new Mater Misericordiae University Hospital Department of Thoracic Surgery Referral Proforma.



**Thoracic Surgery Referral Proforma**

Before sending online referral, each case **MUST** have been previously discussed and verbally accepted by the Thoracic Surgery Senior House Officer / Registrar on call (Bleep #2594, Monday – Friday 07.00am – 16.00pm, Bleep #2892 for out of hours), accessible through switchboard at the Mater Hospital (+35318032000)

Online referrals using this proforma are sent to [ctsreg@mater.ie](mailto:ctsreg@mater.ie)

Please send a scanned copy of the patient demographic sheet and relevant investigation reports

Demographic Information	
Referral Date and Time	
Patient Name	
MRN	
DOB (DD/MM/YYYY)	
Gender	
Patient Address (including postcode) and phone number	
Referring Team Details	
Referring Consultant & Specialty	
Referring Hospital	
Referring NCHD name	
Referring NCHD phone number	
Referring team bleep number	
Patient location (e.g.: ward, ICU, home, etc.)	
GP name and address	
GP contact number	
Clinical Referral Details	
Clinical reason for referral	
Urgency (e.g.: emergency transfer, elective, outpatient)	
Consultant and NCHD referred to	
History	
Presentation	
Clinical exam (e.g.: stability, ventilation, drain, etc.)	
Past medical history	
Previous surgeries	
Medications	
Anticoagulation therapies	
Antimicrobial therapies	
Allergies	
Investigations	
Bedside (e.g.: ECG, ABG, etc.)	
Laboratory	
Radiological (dates and locations required)	
Other (e.g.: PFTS, Echo, etc.)	



**Table 1.**

Pre- and post-intervention compliance with the York Thoracic Surgery Referral.

Parameter	Pre-Intervention	Post-Intervention	P-value †
Referral Date	33.3% (10/30)	100.0%, 21/21	0.001*
Surname	100.0% (30/30)	100.0%, 21/21	1.000
First name	100.0% (30/30)	100.0%, 21/21	1.000
DOB	96.7% (29/30)	100.0%, 21/21	1.000
Gender	93.3% (28/30)	100.0%, 21/21	1.000
MRN	86.7% (26/30)	100.0%, 21/21	0.381
Phone Number	46.7% (14/30)	81.0%, 17/21	0.073
Address	60.0% (18/30)	95.2%, 20/21	0.007*
Postcode	16.6% (5/30)	23.8%, 5/21	0.772
Patient Location	16.6% (5/30)	95.2%, 20/21	<0.001*
Reason for Referral	93.3% (28/30)	100.0%, 21/21	1.000
Urgency	26.7% (8/30)	76.2%, 16/21	<0.001*
Imaging	76.7% (23/30)	95.2%, 20/21	<0.001*
Imaging Date	63.3% (19/30)	76.2%, 16/21	0.013*
Investigations	73.3% (22/30)	100.0%, 21/21	<0.001*
Past Medical History	83.3% (25/30)	95.2%, 20/21	0.226
Referring Doctor	96.7% (29/30)	100.0%, 21/21	1.000
-Contact number	80.0% (24/30)	100.0%, 21/21	0.217
General Practitioner	30.0% (9/30)	90.5%, 19/21	<0.001*
-Contact number	23.3% (7/30)	76.2%, 16/21	<0.001*
Mater Consultant	30.0% (9/30)	57.1%, 12/21	0.083

DOB; date of birth, MRN; medical record number

\*denotes statistical significance

All Fisher's Exact test (†)