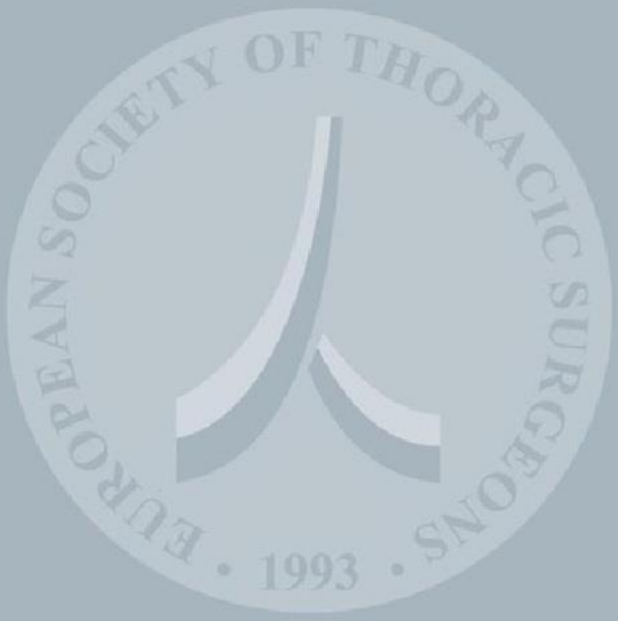

DATABASE ANNUAL REPORT

2023

PRODUCED BY THE ESTS DATABASE COMMITTEE

*Powered by **KData Clinical***

EUROPEAN SOCIETY OF THORACIC SURGEONS DATABASE COMMITTEE

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Appendices

Message from the President of ESTS

It is a great privilege for me to write as ESTS President the introduction of the 2023 Silver book summarizing the large amount of data collected and submitted by our members. The invaluable asset of this registry is the reflection of real-world data of the thoracic surgical activity and its outcome of our members in different countries and different healthcare settings. So many important projects and relevant findings arose from the database over the past decades since the first publication in 2009.

All these relevant findings were only possible with the contribution of our active members submitting their cases which is an extra work in their busy clinical practice and a dedication to improve the standards of care and my special thank goes to them for their time and commitment, but also to the leaders of our different satellite databases (mesothelioma, thymic tumors, neuroendocrine tumors, chest wall etc) to increase the numbers of these special subsets of data. The coordination and leadership needed to hold the book in your hands is only possible by the work of our Director of the Database, Prof. Zalan Szanto and the whole team of Kdata Clinical (led by Dr. Stefano Passani) - a big thank you!

For the next years I will personally engage in further promoting the Robotic Database and will work hard together with the Board of Directors and the Robotic Working Group to establish this subsection, together with another important future project to increase the significance of the readout about quality of care. We have embarked to further extend our Composite Performance Score by adding further variables to reflect the quality of thoracic surgery for the better care of our patients and I am confident that together with Professor Szanto we will bring this database to the next level.

Isabelle Opitz
ESTS President
Isabelle.Schmitt-Opitz@usz.ch

Message from the Director of ESTS Database

Dear Colleagues and Friends,

I am delighted to introduce to you the 13th edition of the ESTS Silver Book, which provides a comprehensive overview of thoracic surgical activity spanning from 2007 to 2022.
This latest edition, enriched with data from the previous year, continues the tradition of summarizing observations and experiences in the field of thoracic surgery, serving the Society's endeavours in quality improvement, research, and patient safety.

In 2022, over 130 European Units actively participated again in the ESTS Databasecollectively adding a significant number of cases amounting to 17 797 new patient records. The database has experienced remarkable growth since its establishment in 2007, thanks to the growing interest of dedicated units and surgeons who diligently record and contribute their cases. As a result, it now encompasses a vast collection of over 232 000 procedures. The ESTS Database has evolved into a paramount source of structured information within the field of thoracic surgery, featuring meticulously designed sub-databases led by clinical experts. These sub-databases include the Chest Wall Registry, diligently overseen by Hans Van Veer who recently took over from Jose Ribas M. Campos, theThymic section, overseen by Bernhard Moser, the Mesothelioma section, headed by Andrea Billé, the NETs Registry, expertly managed by Pier Luigi Filoso, the Airway section, led by Konrad Hötzenecker and Benoit Bibas. With increaasing interest for robotic technology, the Robotic Sub-Database is continuously growing, and according to our aims it will soon serve as a proper registry for all procedures in this field for all European centers. By establishing an international collaboration in the ESTS Database, numerous improvements have been implemented to ensure the robustness and reliability of the collected data. This collaborative effort holds great promise for further advancing the knowledge and understanding of thoracic surgery, benefiting both patients and the medical community at large.

The importance of ensuring the quality of data collected in a database cannot be overstated. High-quality data serves as the foundation for accurate analysis, research, and decision-making within the medical field. Improvements in computer software play a vital role in

achieving and maintaining data quality, enabling efficient data collection, organization, and analysis. Additionally, feedback regarding the quality of data contribution from individual institutions and surgeons further enhances the integrity and reliability of the database. In the last year the database team tried to focus to enable a GDPR compliant cooperation within institutions and the quality insurance for data contribution.

A pivotal factor determining eligibility for the ESTS accreditation remains the Composite Performance Score (CPS). This comprehensive quality measure for thoracic surgery units offers a holistic perspective on quality and effectively discerns hospital performance. From this year you will meet the updated version of the CPS in line with the advancements in available patient safety protocols. Proportion of VATS surgeries and the percentage of PET CT utilization in NSCLC cases will be incorporated to facilitate modern quality assessment of an institution.

The ESTS Database Committee extends its heartfelt appreciation to all recent and future data contributors for their remarkable dedication and invaluable cooperation.

I am glad, that we have the opportunity to meet you in person in Milan and eagerly look forward to receiving your feedback and engaging in fruitful discussions about new initiatives. Don't forget to download the condensed version of the Silver Book from the Congress App for quick reference!

Dr. Zalan Szanto

Director of ESTS Audit and Database

szantozalan@gmail.com

The European Society of Thoracic Surgeons Database

The European Society of Thoracic Surgeons Database was founded in 2001 by the ESTS Database Committee with the aim to develop risk-adjusted instruments for assessing the performance of thoracic surgery units across Europe. The first version of the Database lead to the publication of the first risk- adjusted multinational risk-score for mortality *(Berrisford R et al. Eur J Cardiothorac Surg 2005; 28:305-311)* which has been already applied to compare the performance of different units *(Brunelli A et al. Eur J Cardiothorac Surg 2008; 33:284-288)*.

The second version of the Database was launched online in July 2007 and has so far accrued approximately 205 general thoracic surgical units.

Data is anonymously reported, independently accessed and encrypted to other users.

Participation to the Database project is **totally free and voluntary**, but strongly recommended by our Society. Infact participation to the ESTS Database with at least 100 Major Lung Resections per year for at least 2 consecutive years is one of the key requirements for the ESTS Accreditation Program. You can access the Database from ESTS website or by using the address: https://ests.kdataclinical.it

To join the Database you need your own personal login account that you can request by downloading and completing an application form from the ESTS homepage (http://www.ests.org).

Once data is being recorded on the System (*powered by KData Clinical software*), you will be able to visualize your up-to-date summary of your surgical activity; called Clinical Care Analysis CCA, it includes a few surgical activity indicators (*Total N Procedures, Types Lung Procedures, VATS, Outcome at discharge, CPS and eligibility for ESTS Accreditation*)

To the benefit of your patients, your practice and your specialty, your data will contribute to the followings:

- Development of European benchmarks of performance through the analysis of outcomes and processes of care indicators.
- Performance assessment by risk-adjusted outcome and/or process indicators, which will allow you to compare your own institutional performance against European benchmarks.
- Analysis and development of new potential outcomes and processes of care indicators that may complement/substitute current quality of care measures.
- Autocalculation of the Composite Performance Score.
- Feedback to document quality efforts and areas for improvement in quality of care.
- Data for research projects, which can be used to assess new technologies/pathways of care that can ultimately lead to improved patient care and outcomes.
- Maintain your own data if data is requested or mandated by third parties.
- Use for local hospital administration resource allocation.
- Use for individual negotiations, public relations and expert witness.
- Opportunity to participate in a European quality improvement effort for general thoracic surgery that has a positive impact at the local, national and international levels.

Participants benefits

- Participation to the ESTS Database is a pre-requisite to participate in the European Institutional Quality Certification Program.
- Participation will be acknowledged and, if requested, local institutional administrations made aware that your unit is enrolled in a European Thoracic Database aimed at implementing quality of care monitoring and improvement programs endorsed by ESTS and pre-requisite for future clinical Institutional European Accreditation.
- Your own data, collected in a standardized ESTS-endorsed Dataset, can be downloaded at local level and used for your internal quality analyses or institutional research purposes.
- Participants can visualize in the CCA (currently it includes: *Total N Procedures, Types Lung Procedures, VATS, Outcome at discharge, CPS and eligibility for ESTS Accreditation*) and be first to know aboutthe quality of their data and their performance against European benchmarks.
- Participants can propose their own research projects based on the total data present in the database.
  Projects should be submitted to the ESTS database Committee for peer review and, if accepted, the requested and anonymized data will be provided to the proponent of the project. ESTS will retain the responsibility for the final analysis and interpretation of results. The proponent of the project will be the first Author of the final manuscript and he/she will be allowed to include, if requested, two additional colleagues, who helped in the elaboration of the manuscript. The members of the Database Committee who contributed to the review process and assisted in the development of the manuscript will be also included in the list of Authors.

As the ESTS Database approached a more mature stage, and more demanding aspects of data management were required, it was been decided to make use of professional expertise in running and managing contents, data flow, data merge and so on of our Registry; in Nov 2009 the ESTS Council awarded this task to Dendrite Clinical System Italia srl, now renamed KData Clinical srl, following a management by-out in July 2015

Since 1993 Dendrite, and now KData Clinical, have established a highly respected track record in setting up and running a variety of International Registries, with an underlying philosophy of long term partnership with numerous Clinical Associations within and outside Europe.

The main reasons for their widespread activity in this field include:

- Bottom-up approach to data management: the range of products and services starts from database and electronic patient records and serves Clinicians daily needs; it escalates to hospital-wide systems, to regional, national and finally to international registries.
- User-friendly inclusion of all who wish to participate: the Import Data process, governed by a Standard Operating Procedure SOP (see Appendix N.4) allows any Contributor to use his chosen type of tool to collect data, and KData will perform the correspondence and data merge required to add their data to the main ESTS Database, if there is clinically correct conformity with the required ESTS dataset.
- Automatically up-dated clinical statistical analysis shown in the CCA screen, integrated in the data collection section of the ESTS Registry.
- Contributors can retain, download and use own data, from the ESTS site, in MS Excel format, which lends itself to be analyzed by any clinical software product.
- Unblemished track record of data handling integrity: not ever lost, leaked or misplaced third Party data to date

Institutions that contributed to the ESTS Registry

Please note that Only units contributing more than 100 patients and consistently (as of December 31th 2022) in the registry are shown

Country	City	Institution
ALBANIA	TIRANA	University Hospital of Lung Diseases "Shefqet Ndroqi"
AUSTRIA	VIENNA	Otto Wagner Hospital
BELGIUM	ANTWERP	University Hospital of Antwerp
BELGIUM	GENK	ZOL St. - Jan Genk
BELGIUM	BRUSSELS	Cliniques Universitaires Saint- Luc
BELGIUM	BRUSSELS	Hopital Academique Erasme
BELGIUM	BRUSSELS	CHU Saint-Pierre | UMC Sint-Pieter
BELGIUM	LEUVEN	University Hospitals Leuven
BELGIUM	GILLY	GHDC Site Gilly, Belgium
CROATIA	ZAGREB	Department of Thoracic Surgery “Jordanovac” University Hospital Centre Zagreb
FRANCE	LA ROCHELLE	Hôpital St Louis
FRANCE	LE HAVRE	Clinique Petit Col Moulin
FRANCE	LE PLESSISROBINSON	Marie Lannelongue Hospital
FRANCE	LILLE	CHU Calmette
FRANCE	LILLE	Clinique de la Louvière
FRANCE	LILLE	Polyclinique du Bois
FRANCE	LYON	CHU Lyon Sud
FRANCE	LYON	Clinique St Louis
FRANCE	LYON	Hôpital privé Jean Mermoz
FRANCE	MARSEILLE	CHU Ste Marguerite
FRANCE	MARSEILLE	HIA Alphonse LAVERAN
FRANCE	MAXEVILLE	Médipole Gentilly
FRANCE	MEAUX	CH - Meaux
FRANCE	METZ	Hôpital Belle-Isle
FRANCE	MONTPELLIER	CHU de Montpellier
FRANCE	MONTPELLIER	Clinique du Millénaire
FRANCE	MORLAIX	CMC de la Baie de Morlaix
FRANCE	NANCY	CHU Central de
FRANCE	NANTES	CHU - Nantes
FRANCE	NANTES	Clinique St Augustin
FRANCE	NANTES	Nouvelle Clinique Nantaise

FRANCE	NICE	CHU Pasteur
FRANCE	NICE	Clinique Saint Georges
FRANCE	NIMES	Clinique les Franciscaines
FRANCE	PARIS	HEGP
FRANCE	PARIS	Hôtel Dieu
FRANCE	PARIS	IMM
FRANCE	PAU	CHG - Pau
FRANCE	POITIERS	CHU - Pointers
FRANCE	QUIMPER	Clinique Quimper sud
FRANCE	REIMS	Clinique Courlancy
FRANCE	ROUEN	CHU Charles Nicolle
FRANCE	SAINT BRIEUC	Hopital Yves le Foll
FRANCE	SAINT CLOUD	Clinique du Val D'or
FRANCE	SAINT ETIENNE	CH Privé de la Loire
FRANCE	SAINT ETIENNE	CHU – Saint Etienne
FRANCE	SAINT GRÉGOIRE	CH Privé Saint Grégoire
FRANCE	STRASBOURG	CHU - Strasbourg
FRANCE	STRASBOURG	Clinique St Odile
FRANCE	TALANT	Clinique Bénigne Joly
FRANCE	TOULOUSE	CHU Larrey
FRANCE	TOULOUSE	Clinique Pasteur
FRANCE	TOURS	CHU Trousseau
FRANCE	VALENCIENNES	Clinique Teissier
FRANCE	VANNES	Clinique Océane
GERMANY	BREMEN	Klinikum Bremen-Ost - Bremen
GERMANY	MONCHENGLADBACH	Maria Hilf Kliniken
GERMANY	DELMENHORST	Klinik f. Thoraxchirurgie, Klinikum Delmenhorst gGmbH
GERMANY	ESSEN	Medical University of Essen, Ruhrlandklinik, Dept. of Thoracic Surgery
GREECE	ATHENS	Evangelismos
GREECE	THESSALONIKI	Ahepa University Hospital
HUNGARY	BUDAPEST	National Institute of Oncology
HUNGARY	BUDAPEST	KORANYI National Institute for Pulmonology and Semmelweis University
HUNGARY	BUDAPEST	Bajcsy-ZsilinszKy Kòrhàz Thoracic surgery
HUNGARY	DEBRECEN	University Of Debrecen
HUNGARY	SZEGED	University of Szeged, Department of Surgery
HUNGARY	PÉCS	University of Pecs, Department of Surgery
HUNGARY	GYŐR	Petz Aladar Teaching H (Pamok) Györ, Hungary
HUNGARY	KECSKEMÉT	Bàcs Kiskun County Hospital

HUNGARY	MISKOLC	Semmelweis Teaching Hospital of Miskolc
HUNGARY	SZOLNOK	Hetenyi Geza County Hospital of Szolnok
HUNGARY	SZOMBATHELY	Teaching Hospital Markusovszky
IRELAND	DUBLIN	St. James's Hospital, Dublin, Republic of Ireland
ITALY	ALESSANDRIA	A.O. Alessandria (Ospedale Civile)
ITALY	BARI	Policlinico Univ. Bari
ITALY	BARI	Opedale San Paolo Bari
ITALY	BERGAMO	Humanitas Gavazzeni
ITALY	BOLZANO	A.O. Bolzano
ITALY	NAPLES	National Cancer Institute Pascale Foundation, Napoli
ITALY	NAPLES	OSP. Dei Colli - Monaldi
ITALY	NAPLES	AORN Cardarelli
ITALY	NAPLES	A.O.U. L. Vanvitelli
ITALY	ANCONA	Ospedali Riuniti Umberto I - GM Lancisi – G Salesi Ancona
ITALY	MILANO	Fondazione Ospedale Maggiore Policlinico
ITALY	MILANO	A.O. San Paolo
ITALY	MILANO	Ospedale San Raffaele
ITALY	MILANO	Istituto Europeo Oncologico
ITALY	MILANO	IRCCS Fondazione Ca' Granda
ITALY	MILANO	A.O. Niguarda
ITALY	MILANO	IRCCS Istituto Nazionale dei Tumori
ITALY	PARMA	University Hospital Parma
ITALY	TORINO	OSP. San Giovanni Bosco
ITALY	TORINO	A. O. Universitaria Molinette San Giovanni Battista
ITALY	FOGGIA	A. O. Universitaria Foggia – Dip. Chirurgia Toracica
ITALY	MILANO	Azienda Ospedaliero San Paolo
ITALY	ROZZANO(MI)	IRCCS Istituto Clinico Humanitas
ITALY	BOLOGNA	Discipline Chirurgiche, Rianimatorie Trapianti Univ.Bologna
ITALY	GENOVA	IRCCS San Martino - Genoa
ITALY	DENOVA	Osp. Villa Scassi
ITALY	SIENA	A.O. Univ. Senese
ITALY	LECCE	A.O. LECCE – V. Fazzi Hospital
ITALY	UDINE	AOU S. Maria della Misericordia
ITALY	ROMA	Campus Bio-Medico University Hospital,Thor. Surgery
ITALY	ROMA	University of Rome La Sapienza, Dep. Thoracic Surgery
ITALY	ROMA	Fondazione Policlinico Gemelli, University Cattolica del sacro cuore, IRCCS
ITALY	ROMA	Policlinico Umberto I

ITALY	ROMA	A.O. Sant'Andrea
ITALY	ROMA	Forlanini
ITALY	MONZA	Chirurgia Toracica San Gerardo
ITALY	BRESCIA	Spedali Civili
ITALY	CAGLIARI	P.O.A. Businco
ITALY	CATANZARO	Az.Osp. di Catanzaro "Pugliese Ciaccio"
ITALY	CHIETI	Chir. Gen. e Tor. UNIV. Chieti
ITALY	CUNEO	Chir. Tor. S. Croce E Carle
ITALY	FERRARA	Chir Gen e Tor. A.O. Ferrara
ITALY	FIRENZE	A.O.U. Carreggi
ITALY	FORLI'	Univ. degli studi Bologna -U.O.Chir.Tor.AUSL Romagna
ITALY	MANTOVA	ASST Mantova e ASST Cremona
ITALY	MESSINA	Univ. di Messina
ITALY	MESTRE	A.O. Mestre - Venezia – Ospedale Civile
ITALY	MISTERBIANCO	Humanitas Centro Catanese di Oncologia
ITALY	MODENA	Policlin. Univ. Modena
ITALY	NEGRAR	OSP. Sacro Cuore Negrar
ITALY	NOVARA	A.O. Novara - UPO
ITALY	PADOVA	A.O. Padova - Unipd
ITALY	PALERMO	ISMETT
ITALY	PALERMO	OO.RR. Villa Sofia - Cervello
ITALY	PERUGIA	A.O. Univ. Perugia
ITALY	PISA	A.O. Univ. Pisana
ITALY	S.GIOVANNI ROTONDO	Polm. IRCCS Casa Sollievo della Sofferenza
ITALY	TARANTO	U.O.S.D. Chir.Tor. – Osp. Ss.Annunziata
ITALY	TERAMO	A.O. Teramo
ITALY	VARESE	Osp. di Circolo - Uninsubria
ITALY	VERONA	A.O. Verona – Borgo Trento
NETHERLANDS	AMSTERDAM	VUMC Dept of Surgery
NETHERLANDS	BREDA	Amphia Hospital
NETHERLANDS	HAARLEM	Kennemer Gasthuis
NETHERLANDS	HEERLEN	Zuyderland Medical Center
POLAND	POZNAN	Marcinkowski University of Medical Sciences
POLAND	WARSAW	National Institut of Tuberculosis and Lung Disease Warsaw
POLAND	POZNAN	Wielkopolskie Centrum Pulmonologii i Torakochirurgii im. Eugenii i Janusza Zeylandów Szamarzewskiego
PORTUGAL	LISBON	Santa Martha Hospital, Lisbon
PORTUGAL	VILA NOVA DE GAIA	centro Hospitalar de Vila Nova de Gaia Espinho
ROMANIA	BUCHAREST	Institute of Oncology Bucharerst

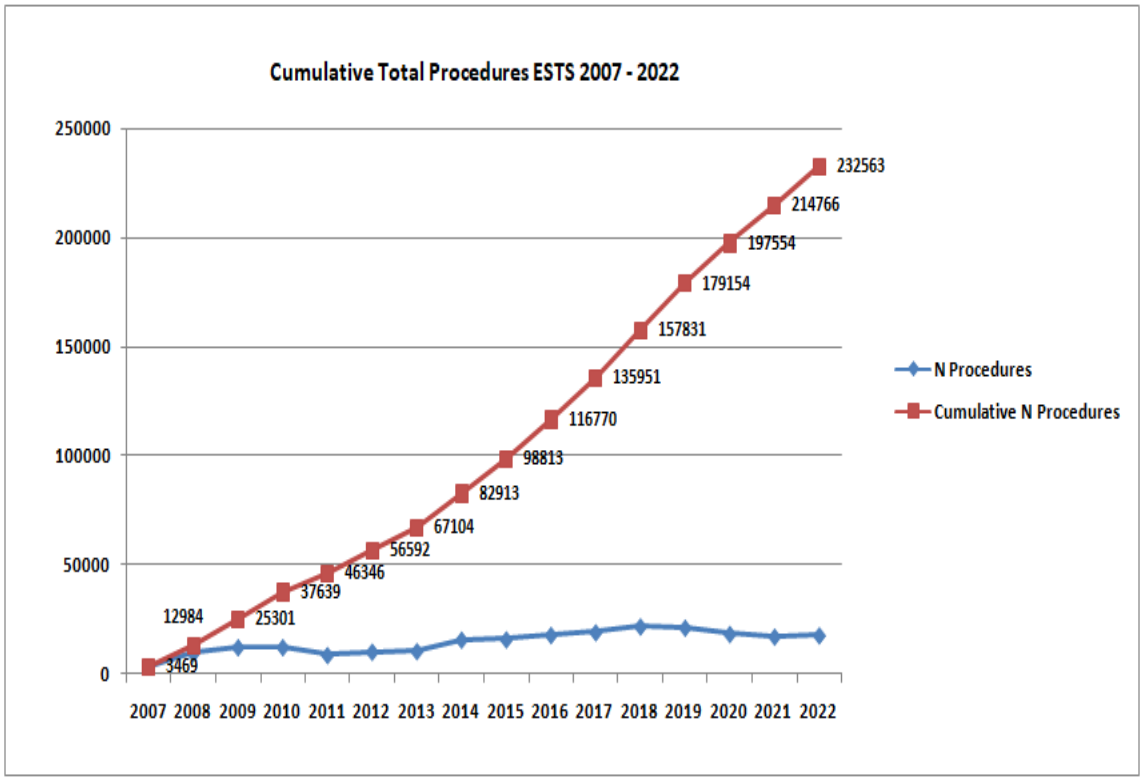
ROMANIA	BUCHAREST	Marius Nasta Institute of Pneumonology
ROMANIA	DROBETA-TURNU SEVERIN	County Emergency Hospital
ROMANIA	TIMISOARA	Clinical Muncipal Emergency Hospital
SLOVAKIA	BRATISLAVA	University Hospital Bratislava , Slovacchia
SLOVENIA	LJUBLJANA	University Medical Centre Ljubljana
SPAIN	BARCELONA	Hospital Clinic
SPAIN	BARCELONA	Sagrat Cor University Hospital
SPAIN	HEBRON	HG Vall d'Hebron
SPAIN	MADRID	H. Clinico San Carlos
SPAIN	MADRID	Hospital general Universitario Gregorio Maranon
SPAIN	MADRID	Ramon y Cajal University Hospital
SPAIN	NAVARRA	Clinica Universitaria De Navarra
SPAIN	SALAMANCA	University Hospital Salamanca
SPAIN	SEVILLA	HHUU Virgen del Rocio
SPAIN	VALENCIA	General University Hospital Valencia
SPAIN	SEVILLA	Hospital Virgen Macarena
SPAIN	PALMA	Hospital Universitari Son Espases
SPAIN	SAN SEBASTIAN	University Hospital Donostia
SWITZERLAND	ZURICH	UniversitätsSpital Zürich Klinik für Thoraxchirurgie
SWITZERLAND	ST. GALLEN	Klinik fur Thoraxchirurgie Kantonsspital St. Gallen
TURKEY	BURSA	Uludag University, School of Medicine
TURKEY	ISTANBUL	Istanbul School of Medicine
TURKEY	ISTANBUL	Istanbul University, Cerrahpasa Medical Faculty
TURKEY	ISTANBUL	Sureyyapasa Chest Disease & Thoracic Surgery Hospital
TURKEY	ISTANBUL	Koç University Hospital
UK	EXETER	Royal Devon & Exeter NHS Foundation Trust
UK	LEEDS	St. James's University Hospital

PART 1

EUROPEAN DATABASE

CUMULATIVE ACTIVITY (2007-2022)
(European units Only)

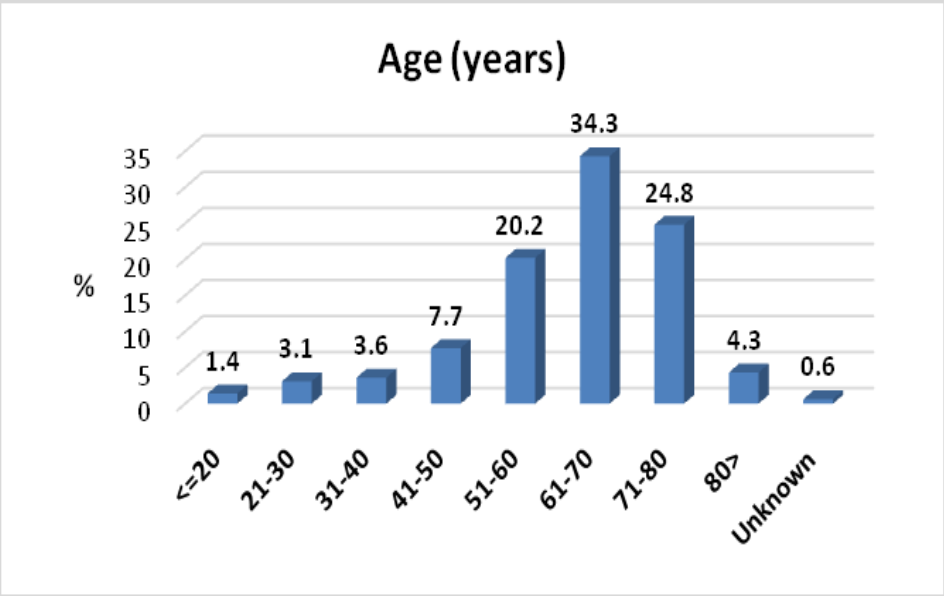
Growth of the ESTS Database 2007-22



Overall age and gender distributions

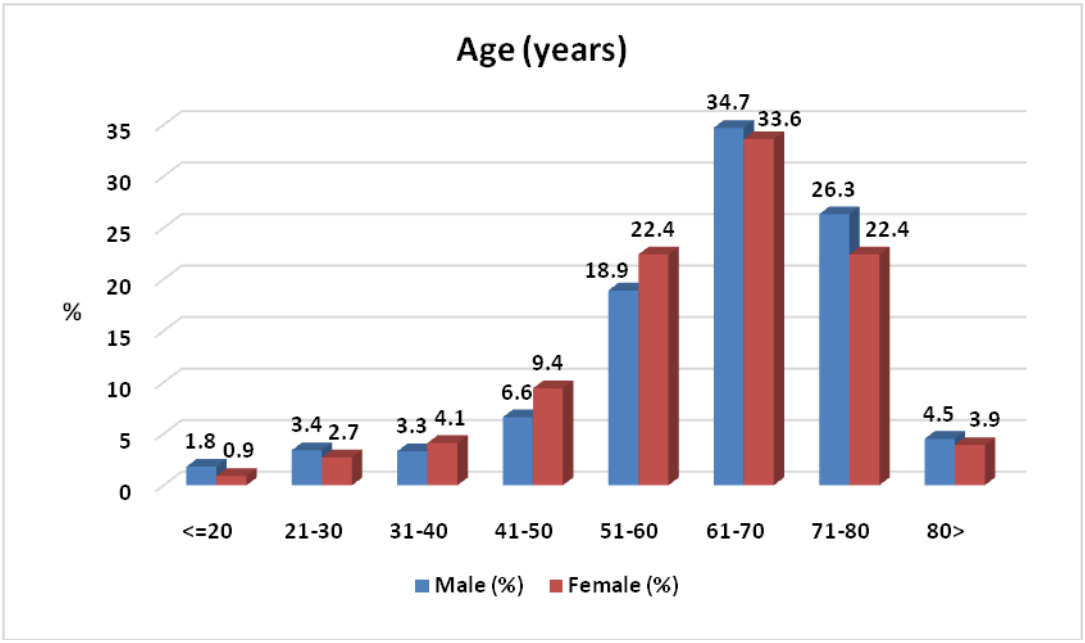
Age (years)

Age (years)	Occurrences	Percentages
<=20	3274	1.4
21-30	7298	3.1
31-40	8381	3.6
41-50	17894	7.7
51-60	47034	20.2
61-70	79809	34.3
71-80	57672	24.8
>80	9940	4.3
Unknown	1261	0.6
Total	**232563**	100



Gender according to age distribution (years)

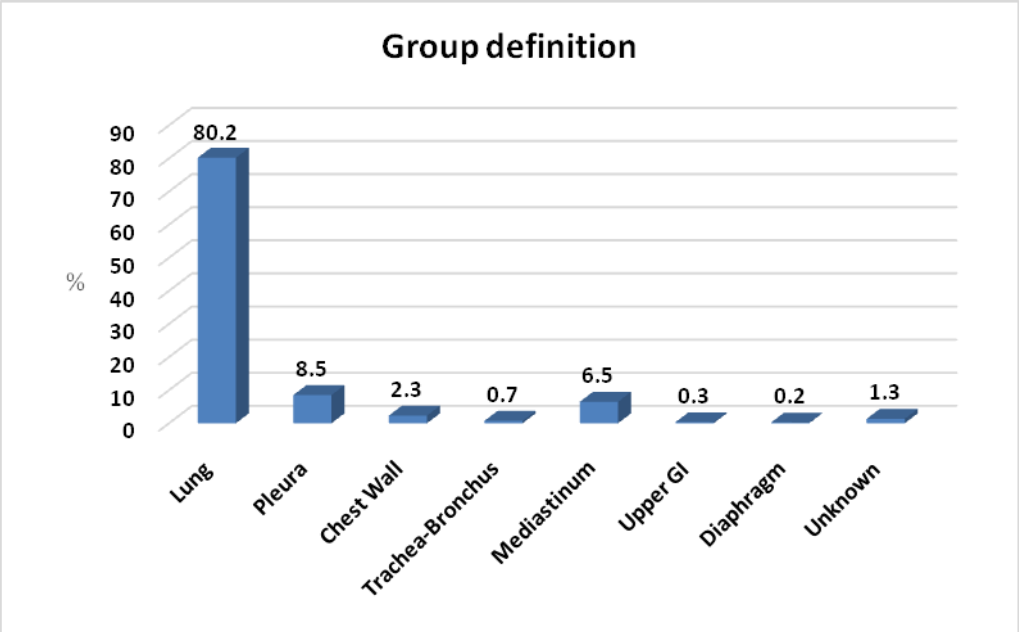
Age (years)	Male (%)	Female (%)
<=20	1.8	0.9
21-30	3.4	2.7
31-40	3.3	4.1
41-50	6.6	9.4
51-60	18.9	22.4
61-70	34.7	33.6
71-80	26.3	22.4
>80	4.5	3.9
Unknown	0.5	0.6



Total surgical activity within the entire dataset

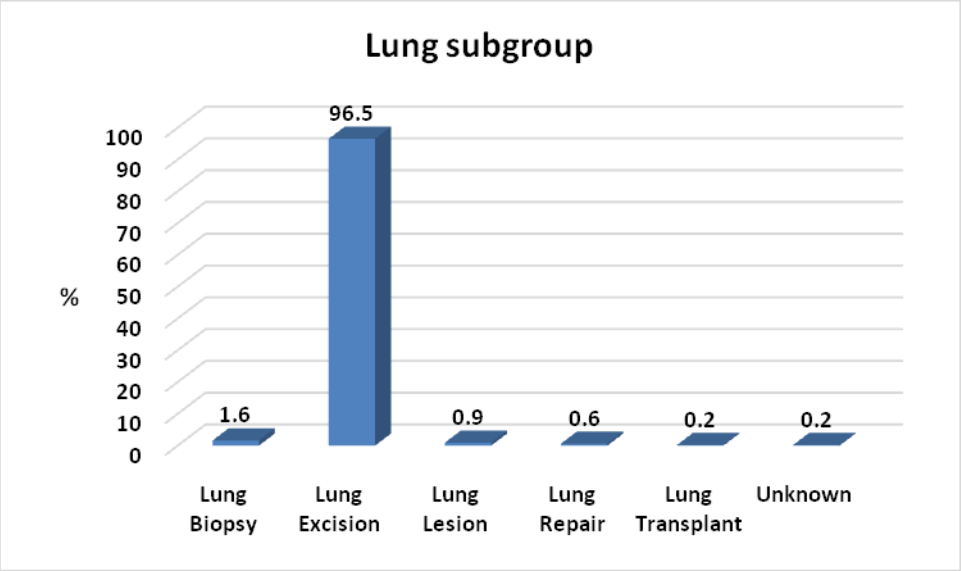
Group Definitions

Group Definition	Occurrences	Percent
Lung	187084	80.4
Pleura	19516	8.4
Chest Wall	5308	2.3
Trachea-Bronchus	1626	0.7
Mediastinum	14974	6.4
Upper GI	807	0.4
Diaphragm	448	0.2
Unknown	2800	1.2
Total	**232563**	**100**



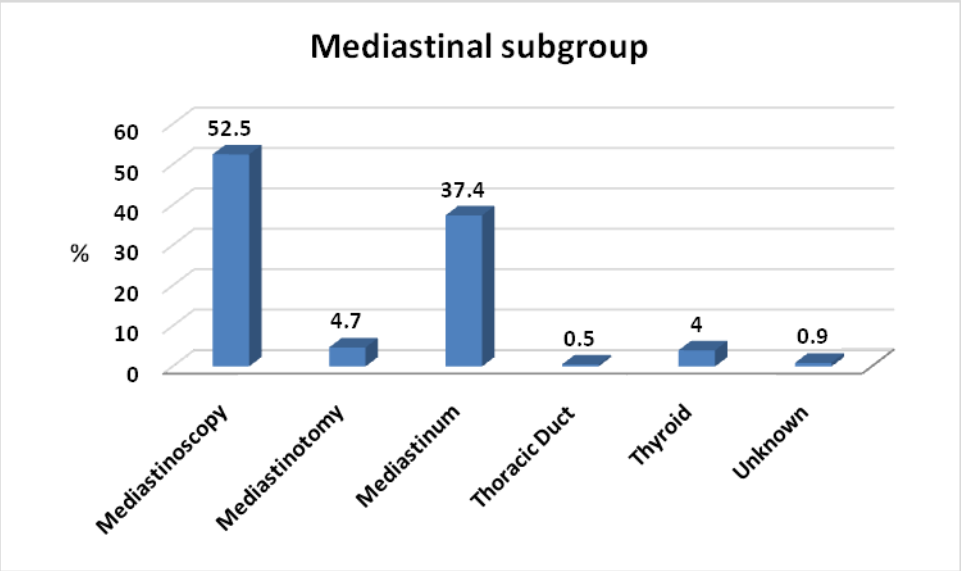
Lung Subgroup

	Occurrences	Percent
Lung Biopsy	3030	1.6
Lung Excision	180437	96.5
Lung Lesion	1768	0.9
Lung Repair	1071	0.6
Lung Transplant	428	0.2
Unknown	350	0.2
Total	**187084**	**100**



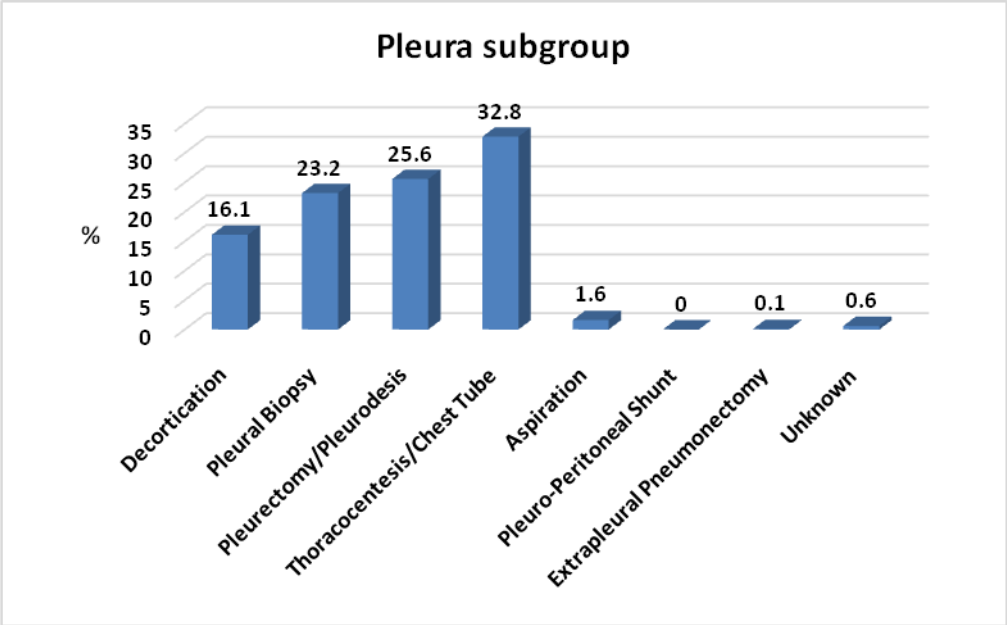
Mediastinum Subgroup

	Occurrences	Percent
Mediastinoscopy	7867	52.5
Mediastinotomy	697	4.7
Mediastinum	5604	37.4
Thoracic Duct	83	0.5
Thyroid	593	4
Unknown	130	0.9
Total	**14974**	**100**



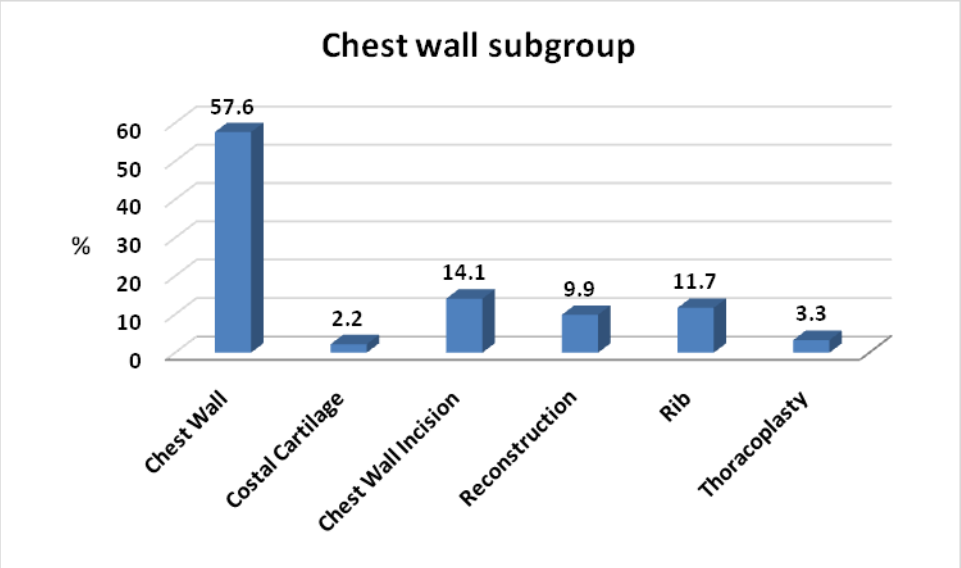
Pleura Subgroup

	Occurrences	Percent
Decortication	3138	16.1
Pleural Biopsy	4530	23.2
Pleurectomy/Pleurodesis	4998	25.6
Thoracocentesis/Chest Tube	6393	32.8
Aspiration	321	1.6
Pleuro-Peritoneal Shunt	9	0
Extrapleural Pneumonectomy	11	0.1
Unknown	116	0.6
Total	**19516**	**100**



Chest Wall Subgroup

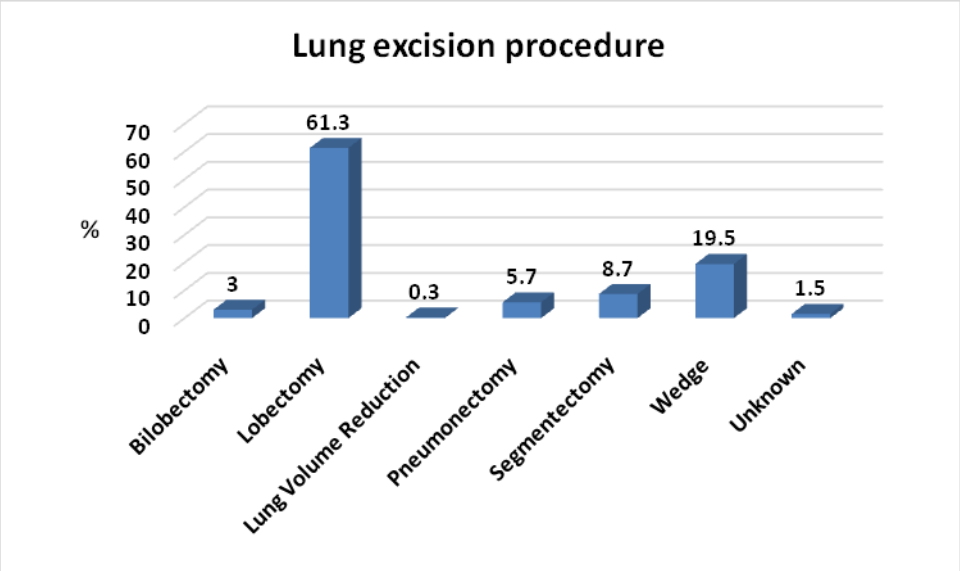
	Occurrences	Percent
Chest Wall	3057	57.6
Costal Cartilage	118	2.2
Chest Wall Incision	749	14.1
Reconstruction	527	9.9
Rib	622	11.7
Thoracoplasty	174	3.3
Unknown	61	1.2
Total	**5308**	**100**



Lung resections

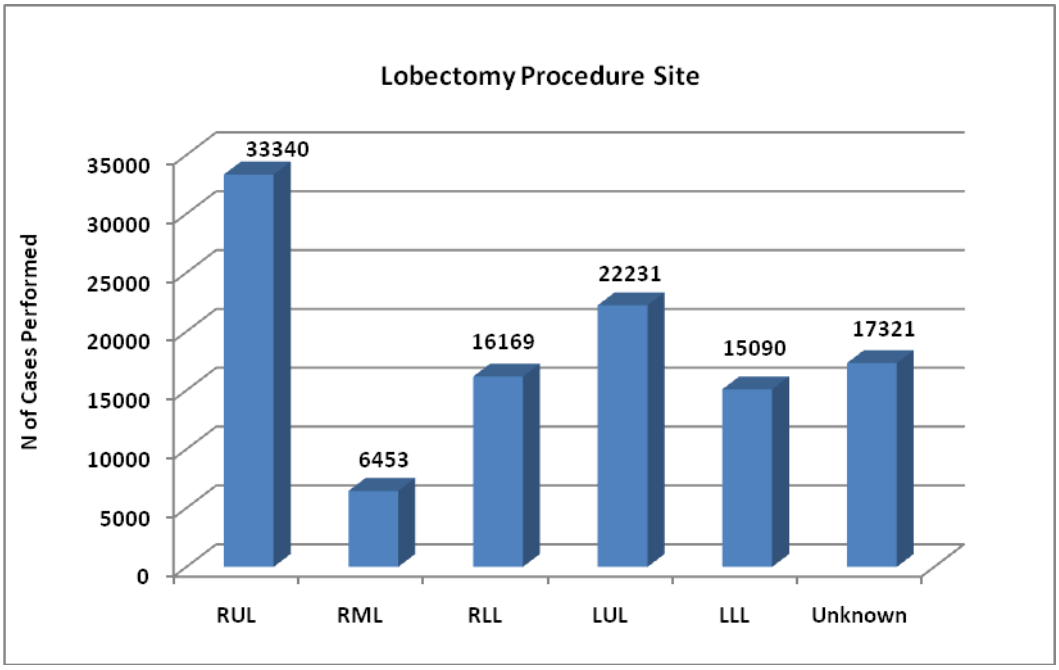
Types of lung resections performed, including all diagnoses

	Occurrences	Percent
Bilobectomy	5446	3
Lobectomy	110604	61.3
Lung Volume Reduction	599	0.3
Pneumonectomy	10273	5.7
Segmentectomy	15608	8.7
Wedge	35257	19.5
Unknown	2650	1.5
Total	**180437**	**100**



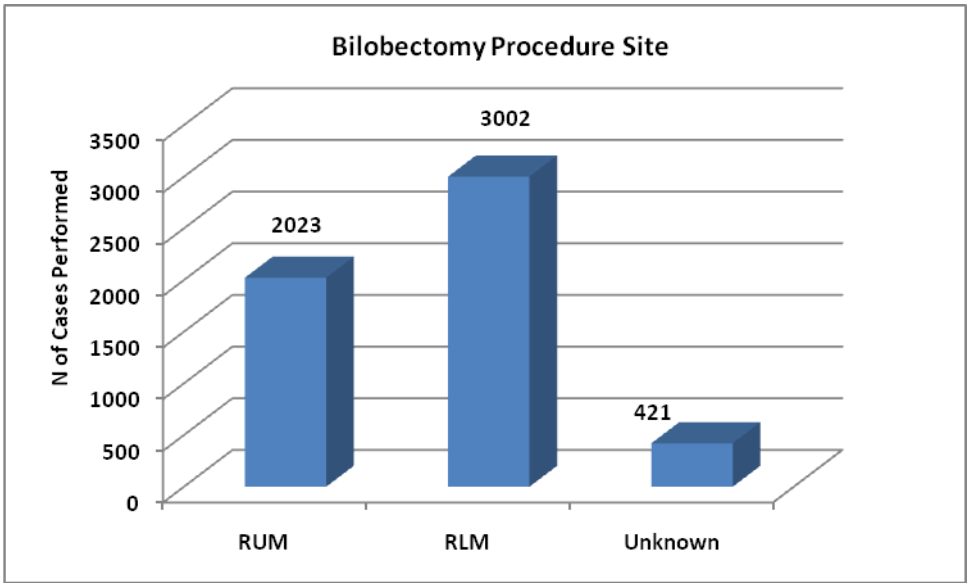
Distribution of lobectomy by site of resection

Lobectomy Procedure Site	Occurrences	Percent
RUL	33340	30.2
RML	6453	5.8
RLL	16169	14.6
LUL	22231	20.1
LLL	15090	13.6
Unknown	17321	15.7
Total	**110604**	**100**



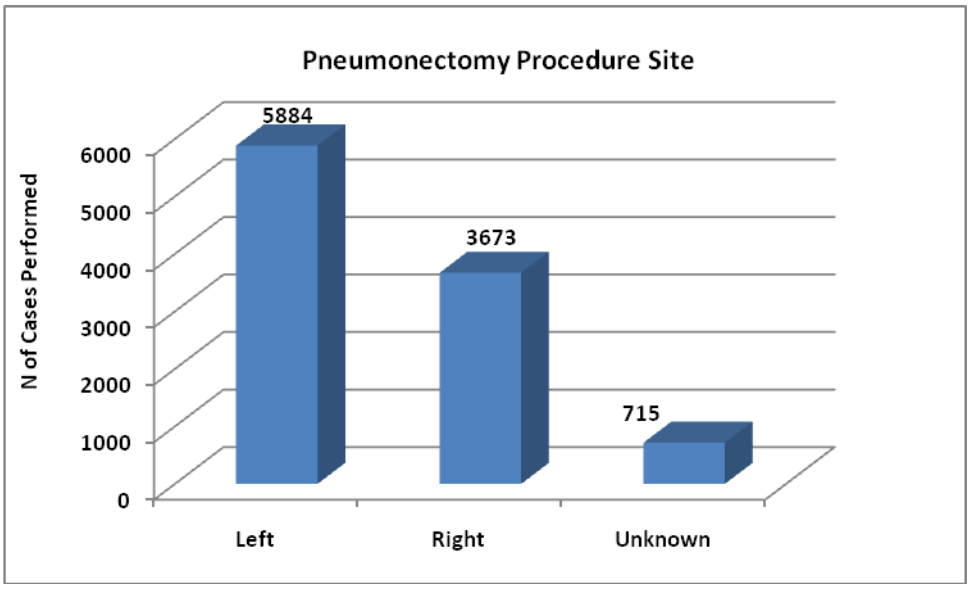
Distribution of bilobectomy by site of resection

Bilobectomy Procedure Site	Occurrences	Percent
RUM	2023	37.2
RLM	3002	55.1
Unknown	421	7.7
Total	**5446**	**100**



Distribution of pneumonectomy by side

Pneumonectomy Side	Occurrences	Percent
Left	5884	57.3
Right	3673	35.7
Unknown	715	7
Total	**10272**	**100**

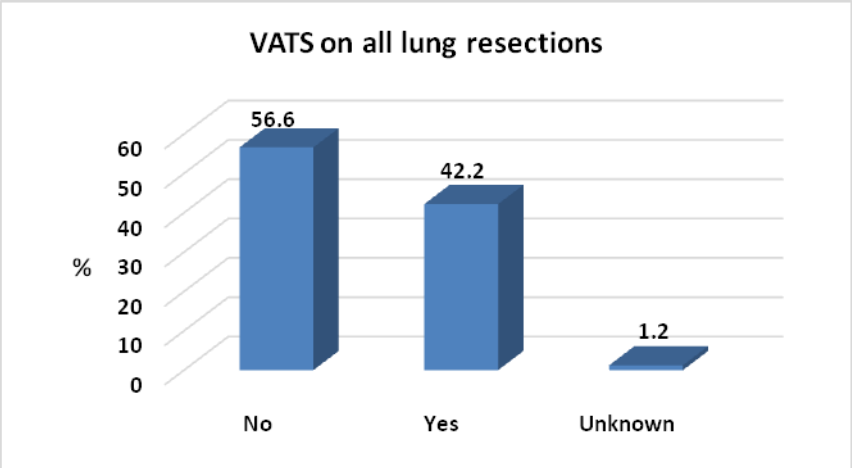


Pneumonectomy Qualifier	Occurrences	Percent
Alone	6059	59
Completion	484	4.7
Intrapericardial	897	8.7
Pleuropneumonectomy	240	2.3
Sleeve Resection	121	1.2
Diaphragm Resection	28	0.3
Atrial Resection	121	1.2
SVC Resection/Reconstruction	95	0.9
Vertebral Resection	163	1.6
Unknown	2065	20.1
Total	**10273**	**100**

VATS as a proportion of all lung resections

VATS	Occurrences	Percent (%)
No	102076	56.6
Yes	76097	42.2
Unknown	2264	1.2
Total	**180437**	**100**

Note the increase from 40.3 to 42.2!!!! Also a similar % of data completeness



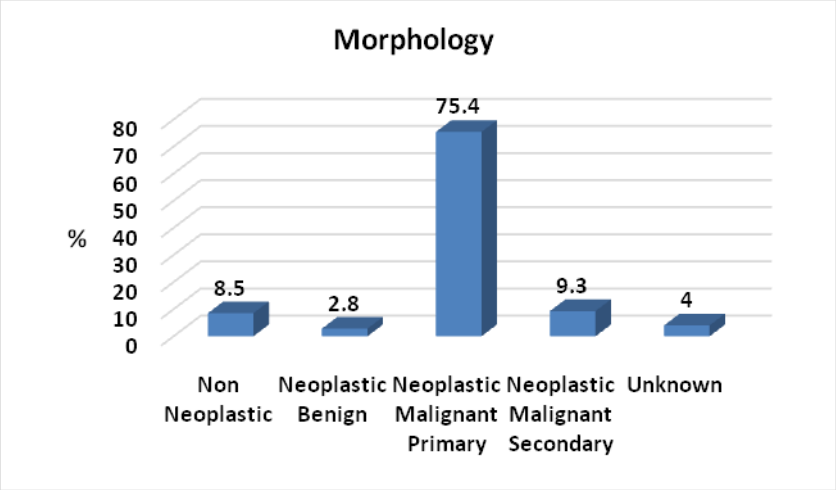
	No	Yes	Yes (%)
2007-2014	49732	13944	21.9
2015-2022	52344	62153	54.3
Total	**102076**	**76097**	**42.7**

VATS as a proportion of lobectomy

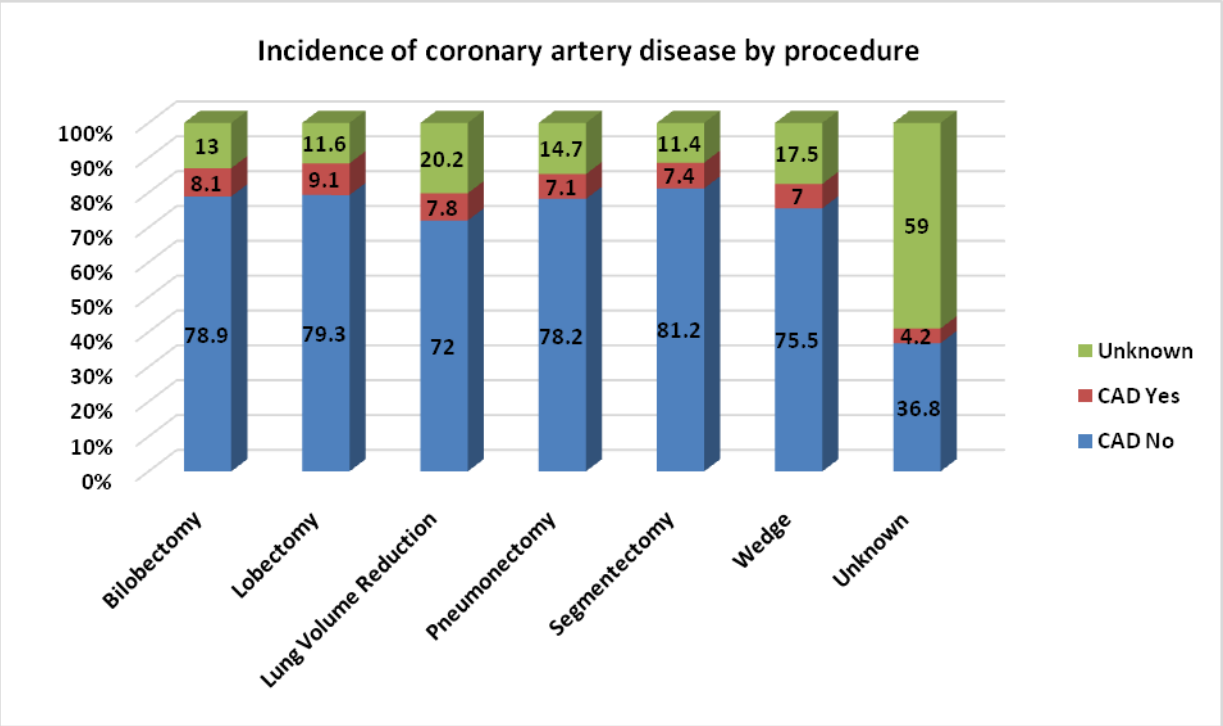
	No	Yes	Yes (%)
2007-2014	31272	5020	13.8
2015-2022	34398	38676	52.9
Total	**65670**	**43696**	**40**

Lung resections pathology

Morphology	Occurrences	Percent (%)
Non Neoplastic	15411	8.5
Neoplastic Benign	4959	2.8
Neoplastic Malignant Primary	136073	75.4
Neoplastic Malignant Secondary	16741	9.3
Unknown	7253	4
Total	**180437**	**100**

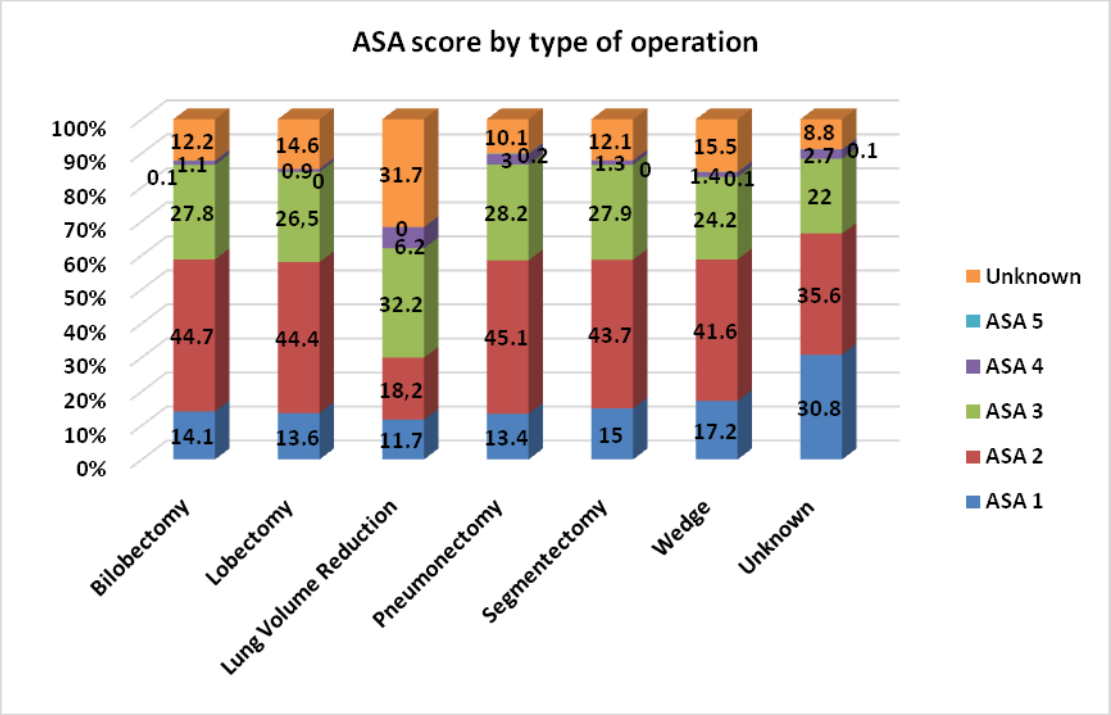


Incidence of coronary artery disease by procedure



Lung Excision Procedure	CAD NO	CAD YES	Unknown	Total
Bilobectomy	4299	442	705	5446
Lobectomy	87708	10043	12853	110604
Lung Volume Reduction	431	47	121	599
Pneumonectomy	8032	732	1509	10273
Segmentectomy	12671	1155	1782	15608
Wedge	26604	2465	6188	35257
Unknown	976	112	1562	2650
Total	**140721**	**14996**	**24720**	**180437**

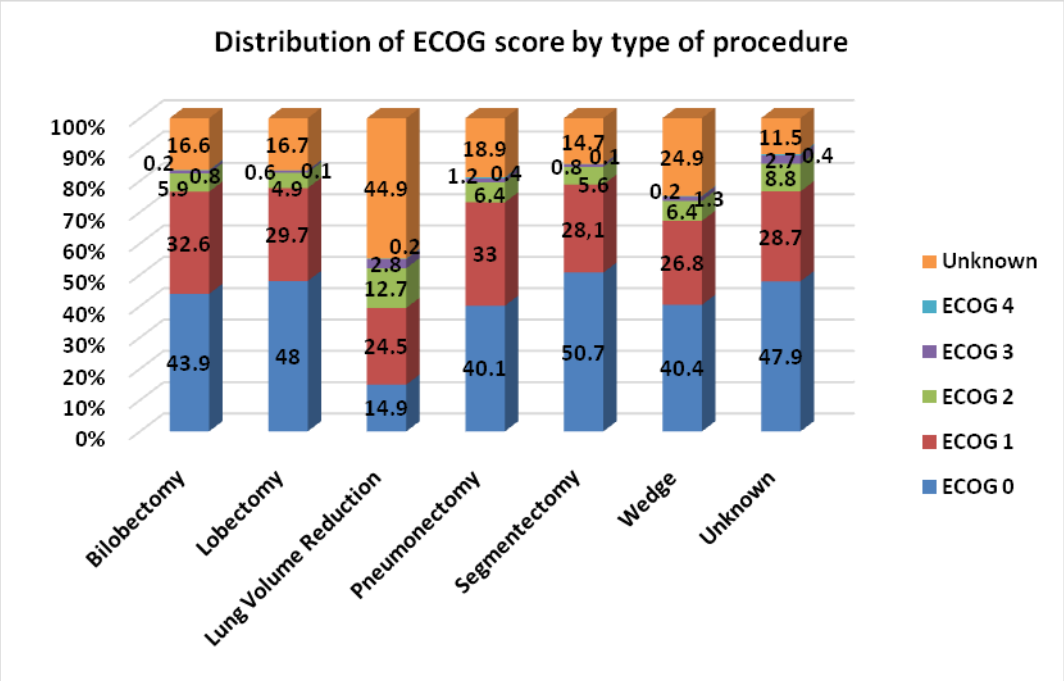
Distribution of ASA score by type of operation



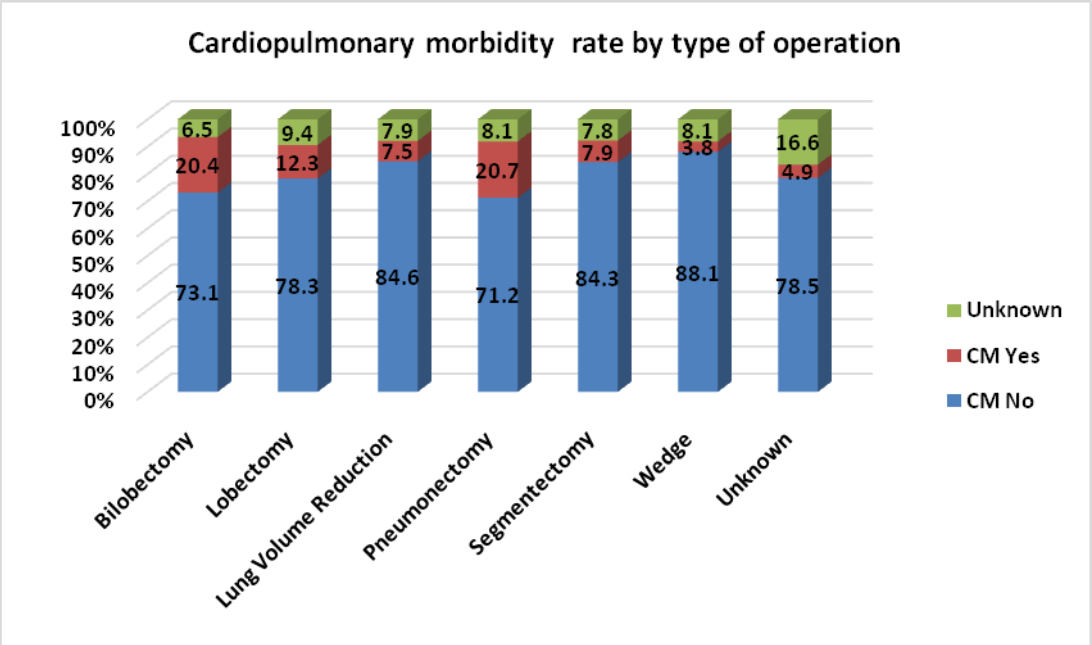
Lung Excision Procedure	ASA 1	ASA	ASA 3	ASA 4	ASA 5	Unknown	Total
Bilobectomy	767	2435	1516	61	3	664	5446
Lobectomy	15014	49099	29328	954	52	16155	110602
Lung Volume Reduction	70	109	193	37	0	190	599
Pneumonectomy	1373	4627	2901	308	24	1040	10273
Segmentectomy	2338	6826	4358	194	1	1891	15608
Wedge	6080	14668	8528	508	24	5449	35257
Unknown	817	942	583	71	3	234	2650
Total	**26459**	**78706**	**47407**	**2133**	**107**	**25623**	**180435**

Distribution of ECOG score by type of operation

Lung Excision Procedure	ECOG 0	ECOG 1	ECOG 2	ECOG 3	ECOG 4	Unknown	Total
Bilobectomy	2393	1775	319	46	10	903	5446
Lobectomy	53043	32863	5442	656	107	18493	110604
Lung Volume Reduction	89	147	76	17	1	269	599
Pneumonectomy	4114	3390	662	118	45	1944	10273
Segmentectomy	7921	4379	881	118	17	2292	15608
Wedge	14260	9442	2255	450	79	8771	35257
Unknown	1271	760	233	71	10	305	2650
Total	**83091**	**52756**	**9868**	**1476**	**269**	**32977**	**180437**



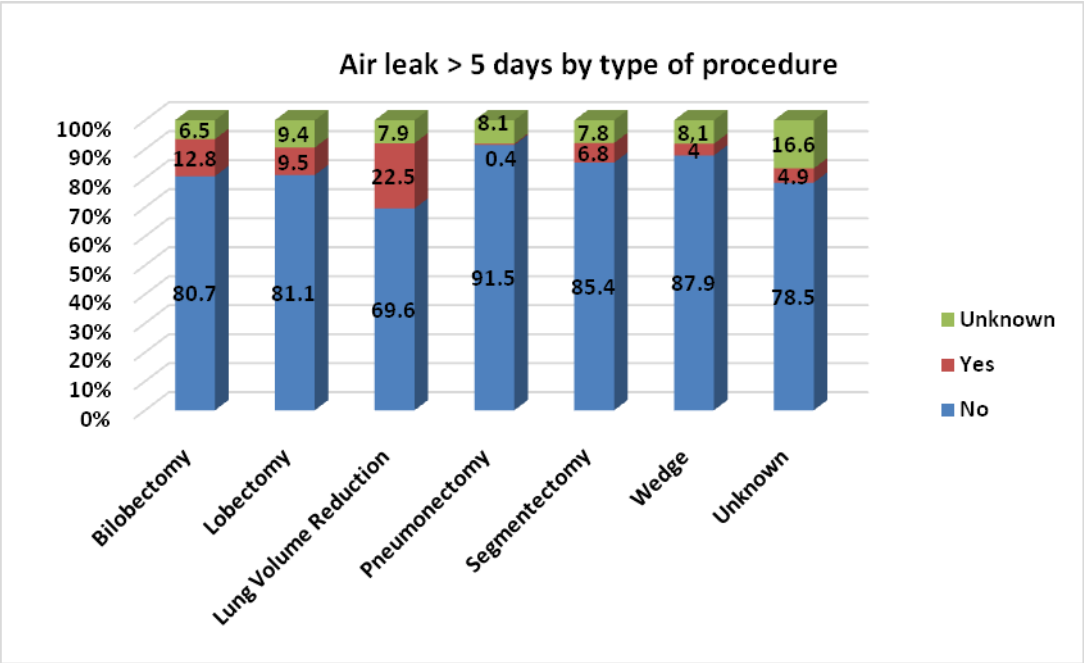
Cardiopulmonary morbidity rate in different types of lung resections



	CM No	CM No (%)	CM Yes	CM Yes(%)	Unknown	Unknown (%)	Total
Bilobectomy	3980	73.1	1113	20.4	353	6.5	5446
Lobectomy	86636	78.3	13604	12.3	10364	9.4	110604
Lung Volume Reduction	507	84.6	45	7.5	47	7.9	599
Pneumonectomy	7315	71.2	2125	20.7	833	8.1	10273
Segmentectomy	13166	84.3	1226	7.9	1216	7.8	15608
Wedge	31059	88.1	1340	3.8	2858	8.1	35257
Unknown	2080	78.5	131	4.9	439	16.6	2650
Total	**144743**		**19584**		**16110**		**180437**

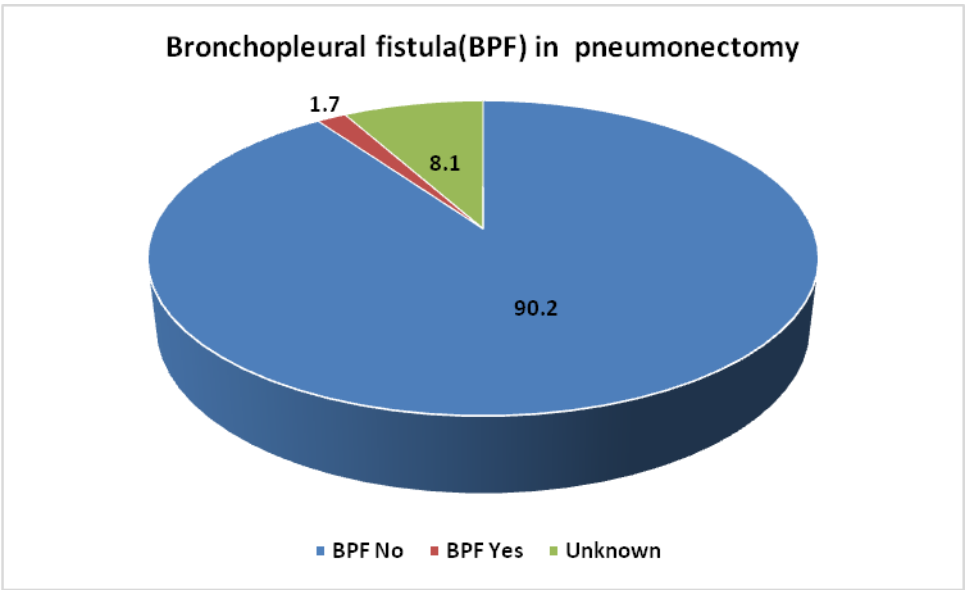
Incidence of prolonged air leak (> 5days) in different types of lung resections

	Air Leak > 5 days		
Lung Excision - PROCEDURE	**No (%)**	**Yes (%)**	**Unknown (%)**
Bilobectomy	80.7	12.8	6.5
Lobectomy	81.1	9.5	9.4
Lung Volume Reduction	69.6	22.5	7.9
Pneumonectomy	91.5	0.4	8.1
Segmentectomy	85.4	6.8	7.8
Wedge	87.9	4	8.1



Incidence of bronchopleural fistula (BPF) in pneumonectomy

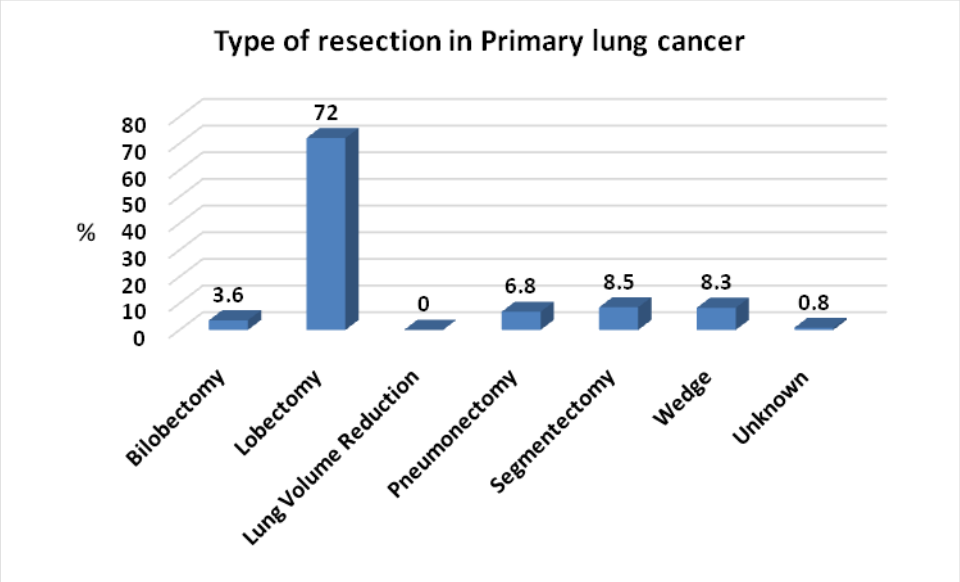
Bronchopleural fistula	**BPF No**	**BPF Yes**	**Unknown**	**Total**
Pneumonectomy (N)	9262	178	833	10273
Pneumonectomy (%)	90.2	1.7	8.1	100



Primary lung cancer

Lung resection for primary lung cancer: Types of procedures

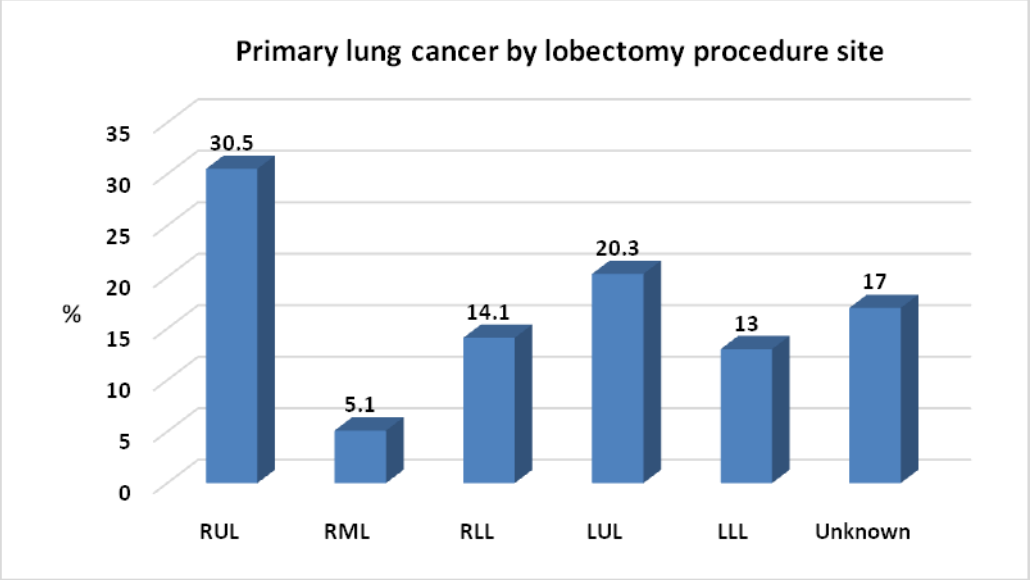
	Occurrences	Percent
Bilobectomy	4922	3.6
Lobectomy	97902	72
Lung Volume Reduction	18	0
Pneumonectomy	9215	6.8
Segmentectomy	11608	8.5
Wedge	11305	8.3
Unknown	1103	0.8
Total	**136073**	**100**



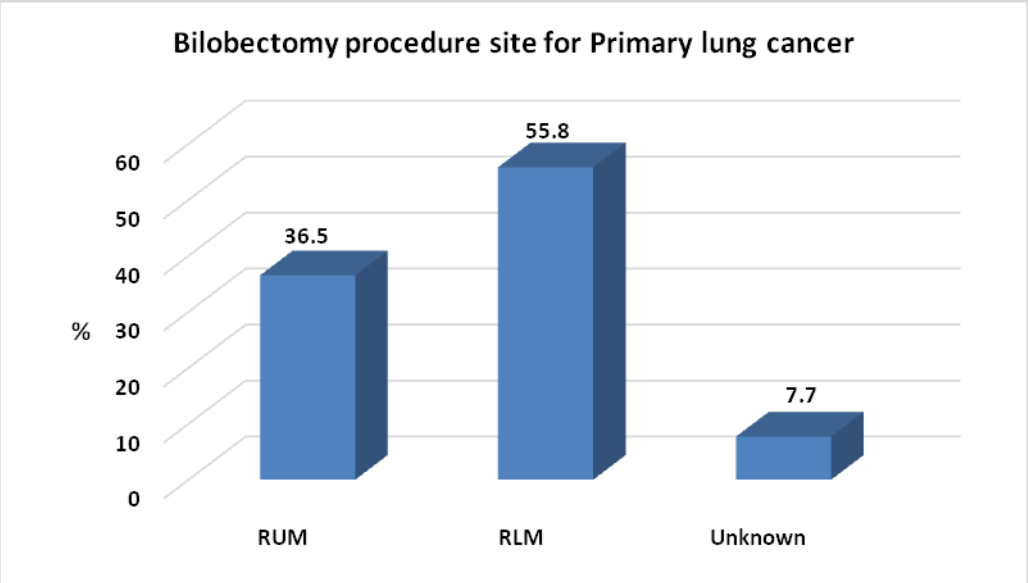
Bilobectomy – Lobectomy qualifier	Occurrences	Percent
Alone	89221	86.8
Chest Wall	3514	3.4
Superior Sulcus Tumor	520	0.5
Sleeve	3170	3.1
Diaphragm Resection	106	0.1
Atrial Resection	79	0.1
SVC Resection/Reconstruction	83	0.1
Vertebral Resection	376	0.3
Unknown	5755	5.6
Total	**102824**	**100**

Distribution of lobectomy/bilobectomy by site of resection

Lobectomy procedure site	Occurrences	Percent
RUL	29864	30.5
RML	4971	5.1
RLL	13829	14.1
LUL	19877	20.3
LLL	12698	13
Unknown	16663	17
Total	**97902**	**100**



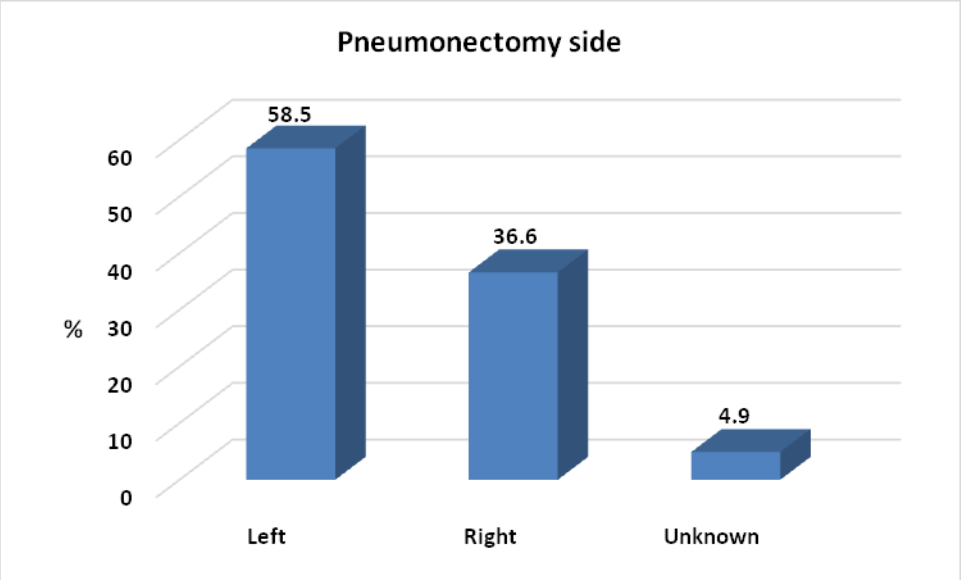
Bilobectomy procedure site	Occurrences	Percent
RUM	1796	36.5
RLM	2746	55.8
Unknown	380	7.7
Total	**4922**	**100**



Distributions of pneumonectomy

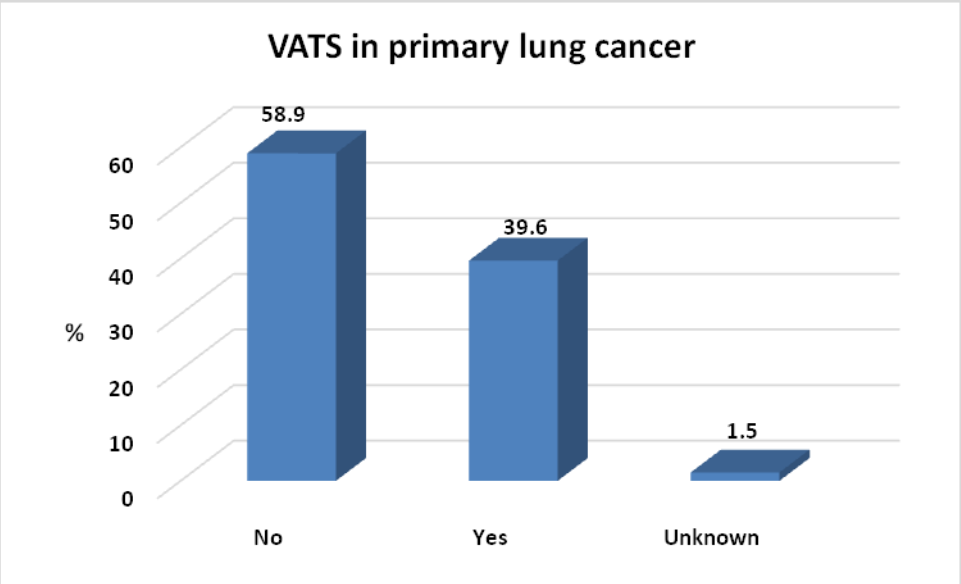
Pneumonectomy Qualifier	Occurrences	Percent
Alone	5497	59.6
Completion	391	4.2
Intrapericardial	792	8.6
Pleuropneumonectomy	190	2.1
Sleeve Resection	117	1.3
Diaphragm Resection	16	0.2
Atrial Resection	118	1.3
SVC Resection/Reconstruction	95	1
Vertebral Resection	159	1.7
Unknown	1840	20
Total	**9215**	**100**

Pneumonectomy side	Occurrences	Percent
Left	5393	58.5
Right	3374	36.6
Unknown	447	4.9
Total	**9214**	**100**



Distribution of VATS procedures in total lung resections

VATS	Occurrences	Percent
No	80122	58.9
Yes	53934	39.6
Unknown	2017	1.5
Total	**136073**	**100**



Distributions of VATS procedures in lobectomy/bilobectomy

VATS	Occurrences	Percent
No	61638	60
Yes	40022	38.9
Unknown	1164	1.1
Total	**102824**	**100**

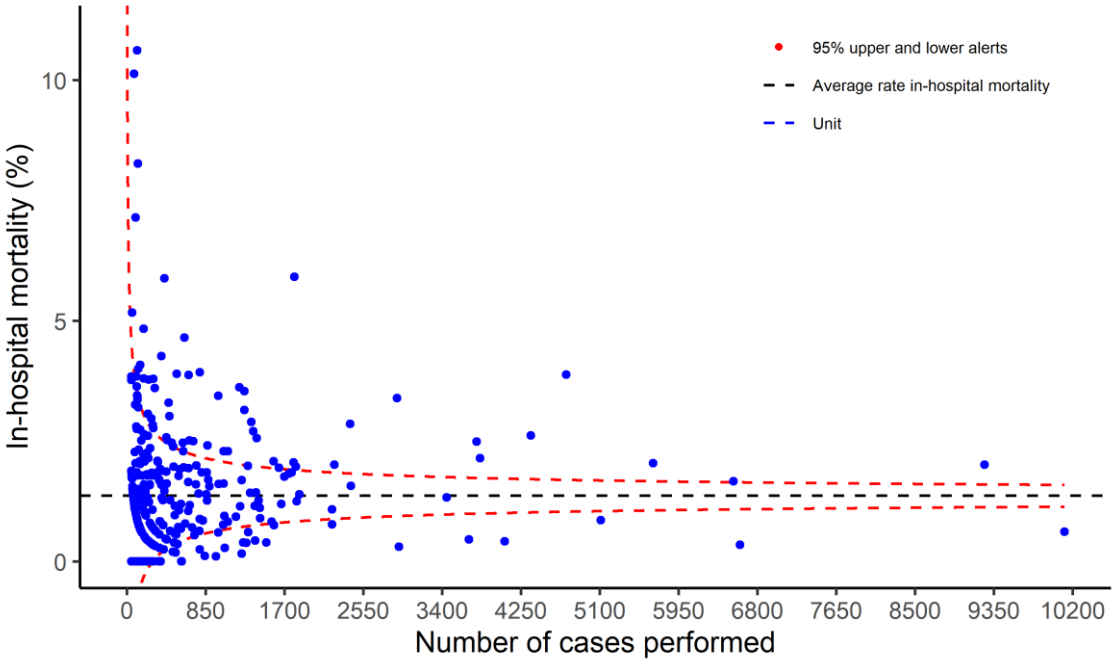
Unadjusted in-hospital mortality rates in primary lung cancer resections

Outcome at Discharge - Died in Hospital	N	Died in Hospital	Percent(%)
Bilobectomy	4636	165	3.6
Lobectomy	91648	1130	1.2
Lung Volume Reduction	13	0	0
Pneumonectomy	8716	472	5.4
Segmentectomy	10518	72	0.7
Wedge	10706	91	0.8
Total	**126237**	**1930**	**1.5**

Overall unadjusted in-hospital mortality calculated in the total dataset

(Only centres with at least N>50 procedures were included)

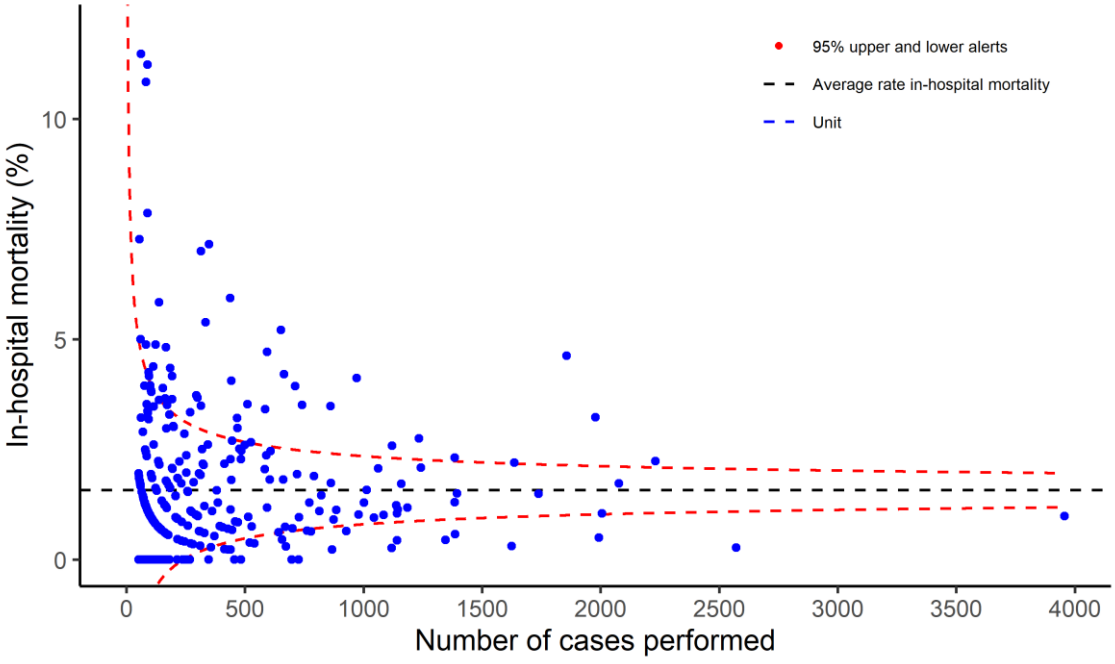
Please note that the majority of the units are within the limits. Around 15% of the Units are above the 95% upper limit whereas the 7% are below the 95% lower limit.



Overall unadjusted in-hospital mortality calculated for the major lung resections

(Only centres with at least N>50 major lung resections were included)

Please note that most of the units are within the limits. Around 14% of the Units are above the 95% upper limit whereas the 9% are below the 95% lower limit.

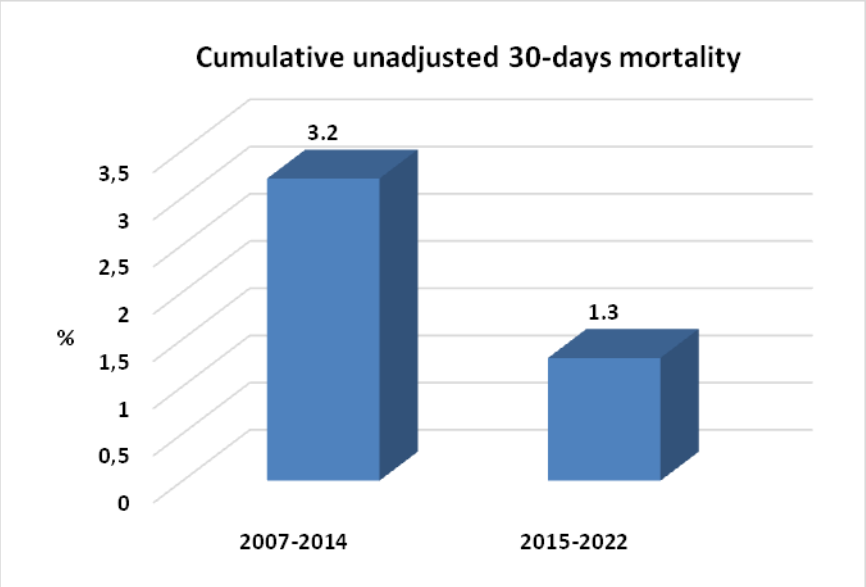


Comparisons of outcomes between 2007-2014 *vs* 2015-2022 in the total dataset

** Due to missing data, the 30-day mortality was only evaluated in 127399 patients, leaving 105164 patients out*

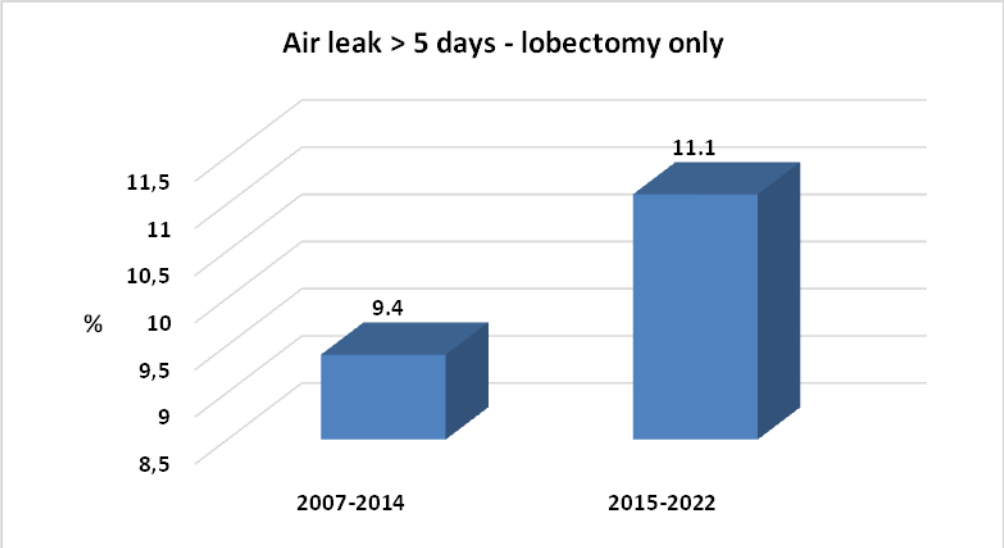
Cumulative non-adjusted 30-day mortality

Cumulative non-adjusted 30-day mortality	Alive	Died	Died Percent
2007-2014	36165	1204	3.2
2015-2022	88904	1126	1.3
Total	**125069**	**2330**	**1.8**



Prolonged air leak (*LOBECTOMY ONLY*)

Air leak > 5 Days	No	Yes	Yes(%)
2007-2014	30573	3184	9.4
2015-2022	59115	7368	11.1
Total	**89688**	**10552**	**10.5**



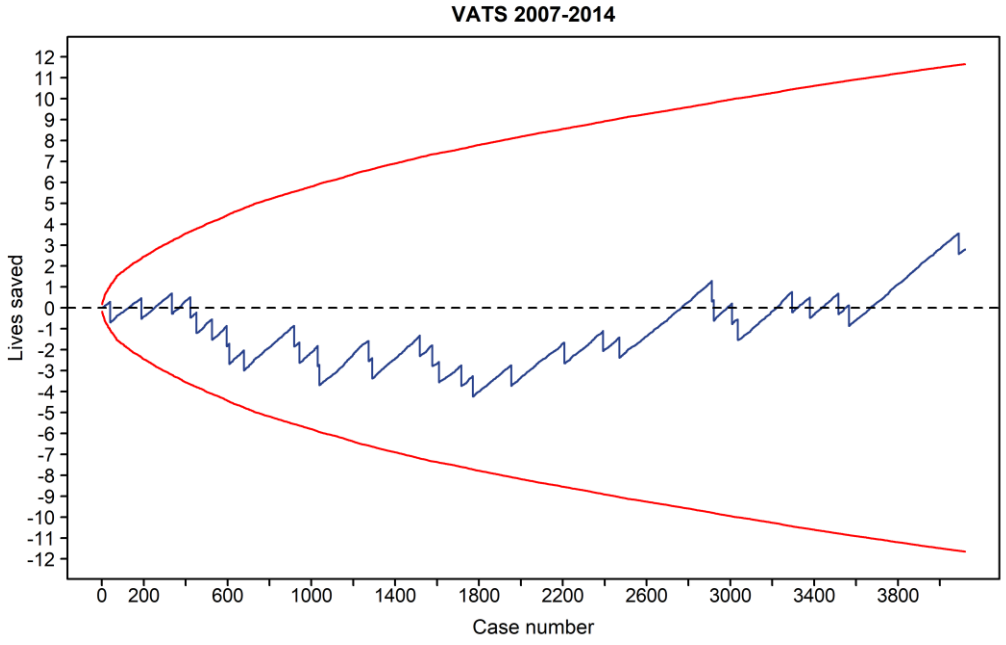
Hospital Mortality trending presented as CUSUM plots

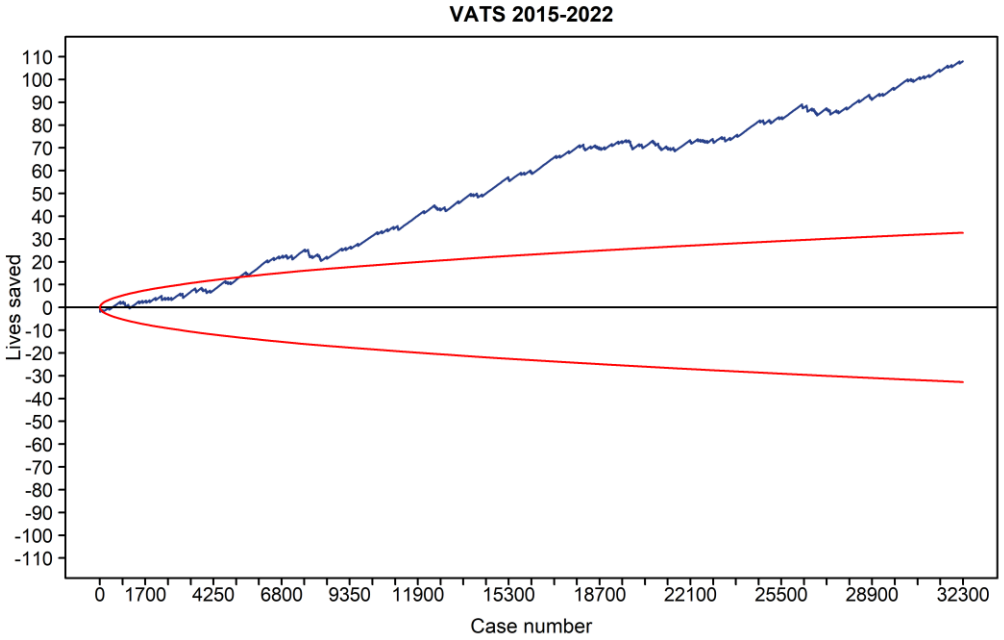
VATS CUSUM PLOTS

Cumulative sum (CUSUM) techniques offer the possibility of checking a process along time and knowing if its quality is kept constant, improves or deteriorates. In the last case, corrective measures can be implemented and their efficacy investigated. We have used risk-adjusted expected minus observed CUSUM charts in this report. The results of the analysis are presented in graphs, were the horizontal axis represents the cases over time and the vertical axis shown the difference between the calculated risk of the outcome for a single individual and its occurrence.

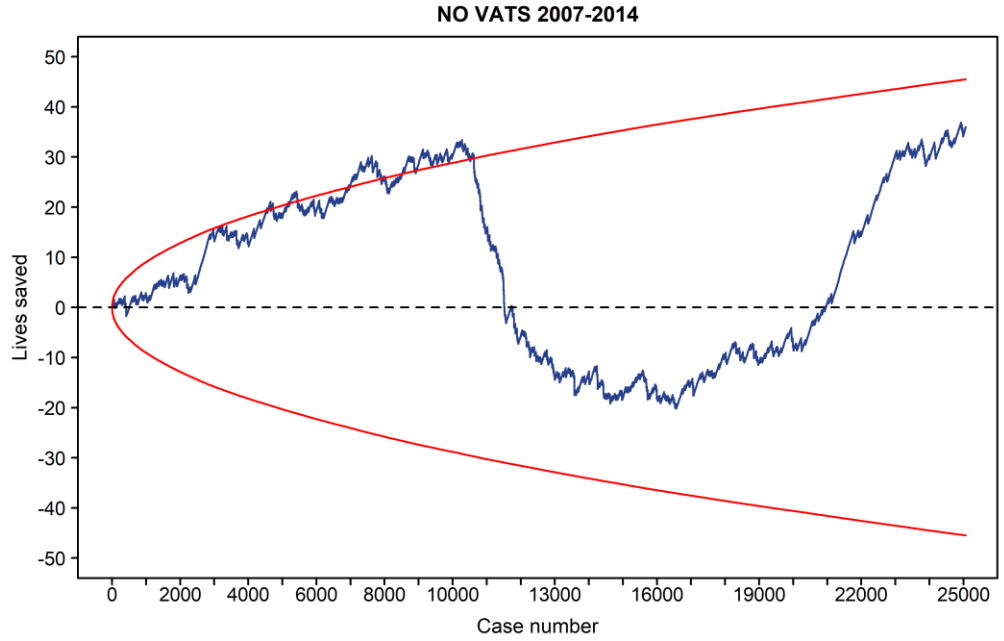
In the next figures, risk-adjusted CUSUM graphs for hospital mortality are presented for non-extended lobectomy performed through VATS or open approach in two different periods of time: 2007-2014 and 2015-2022

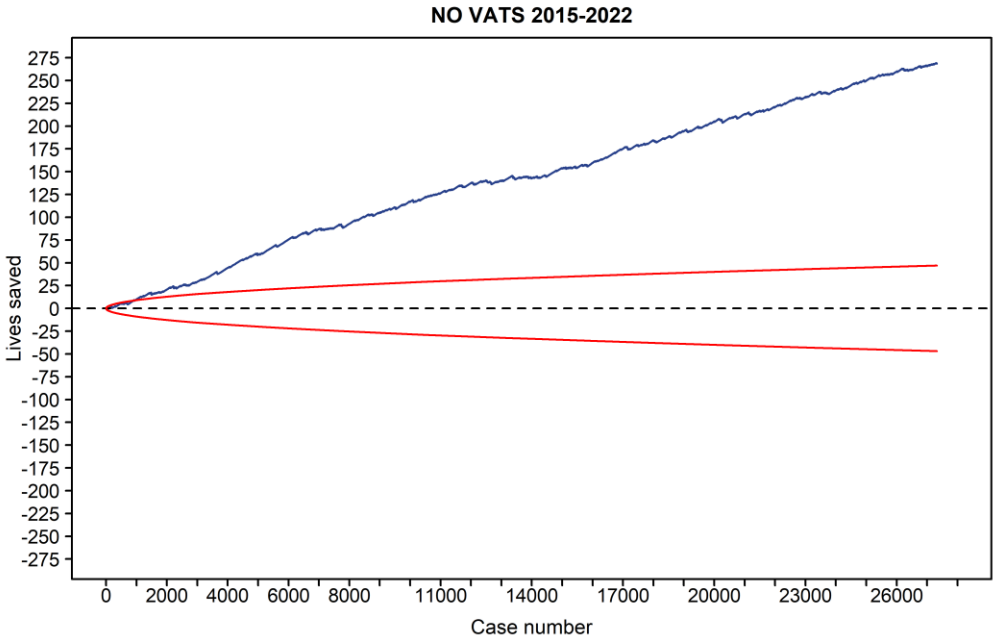
In the case of VATS, the first timeframe shows some variation around the zero for the first 400 cases followed by more than 2000 cases characterized by a slight mortality increase. After case 3000 the number of lives saved stabilized again around zero until it starts increasing after case 3600. In the period 2015-2022, a steady decrease in mortality is detected, especially after the first 6000 procedures. The graph stabilizes around 70-80 lives saved between 20000 and 25000 procedures, but it continues the upward trend thereafter especially in from the last 4000 cases.





For cases not approached by VATS in the first time period, the graph shows a sharp decrease in mortality for the first 11000 procedures followed by a drop in lives saved for the following 5000 procedures, probably meaning that the easiest cases were shifted to VATS in most institutions. A subsequent increase in lives saved is shown from case 17000 onwards. After 2015 no VATS procedures resulted in a continuous and sharp improve of hospital mortality.




NO VATS 2015-2022
Lives saved
275
250
225
200
175
150
125
100
75
50
25
0
-25
-50
-75
-100
-125
-150
-175
-200
-225
-250
-275
0
2000
4000
6000
8000
11000
14000
17000
20000
23000
26000
Case number

PART 2

UNITS-SPECIFIC ACTIVITY

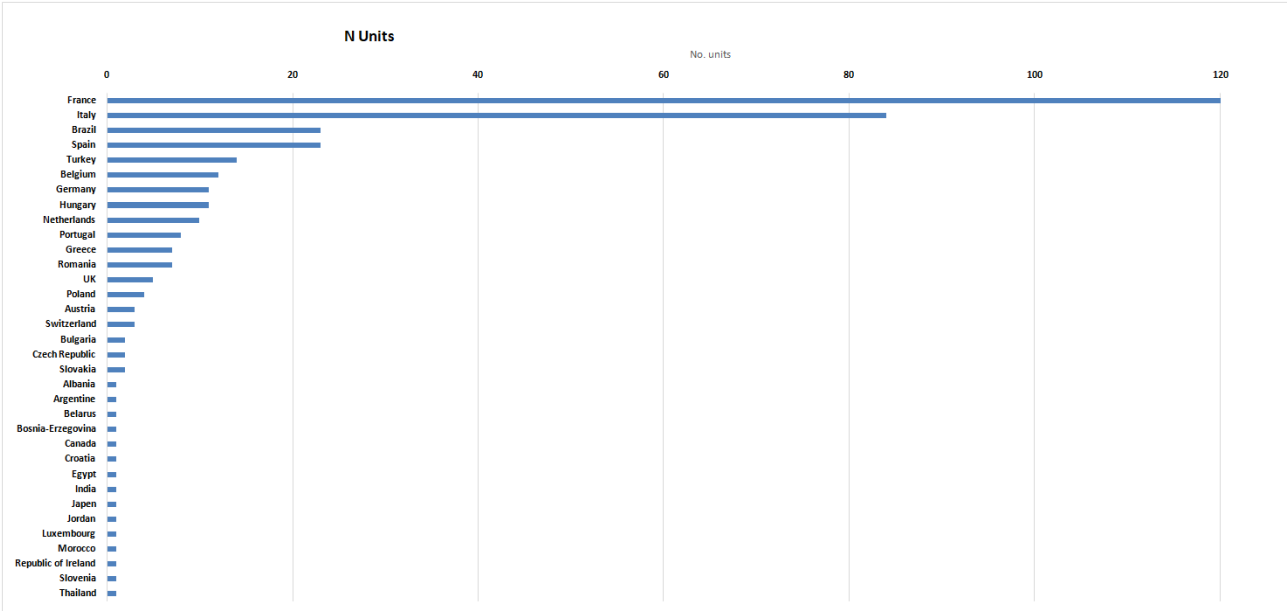
&

COMPARATIVE ANALYSIS

BETWEEN CONTRIBUTING UNITS
(2007-2022)
(European units Only)

Only units contributing more than 150 lung resections ***performed in the last three*** years *were included*

Number of Units enrolled in the ESTS database as of December 2022, by Country



Proportion of elderly patients (older than 70 years of age) operated on in different European countries

Unit	Percent
Bm02dl	29
Bm05dl	33.79
Ch10dl	30.23
Fr130780521	36.21
Fr130780521_01°	41.87
Fr130785652°	40.87
Fr140000209	31.78
Fr140000209_01°	35.89
Fr210987558	36.65
Fr210987558_01°	45.87
Fr300782117°	48.28
Fr310019351	30.45
Fr310019351_01°	36.03
Fr330783648	29.75
Fr330783648_01°	34.98
Fr340796663	37.88
Fr350000741	35.21
Fr350000741_01°	44.44
Fr370004467	37.46
Fr380000067	41.17
Fr540000486	36.41
Fr540001138	30.17
Fr540001138_01°	38.12
Fr590780383	27.8
Fr590784864	28.72
Fr590784864_01°	21.46
Fr630000479	35.55
Fr630000479_01°	38.57
Fr670000025	34.25
Fr670000025_01°	37.32
Fr690000880	31.96
Fr690784186	36.49
Fr690784186_01°	37.66
Fr750100273	32.88
Fr750100273_01°	36.53
Fr750150104	35.96
Fr750150104_01°	39.3
Fr750712184	40.21
Fr750712184_01°	38.35

Fr750803447	36.23
Fr750803447_01°	40.13
Fr760000158	29.69
Fr760000158_01°	34.91
Fr800006124	31.44
Fr830100574	46.79
Fr860000223	34.36
Fr870000064°	35.84
Fr920000650	37.63
Fr920000650_01°	44.01
Fr920000684	30.58
Gr02d0	43.88
Gy18dl	38.5
Gy23dl	28.74
Hu01dl	21.94
Hu02dl	24.62
Hu03dl	23.35
Hu04dl	21.7
Hu05dl	19.2
Hu06dl	20.73
Hu07dl	25.71
Hu08dl	23.35
Hu09dl	22.46
Hu12dl	17.21
Ie01dl	40.94
It03d0	37.65
It26dl	46.88
It32dl	37.75
It38dl	48.33
ITSICT-0078	47.99
Nl19dl°	37.42
Pl06dl	38.69
Sk01dl	23.41
Sp01dl	36.34
Sp06dl°	35.08
Sp17dl	37.19
Sp28dl	31.27
Sp31dl	41.05
Ty21dl°	36.46
Uk05dl	49.9

(°): Units with less than 500 patients included, results must be interpreted with caution

Percentage of patients submitted to major anatomic lung resections with preoperative measurement of DLCO in different European Countries.

Unit	Percent
Bm02dl	90.54
Bm05dl	92.25
Ch10dl	83.74
Fr130780521	96.86
Fr130780521_01°	97.49
Fr130785652°	51.22
Fr140000209	92.44
Fr140000209_01°	100
Fr210987558	67.92
Fr210987558_01°	97.44
Fr300782117°	91.76
Fr310019351	64.1
Fr310019351_01°	89.75
Fr330783648	60.78
Fr330783648_01°	83.51
Fr340796663°	77.54
Fr350000741°	70.62
Fr350000741_01°	87.91
Fr370004467°	86.33
Fr380000067°	56.09
Fr540000486	27.88
Fr540001138	82.68
Fr540001138_01°	92.5
Fr590780383	56.95
Fr590784864	87.25
Fr590784864_01°	97.9
Fr630000479	92.83
Fr630000479_01°	97.83
Fr670000025	46.19
Fr670000025_01	97.24
Fr690000880	98.37
Fr690784186	82.48
Fr690784186_01°	97.63
Fr750100273	84.87
Fr750100273_01°	94.12
Fr750150104	73.92
Fr750150104_01°	96.25
Fr750712184	67.99
Fr750712184_01°	82.17
Fr750803447	46.2
Fr750803447_01°	80.45
Fr760000158	74.28
Fr760000158_01°	88.26

Unit	Percent
Fr830100574°	95.41
Fr860000223	79.58
Fr870000064°	76.44
Fr920000650	90.16
Fr920000650_01°	97.03
Fr920000684	79.46
Gr02d0	6.2
Gy18dl°	63.32
Gy23dl	90.41
Hu01dl	15.03
Hu02dl	38.08
Hu03dl	1.97
Hu04dl°	0.45
Hu05dl	0.77
Hu06dl	2.44
Hu07dl	6.1
Hu08dl	1.18
Hu09dl	0.58
Hu12dl	56.58
Ie01dl	98.79
It03d0	74.26
It26dl°	84.8
It32dl	93.83
It38dl	64.46
ITSICT-0078°	92.96
Nl19dl°	95.61
Pl06dl	83.57
Sk01dl	90.42
Sp01dl	90.76
Sp06dl°	78.35
Sp17dl	82.71
Sp28dl	88.62
Sp31dl	89.9
Ty21dl°	98.19
Uk05dl	94.74

(°): Units with less than 500 patients included, results must be interpreted with caution

Percentage of patients with primary neoplastic disease and suspicious clinical N2 stage (enlarged >1cm mediastinal nodes at CT scan or PET positive mediastinal nodes) who underwent at least one preoperative invasive mediastinal staging procedure (EBUS, EUS, mediastinoscopy, mediastinotomy, VATS, TEMLA etc.)

Unit	Percent
Bm02dl°	85.97
Bm05dl°	89.45
Ch10dl°	77.24
Fr130780521°	80.15
Fr130780521_01°	80
Fr130785652°	100
Fr140000209°	67.57
Fr140000209_01°	50
Fr210987558°	34.19
Fr210987558_01°	15.79
Fr300782117°	50
Fr310019351°	59.2
Fr310019351_01°	52
Fr330783648°	30.58
Fr330783648_01°	22.22
Fr340796663°	46.67
Fr350000741°	53.85
Fr350000741_01°	50
Fr370004467°	36.96
Fr380000067°	32
Fr540000486°	10.67
Fr540001138°	40.38
Fr540001138_01°	0
Fr590780383°	15.15
Fr590784864°	43.64
Fr590784864_01°	57.14
Fr630000479°	48.21
Fr630000479_01°	70.59
Fr670000025°	24.93
Fr670000025_01°	23.53
Fr690000880°	65.71
Fr690784186°	27.45
Fr690784186_01°	25
Fr750100273°	35.25
Fr750100273_01°	56
Fr750150104°	67.19
Fr750150104_01°	90
Fr750712184°	31.94
Fr750712184_01°	47.83
Fr750803447°	13.21
Fr750803447_01°	30

Unit	Percent
Fr760000158_01°	46.15
Fr800006124°	65.96
Fr830100574°	82.69
Fr860000223°	15.58
Fr870000064°	20
Fr920000650°	27.78
Fr920000650_01°	47.06
Fr920000684°	35.21
Gr02d0°	2.38
Gy18dl°	53.16
Gy23dl°	64.09
Hu01dl°	7.75
Hu02dl°	7.77
Hu03dl	6.62
Hu04dl°	7.41
Hu05dl°	3.28
Hu06dl°	4.28
Hu07dl°	20
Hu08dl°	23.81
Hu09dl°	12.39
Hu12dl°	74.47
Ie01dl°	60.78
It03d0°	31.82
It26dl°	39.22
It32dl°	8.72
It38dl°	14.29
ITSICT-0078°	75.58
Nl19dl°	84.13
Pl06dl°	78.12
Sk01dl°	30.16
Sp01dl°	75
Sp06dl°	80.95
Sp17dl°	45.16
Sp28dl°	71.77
Sp31dl°	69.09
Ty21dl°	76.19
Uk05dl°	81.4

(°): Units with less than 500 patients included, results must be interpreted with caution

Percentage of patients submitted to lymph node dissection during major lung resection for malignant primary neoplastic disease grouped by Countries

Lymph node dissection more extended than sampling alone or selected biopsy (as defined and recommended by the ESTS guidelines for intra-operative mediastinal staging) in lung cancer patients was a frequent procedure in all countries.

This variable will be included in the composite performance score (CPS) used for the ESTS quality certification program.

Unit	Percent
Bm02dl	91.48
Bm05dl	95.31
Ch10dl	96.24
Fr130780521	95.96
Fr130780521_01°	97.99
Fr130785652°	98.63
Fr140000209	94.7
Fr140000209_01°	94.12
Fr210987558	99.3
Fr210987558_01°	99.15
Fr300782117°	98.21
Fr310019351	98.16
Fr310019351_01°	100
Fr330783648	98.51
Fr330783648_01°	96.39
Fr340796663°	91.97
Fr350000741°	82.07
Fr350000741_01°	88.89
Fr370004467°	91.71
Fr380000067°	71.72
Fr540000486	98.08
Fr540001138	99.61
Fr540001138_01°	100
Fr590780383°	99.54
Fr590784864°	86.89
Fr590784864_01°	95.8
Fr630000479	97.19
Fr630000479_01°	96.74
Fr670000025	96.83
Fr670000025_01°	97.93
Fr690000880°	96.05
Fr690784186°	99.76
Fr690784186_01°	98.78
Fr750100273°	98.89
Fr750100273_01°	98.39
Fr750150104	93.27
Fr750150104_01°	93.67
Fr750712184	94.62
Fr750712184_01°	75.82
Fr750803447	97.79
Fr750803447_01°	99.23
Fr760000158	80.61
Fr760000158_01°	82.94
Fr800006124°	99.12
Fr830100574°	91.85
Fr860000223°	97.43
Fr870000064°	88.94
Fr920000650°	86.44
Fr920000650_01°	76.69
Fr920000684	94.53
Gr02d0°	83.45
Gy18dl°	100
Gy23dl	96.8
Hu01dl	95.64
Hu02dl	88.53
Hu03dl	60.44
Hu04dl°	98.05
Hu05dl°	60.69
Hu06dl	96.49
Hu07dl°	99.17
Hu08dl°	41.33
Hu09dl	91.6
Hu12dl	97.34
Ie01dl	92.22
It03d0	92.65
It26dl°	47.58
It32dl	87.94
It38dl°	96.96
ITSICT-0078°	89.37
Nl19dl°	92.06
Pl06dl	99.69
Sk01dl	67.37
Sp01dl	86.21
Sp06dl°	49.69
Sp17dl	96.98
Sp28dl	14.47
Sp31dl	91.43
Ty21dl°	100
Uk05dl	84.02

Primary lung cancer per contributing Units

Percentage of lung excision procedures

Unit	Bilobectomy	Lobectomy	Lung Volume Reduction	Pneumonectomy	Segmentectomy	Wedge	Unk
Bm02dl	4	62.5	0	11.4	6.2	15.9	0
Bm05dl	6.5	71.1	0	10.7	6.5	5.2	0
Ch10dl	3	74.3	0.2	9.1	7.4	4.5	1.5
Fr130780521	2.2	66.3	0	4.5	16.9	8.6	1.5
Fr130780521_01°	3.8	63.7	0	1.4	19.4	10	1.7
Fr130785652°	2.6	64.8	0	3.9	22.2	5.2	1.3
Fr140000209	4.3	75.9	0	3.9	3.2	11.3	1.4
Fr140000209_01°	4.8	73.7	0	2.9	11.9	6.2	0.5
Fr210987558	3.3	70.2	0	5.9	17.5	2.1	1
Fr210987558_01°	3.9	68.3	0	4.3	21.2	1	1.3
Fr300782117°	3.9	76.1	0	2.9	14.6	2	0.5
Fr310019351	2.9	82.4	0.1	5.4	4.7	2.3	2.2
Fr310019351_01°	3.3	83.8	0	2.6	7.7	1.9	0.7
Fr330783648	3.2	77.4	0	2.5	12.8	3.1	1
Fr330783648_01°	3.1	80.4	0	3.1	12.1	0.9	0.4
Fr340796663	4.2	70.9	0	3.2	16.4	5.1	0.2
Fr350000741	2.2	62.2	0	2.9	9.6	21.6	1.5
Fr350000741_01°	2	56.2	0.6	1.3	18.3	20.3	1.3
Fr370004467	3.6	69.7	0	3	7.5	14.8	1.4
Fr380000067	3.3	69	0	3.7	17.7	4.8	1.5
Fr540000486	2.9	76.3	0	9.1	3.8	6.7	1.2
Fr540001138	1.8	69.3	0	6.3	15.5	5.4	1.7
Fr540001138_01°	1.9	45	0	3.1	24.4	23.7	1.9
Fr590780383	4.6	76.8	0	6.4	6	5.8	0.4
Fr590784864	3	69.9	0.2	3.9	13.7	8.1	1.2
Fr590784864_01°	2.4	64.6	0	2.4	24.8	5.8	0
Fr630000479	2.9	73.6	0	5.2	9.7	7.2	1.4
Fr630000479_01°	3.1	73.8	0	4.9	14.2	3.6	0.4
Fr670000025	2.8	72.1	0	7.7	11.3	4.5	1.6
Fr670000025_01°	1.9	60.8	0	6.7	24.9	3.3	2.4
Fr690000880	5.1	73.7	0	5.5	10.6	3.7	1.4
Fr690784186	2.9	75.7	0	3.9	12.7	3.8	1
Fr690784186_01°	3	68.4	0	1.7	21.7	4.8	0.4
Fr750100273	2.6	66.4	0.1	6.3	20.5	2.9	1.2
Fr750100273_01°	3.2	56.2	0	2.7	31.5	5.9	0.5
Fr750150104	2.4	61.8	0.1	2.7	29	2.9	1.1
Fr750150104_01°	2.1	53.7	0	0.3	42.1	1.8	0
Fr750712184	2.4	53.2	0.1	6.2	28.4	8.6	1.1
Fr750712184_01°	2.5	51.2	0	2.5	34.8	7.2	1.8
Fr750803447	4.8	73.5	0	4.5	7.2	9.2	0.8
Fr750803447_01°	2.5	79	0	3.2	9.6	5.7	0
Fr760000158	2.2	61.3	0	6.3	19	10.8	0.4

Unit	Bilobectomy	Lobectomy	Lung Volume Reduction	Pneumonectomy	Segmentectomy	Wedge	Unk
Fr760000158_01°	1.3	60.7	0	5	25.5	7.5	0
Fr800006124	2.1	73.4	0	5.9	8.5	9.6	0.5
Fr830100574	2.9	67.4	0	3.6	6.9	18.5	0.7
Fr860000223	3.8	72.4	0	5.5	9	7.7	1.6
Fr870000064°	2.9	68.4	0	3.2	14	9	2.5
Fr920000650	2.7	72	0	2.4	16.1	5.4	1.4
Fr920000650_01°	4.5	69	0	2.6	20	2.6	1.3
Fr920000684	3.8	76.2	0	4.9	7	7.1	1
Gr02d0	4.7	61.6	0	14.5	4.7	6.1	8.4
Gy18dl°	5.1	61.2	0	7.6	22.5	3.6	0
Gy23dl	3.1	69.2	0.1	5.3	5.5	16.7	0.1
Hu01dl	2.7	58	0	4.6	11.1	23.5	0.1
Hu02dl	2.7	73.1	0	4.9	7.6	11.5	0.2
Hu03dl	2.5	66.1	0	7.9	4.6	17.8	1.1
Hu04dl°	3.3	69.6	1	4.1	12.9	7.2	1.9
Hu05dl°	0.8	75	0	7.7	11.3	4.2	1
Hu06dl	1.2	70	0	4.8	1.5	22.4	0.1
Hu07dl	1.5	72.2	0	2	1.3	23	0
Hu08dl	2.2	52.6	0	12.5	10.8	20.9	1
Hu09dl	3.1	70.4	0	8.7	4	13.1	0.7
Hu12dl	2.2	68.8	0.1	6.2	7	15.6	0.1
Ie01dl	5.3	83.1	0	6	0.7	4.6	0.3
It03d0	3.5	74.8	0	4.8	7.9	8.9	0.1
It26dl°	1.7	56.2	0	4	4.2	32.2	1.7
It32dl	3.4	74.9	0	6.3	5.6	9.6	0.2
It38dl°	5.2	86.1	0	1.7	1.5	5.5	0
ITSICT-0078°	2.6	81.4	0	0	16	0	0
Nl19dl°	3.2	65.5	0	5.2	10.4	15.4	0.3
Pl06dl	3.1	83.8	0	3.5	7.5	2.1	0
Sk01dl	4.4	87.5	0	6.1	2	0	0
Sp01dl	4.2	80.9	0	5.4	7.5	1.9	0.1
Sp06dl°	4.2	80.7	0	3.6	6.8	4.7	0
Sp17dl	3.4	72.4	0	5.7	10.6	7.8	0.1
Sp28dl	3.5	72.4	0	6.6	16.2	1.3	0
Sp31dl	2.4	66.7	0	4.2	14.8	11.4	0.5
Ty21dl°	5.9	78.6	0	2.7	7.5	5.3	0
Uk05dl	3.1	74.3	0	5.7	11.8	4.7	0.4

(°): Units with less than 500 patients included, results must be interpreted with caution

Proportion and type of estended resections amongst lobectomy and bilobectomy

Unit	Alone	Chest Wall	Superior Sulcus Tumor	Sleeve	Diaphragm Resection	Atrial Resection	SVC Resection/ Reconstruction	Vertebral Resection	Unk
Bm02dl	90.9	1.6	1.3	5.3	0.2	0.3	0	0	0.4
Bm05dl	79.8	3.6	1.6	14.3	0.2	0.2	0.1	0.1	0.1
Ch10dl	57.6	7.2	0.2	12.9	0.6	1.5	0.1	0.1	19.8
Fr130780521	89.6	5.9	0.9	3.6	0	0	0	0	0
Fr130780521_01°	94.9	2.5	0	2.6	0	0	0	0	0
Fr130785652°	91	7.1	0	1.9	0	0	0	0	0
Fr140000209	93.3	5.9	0	0.8	0	0	0	0	0
Fr140000209_01°	98.8	1.2	0	0	0	0	0	0	0
Fr210987558	91	6.4	0	2.3	0.2	0	0.1	0	0
Fr210987558_01°	95.9	0.9	0.5	2.7	0	0	0	0	0
Fr300782117°	90.8	4.3	0.6	4.3	0	0	0	0	0
Fr310019351	91.4	6.7	0.2	1.6	0.1	0	0	0	0
Fr310019351_01°	95.4	0.8	0.4	3.4	0	0	0	0	0
Fr330783648	91.4	5.2	0.4	3	0	0	0	0	0
Fr330783648_01°	96.3	2.1	0	1.6	0	0	0	0	0
Fr340796663°	94.2	2.5	0.3	3	0	0	0	0	0
Fr350000741°	92.7	5.1	0.5	1.7	0	0	0	0	0
Fr350000741_01°	88.7	7.9	0	3.4	0	0	0	0	0
Fr370004467°	94.3	5	0	0.7	0	0	0	0	0
Fr380000067°	87.5	9.6	0	2.9	0	0	0	0	0
Fr540000486	97.1	1.8	0	1.1	0	0	0	0	0
Fr540001138°	91.3	5.7	0.9	1.9	0.2	0	0	0	0
Fr540001138_01°	100	0	0	0	0	0	0	0	0
Fr590780383°	86.2	12.5	0.3	1	0	0	0	0	0
Fr590784864°	92.6	3.5	0.9	3	0	0	0	0	0
Fr590784864_01°	92.8	0.7	2.2	4.3	0	0	0	0	0
Fr630000479	94	2.7	0.3	2.7	0.3	0	0	0	0
Fr630000479_01°	94.8	1.7	0.6	2.9	0	0	0	0	0
Fr670000025	87.9	8	0.4	3.7	0	0	0	0	0
Fr670000025_01°	91.6	2.3	0	5.3	0.8	0	0	0	0
Fr690000880°	88.5	3.5	1	7	0	0	0	0	0
Fr690784186°	88	8.8	1.2	2	0	0	0	0	0
Fr690784186_01°	91.5	3	0	4.9	0	0	0.6	0	0
Fr750100273	95.6	2.6	0.4	1.4	0	0	0	0	0
Fr750100273_01°	96.1	2.3	0.8	0.8	0	0	0	0	0
Fr750150104	95.2	3.3	0.4	1.1	0	0	0	0	0
Fr750150104_01°	96.9	0	0	3.1	0	0	0	0	0
Fr750712184	93.1	3.9	0.3	2.5	0.2	0	0	0	0
Fr750712184_01°	95.3	2	0.7	2	0	0	0	0	0
Fr750803447	89.2	8.7	0.6	1.5	0	0	0	0	0
Fr750803447_01°	97.6	0.8	0	1.6	0	0	0	0	0
Fr760000158	90	8.4	0	1.6	0	0	0	0	0

Unit	Alone	Chest Wall	Superior Sulcus Tumor	Sleeve	Diaphragm Resection	Atrial Resection	SVC Resection/ Reconstruction	Vertebral Resection	Unk
Fr760000158_01°	97.5	1.5	0	1	0	0	0	0	0
Fr800006124°	80.5	17.6	0.7	1.2	0	0	0	0	0
Fr830100574°	91.6	4.8	0	3.6	0	0	0	0	0
Fr860000223	94	3.2	0.8	2	0	0	0	0	0
Fr870000064°	97.5	2	0	0.5	0	0	0	0	0
Fr920000650	91.1	2.4	0.4	6.1	0	0	0	0	0
Fr920000650_01°	91.7	2.2	0.9	4.8	0	0.4	0	0	0
Fr920000684	88.3	4.9	1.4	5.4	0	0	0	0	0
Gr02d0°	92.9	3	1.4	1.9	0	0.5	0	0	0.3
Gy18dl°	78.8	7.2	0.9	11.9	0	0.8	0.4	0	0
Gy23dl	84	3.5	1.4	10.2	0.3	0.2	0.4	0	0
Hu01dl	82.1	2.2	0	2.1	0	0.2	0	0	13.4
Hu02dl	18.6	1.5	0.1	7.6	0.2	0	0.2	0.2	71.6
Hu03dl	39.2	5.9	0.1	5.6	0.5	0.1	0.1	0	48.5
Hu04dl°	25.3	3.6	0.6	1.1	0.6	0	0.6	0	68.2
Hu05dl°	0.5	0	3.9	0	0	0	0	0	95.6
Hu06dl	97.2	0	0	0.2	0.2	0	0	0	2.4
Hu07dl°	97.8	0	0	2	0	0.2	0	0	0
Hu08dl	41.3	1	0.1	0.1	0.4	0.3	0	0.1	56.7
Hu09dl	39.9	1.1	0.1	1.7	0.2	0.1	0.2	0	56.7
Hu12dl	89	1.4	0	0.8	0.1	0	0	0	8.7
Ie01dl	90.2	1.7	0.1	5.8	0.5	0.3	0	0	1.4
It03d0	91.6	1.4	0.1	3.6	0.1	0.2	0	0	3
It26dl°	90.1	2.2	0	0	0	0	0	0	7.7
It32dl	85	2.5	0.2	1	0.1	0.1	0.1	0.1	10.9
It38dl°	98.4	1.3	0	0.3	0	0	0	0	0
ITSICT-0078°	95.7	0.7	0	3.6	0	0	0	0	0
Nl19dl°	89.2	4	1.8	3.2	1.1	0.4	0.3	0	0
Pl06dl	99.1	0.1	0	0.7	0	0	0	0	0.1
Sk01dl	93.7	1.2	0.3	4.4	0.3	0	0	0	0.1
Sp01dl	80.7	4.7	0.7	3.3	0.1	0.2	0	0	10.3
Sp06dl°	93.9	1.8	0.6	0.6	0.6	0	0	0	2.5
Sp17dl	85.1	2.8	1.4	5.6	0.2	0.5	0.1	0.4	3.9
Sp28dl	95.6	1.9	0.5	1.4	0.3	0	0	0	0.3
Sp31dl°	91.5	2.8	0.4	3.1	0	0.2	0	0.2	1.8
Ty21dl°	99.4	0	0	0	0	0	0	0	0.6
Uk05dl	91.9	1.6	0.1	1.5	0.3	0	0	0	4.6

(°): Units with less than 500 patients included, results must be interpreted with caution

Proportion of estended and type of resection amongts pneumonectomies

Unit	Alone	Completion	Intrap	Pleuropneum	Sleeve Resection	Diaphragm Resection	Atrial Resection	SVC Resection/ Reconstruction	Vertebral Resection	Unk
Bm02dl°	32.6	17.8	33.3	1.5	2.2	0	0	0	0.7	11.9
Bm05dl°	60.5	5.8	28	0.4	0.4	0	0	0.4	0.8	3.7
Ch10dl°	22.6	4.7	23.6	19.8	4.7	7.6	2.8	1	0	13.2
Fr130780521°	50.6	1.3	0	0	1.3	0	0	0	0	46.8
Fr130780521_01°	100	0	0	0	0	0	0	0	0	0
Fr130785652°	88.9	11.1	0	0	0	0	0	0	0	0
Fr140000209°	29.3	2.4	0	0	0	0	0	0	0	68.3
Fr140000209_01°	100	0	0	0	0	0	0	0	0	0
Fr210987558°	54.1	0	0	0	3.5	0	0	0	0	42.4
Fr210987558_01°	92.3	0	0	0	7.7	0	0	0	0	0
Fr300782117°	66.7	0	0	0	0	0	0	0	0	33.3
Fr310019351°	51.5	0	0	0	0	0	0	0	0	48.5
Fr310019351_01°	100	0	0	0	0	0	0	0	0	0
Fr330783648°	51.4	2.9	0	0	0	0	0	0	0	45.7
Fr330783648_01°	100	0	0	0	0	0	0	0	0	0
Fr340796663°	58.8	0	0	0	0	0	0	0	0	41.2
Fr350000741°	81.2	0	0	0	0	0	0	0	0	18.8
Fr350000741_01°	100	0	0	0	0	0	0	0	0	0
Fr370004467°	70.6	0	0	0	0	0	0	0	0	29.4
Fr380000067°	68.4	0	0	0	0	0	0	0	0	31.6
Fr540000486°	50.7	0	0	0	1.3	0	0	0	0	48
Fr540001138°	54.8	0	0	0	0	0	0	0	0	45.2
Fr540001138_01°	100	0	0	0	0	0	0	0	0	0
Fr590780383°	46.9	0	0	0	0	0	0	0	0	53.1
Fr590784864°	78.3	4.3	0	0	13	0	0	0	0	4.4
Fr590784864_01°	100	0	0	0	0	0	0	0	0	0
Fr630000479°	63.4	7.3	0	0	4.9	0	0	0	0	24.4
Fr630000479_01°	90.9	0	0	0	9.1	0	0	0	0	0
Fr670000025°	46.2	0	0	0	1	0	0	0	0	52.8
Fr670000025_01°	100	0	0	0	0	0	0	0	0	0
Fr690000880°	42.9	0	0	0	0	0	0	0	0	57.1
Fr690784186°	40	0	0	0	0	0	0	0	0	60
Fr690784186_01°	100	0	0	0	0	0	0	0	0	0
Fr750100273°	50.8	0	0	0	0	0	0	0	0	49.2
Fr750100273_01°	100	0	0	0	0	0	0	0	0	0
Fr750150104°	57.9	0	0	0	0	0	0	0	0	42.1
Fr750150104_01°	100	0	0	0	0	0	0	0	0	0
Fr750712184°	51.5	3	0	0	0	0	0	0	0	45.5
Fr750712184_01°	100	0	0	0	0	0	0	0	0	0
Fr750803447°	39.5	0	0	0	0	0	0	0	0	60.5
Fr750803447_01°	100	0	0	0	0	0	0	0	0	0
Fr760000158°	56.4	0	0	0	1.3	0	0	0	0	42.3

Unit	Alone	Completion	Intrap	Pleuropneum	Sleeve Resection	Diaphragm Resection	Atrial Resection	SVC Resection/ Reconstruction	Vertebral Resection	Unk
Fr760000158_01°	100	0	0	0	0	0	0	0	0	0
Fr800006124°	42.4	3.1	0	0	3	0	0	0	0	51.5
Fr830100574°	50	0	0	0	0	0	0	0	0	50
Fr860000223°	56.8	0	0	0	0	0	0	0	0	43.2
Fr870000064°	55.6	0	0	0	0	0	0	0	0	44.4
Fr920000650°	45.8	0	0	0	4.2	0	0	0	0	50
Fr920000650_01°	87.5	0	0	0	12.5	0	0	0	0	0
Fr920000684°	43.6	2.6	0	0	5.1	0	0	0	0	48.7
Gr02d0°	22.2	13.6	33.3	3.7	1.3	0	1.2	1.3	1.2	22.2
Gy18dl°	22.2	0	59.3	14.8	0	0	3.7	0	0	0
Gy23dl°	38.8	1.5	34.9	6.2	8.5	1.5	7	1.6	0	0
Hu01dl°	74.5	4.2	12.8	2.1	0	0	0	0	0	6.4
Hu02dl°	12.9	18.8	3	0	0	0	0	1	0	64.3
Hu03dl°	33.6	26.7	10.3	2.4	1.5	0.3	0	0	0	25.2
Hu04dl°	30	45	5	0	0	5	0	0	0	15
Hu05dl°	8.1	35.1	2.7	0	0	0	0	0	0	54.1
Hu06dl°	36.1	0	16.7	0	0	0	0	0	0	47.2
Hu07dl°	66.7	0	33.3	0	0	0	0	0	0	0
Hu08dl°	28.3	12.5	9.2	0	0	0	0	0	0	50
Hu09dl°	44.9	11	17.8	0.9	0	0	1.7	0	0	23.7
Hu12dl°	83.8	4.2	7.8	0	0	0	0	0	0	4.2
Ie01dl°	50	11.4	29.5	2.3	2.3	4.5	0	0	0	0
It03d0°	46.5	8.5	22.5	0	4.2	0	1.4	0	0	16.9
It26dl°	73.7	5.3	10.5	0	0	0	0	0	0	10.5
It32dl°	62.5	4.1	26.4	0	1.4	0	1.4	0	0	4.2
It38dl°	0	0	16.7	0	0	0	0	0	0	83.3
ITSICT-0078°										
Nl19dl°	81	0	19	0	0	0	0	0	0	0
Pl06dl°	75	0	22.9	0	2.1	0	0	0	0	0
Sk01dl°	74	0	26	0	0	0	0	0	0	0
Sp01dl°	51.9	9.1	11.7	6.5	2.6	1.3	1.3	0	0	15.6
Sp06dl°	57.1	0	14.3	14.3	0	0	0	0	0	14.3
Sp17dl°	80	8.3	8.3	0	1.7	0	0	1.7	0	0
Sp28dl°	76.8	8.9	8.9	0	0	0	0	0	0	5.4
Sp31dl°	46.4	10.7	28.6	3.6	0	0	3.6	0	0	7.1
Ty21dl°	80	0	0	0	0	0	0	0	0	20
Uk05dl°	43.2	3.4	5.9	0	0.9	0	0	0	0	46.6

(°): Units with less than 500 patients included, results must be interpreted with caution

Percentage of VATS (LOBECTOMIES)

Unit	No	Yes	Unknown
Bm02dl	82.8	17.2	0
Bm05dl	46.2	49.2	4.6
Ch10dl	48.3	37.4	14.3
Fr130780521	42	55.5	2.5
Fr130780521_01°	26	70.2	3.8
Fr130785652°	21.7	78.3	0
Fr140000209	74.4	25.6	0
Fr140000209_01°	62.2	37.8	0
Fr210987558	62.9	17.1	20
Fr210987558_01°	51.3	5.2	43.5
Fr300782117°	24.4	74.6	1
Fr310019351	60.4	39.4	0.2
Fr310019351_01°	35.3	64	0.7
Fr330783648	45.8	52.5	1.7
Fr330783648_01°	34.8	65.2	0
Fr340796663	26.1	72.8	1.1
Fr350000741	19.1	77.3	3.6
Fr350000741_01°	20.9	77.8	1.3
Fr370004467	65.2	34.3	0.5
Fr380000067	67.4	32.2	0.4
Fr540000486	82.3	17.5	0.2
Fr540001138	58.3	40.8	0.9
Fr540001138_01°	13.1	83.1	3.8
Fr590780383	82.4	17.6	0
Fr590784864	60.8	32.9	6.3
Fr590784864_01°	32.5	55.8	11.7
Fr630000479	45.4	54.1	0.5
Fr630000479_01°	40	59.6	0.4
Fr670000025	47.7	50.8	1.5
Fr670000025_01°	44.5	55.5	0
Fr690000880	37.6	61.4	1
Fr690784186	46.4	52.8	0.8
Fr690784186_01°	36.4	61.9	1.7
Fr750100273	56.2	40	3.8
Fr750100273_01°	45.6	42.5	11.9
Fr750150104	21.9	76.9	1.2
Fr750150104_01°	17.5	81.8	0.7
Fr750712184	75.9	20.2	3.9
Fr750712184_01°	61.3	35.8	2.9
Fr750803447	72.3	26.4	1.3
Fr750803447_01°	51.6	47.1	1.3
Fr760000158	25	73.5	1.5
Fr760000158_01°	10.7	88.4	0.9
Fr800006124	23.8	75.9	0.3

Unit	No	Yes	Unknown
Fr830100574	37.1	61.3	1.6
Fr860000223	72.1	27.8	0.1
Fr870000064°	47.3	51.6	1.1
Fr920000650	34.3	58.5	7.2
Fr920000650_01°	22.9	71.3	5.8
Fr920000684	31.7	65.8	2.5
Gr02d0	98	1.8	0.2
Gy18dl°	89.9	10.1	0
Gy23dl	58.4	41.6	0
Hu01dl	35.6	64.2	0.2
Hu02dl	48.8	51.1	0.1
Hu03dl	41.4	58.5	0.1
Hu04dl°	50.9	46.8	2.3
Hu05dl°	42.8	57	0.2
Hu06dl	68.9	31.1	0
Hu07dl	23.8	76.2	0
Hu08dl	79.6	19.6	0.8
Hu09dl	62.6	37.1	0.3
Hu12dl	54	45.6	0.4
Ie01dl	40.7	59.3	0
It03d0	55.6	43.5	0.9
It26dl°	51.7	48.3	0
It32dl	69.2	30.8	0
It38dl°	36.9	63.1	0
ITSICT-0078°	5.3	94.7	0
Nl19dl°	11.7	88.3	0
Pl06dl	59.3	40.7	0
Sk01dl	52.8	47.2	0
Sp01dl	61.1	38.7	0.2
Sp06dl°	41.1	58.9	0
Sp17dl	57.8	42	0.2
Sp28dl	26.9	73.1	0
Sp31dl	14.8	85.2	0
Ty21dl°	11.8	88.2	0
Uk05dl	29.8	69.4	0.8

(°): Units with less than 500 patients included, results must be interpreted with caution

Observed versus predicted in-hospital mortality rates of major lung resections in different European Units

(risk adjustment according to Brunelli A et al. please see Appendix for details of applied risk models EUROLUNG2)

Predicted and Observed In-Hospital Mortality Rate (%)2	N	Observed	Predicted
Bm02dl	848	1.89	2.82
Bm05dl	1841	1.58	2.14
Ch10dl	695	1.01	1.97
Fr130780521	1114	2.06	1.71
Fr130780521_01°	189	2.65	1.48
Fr130785652°	94	2.13	1.65
Fr140000209	872	1.15	2.07
Fr140000209_01°	167	1.2	1.96
Fr210987558	676	1.33	2.5
Fr210987558_01°	132	0.76	2.95
Fr300782117°	117	1.71	1.7
Fr310019351	941	0.43	1.78
Fr310019351_01°	232	0.43	1.36
Fr330783648	829	2.17	1.59
Fr330783648_01°	186	2.15	1.4
Fr340796663°	186	0.54	1.45
Fr350000741°	274	0.73	1.25
Fr350000741_01°	73	0	1.4
Fr370004467°	344	2.03	1.95
Fr380000067°	282	0.71	2.29
Fr540000486	642	1.09	2.66
Fr540001138°	416	1.2	2.36
Fr540001138_01°	76	2.63	1.45
Fr590780383°	419	0.24	2.44
Fr590784864°	236	0	1.78
Fr590784864_01°	127	0.79	1.36
Fr630000479	503	0.8	1.78
Fr630000479_01°	167	0.6	1.78
Fr670000025	941	1.17	1.96
Fr670000025_01°	139	0.72	2.19
Fr690000880°	399	0.25	1.64
Fr690784186°	375	0.53	1.83
Fr690784186_01°	143	0.7	1.63
Fr750100273°	191	0	1.79
Fr750100273_01°	80	0	1.84
Fr750150104	569	1.05	1.49

Predicted and Observed In-Hospital Mortality Rate (%)2	N	Observed	Predicted
Fr750150104_01°	156	1.28	1.42
Fr750712184	578	0.52	2.49
Fr750712184_01°	144	0	2.12
Fr750803447	515	0	2.07
Fr750803447_01°	117	0.85	1.65
Fr760000158	671	0.15	1.48
Fr760000158_01°	199	1.01	1.37
Fr800006124°	393	1.02	1.78
Fr830100574°	316	2.85	2.07
Fr860000223	630	1.9	2.3
Fr870000064°	158	0.63	1.73
Fr920000650°	486	0.82	1.52
Fr920000650_01°	216	0	1.43
Fr920000684°	193	0.52	1.53
Gr02d0°	352	1.99	3.47
Gy18dl°	253	6.72	2.94
Gy23dl	1810	1.66	2.13
Hu01dl	517	1.55	1.39
Hu02dl	967	0.41	1.49
Hu03dl	2945	0.81	1.63
Hu04dl°	183	2.73	1.46
Hu05dl°	271	0.37	1.57
Hu06dl°	482	0.41	1.65
Hu07dl°	429	2.56	1.18
Hu08dl°	150	2.67	2.56
Hu09dl°	448	0.67	1.61
Hu12dl	1708	1.05	1.76
Ie01dl	669	3.74	1.83
It03d0	1002	0.5	2.02
It26dl°	271	0.37	2.67
It32dl	924	0.22	2.38
It38dl°	311	0.96	1.88
ITSICT-0078°	383	0	0.94
Nl19dl°	294	2.72	1.52
Pl06dl	1214	0.41	1.81
Sk01dl	767	0.78	1.61
Sp01dl	870	0.46	2.19
Sp06dl°	145	1.38	1.39
Sp17dl	790	1.65	2.28
Sp28dl	663	1.66	1.76
Sp31dl°	463	1.73	1.55
Ty21dl°	161	1.24	1.08
Uk05dl	1614	2.79	1.57

(°): Units with less than 500 patients included, results must be interpreted with caution

PART 3

THYMOMA SECTION
(Database users only)

Message from Clinical Leader of ESTS Thymoma Registry

Dr. Bernhard Moser

Chair ESTS Thymic Working Group

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The thymic epithelial tumor section of the 2022 ESTS Silver Book includes the data of the ESTS prospective thymic database as of December 2022, coordinated by the ESTS database committee and managed by the official platform of the ESTS Registry (KData Clinical srl). The continued support of currently 106 thoracic surgery centers around the globe has increased the number of registered cases in the ESTS Thymic database from 3181 last year to 3558. Experts in thymic surgery of 62 European centers, six Asian, ten South American, two African and one North American center have contributed to this database.

In 2022 the ESTS Thymic working group published “Does Myasthenia Gravis Affect Long-Term Survival in Thymic Carcinomas? An ESTS Database Analysis.” with Filippo Lococo as the first author. The study`s conclusion: “Myasthenia occurred in about 10% of thymic carcinomas and it did not seem to affect significantly the long-term prognosis in surgically treated thymic carcinoma-patients.”

We eagerly await the publication of the 9th edition of the TNM stage classification for thymic epithelial tumors. The ESTS prospective Thymic database provided 1141 analyzable thymic epithelial tumor cases to the final database for the 9th ed. TNM of thymic malignancies (9044 total analyzable cases). Institutions that provided complete and updated cases will be recognized in the Staging Project and in all the accompanying publications related to the 9th revision of the TNM stage classification.

The ESTS Thymic working group together with KDATA will launch the optional **β-version** of the Thymic database in order to advance research concerning the surgical aspects of thymoma/thymic carcinoma treatment. This database will collect detailed information on the different surgical approaches to thymectomy. There will be a strong emphasis on all aspects of minimally-invasive thymectomy.

The ESTS prospective thymic database operated by KDATA allows data input by drop down menus. As many centers work with their own institutional databases, a novelty in participation to the ESTS Thymic Database is the possibility of 3rd party data imports. Please contact Dr. Stefano Passani (KDATA) for the possibility of 3rd party data imports (e.g. compatible .xls databases) if preferred.

The ESTS Thymic working group will convene in person again at the annual meeting in Milano and discuss projects of the thymic database.

Once again, I want to thank all the ESTS thymic contributors for their ongoing valuable effort in providing data. Further I want to welcome the new contributors to join us in this important ESTS project!

Dr. Bernhard Moser
Chair of the ESTS Thymic Working Group
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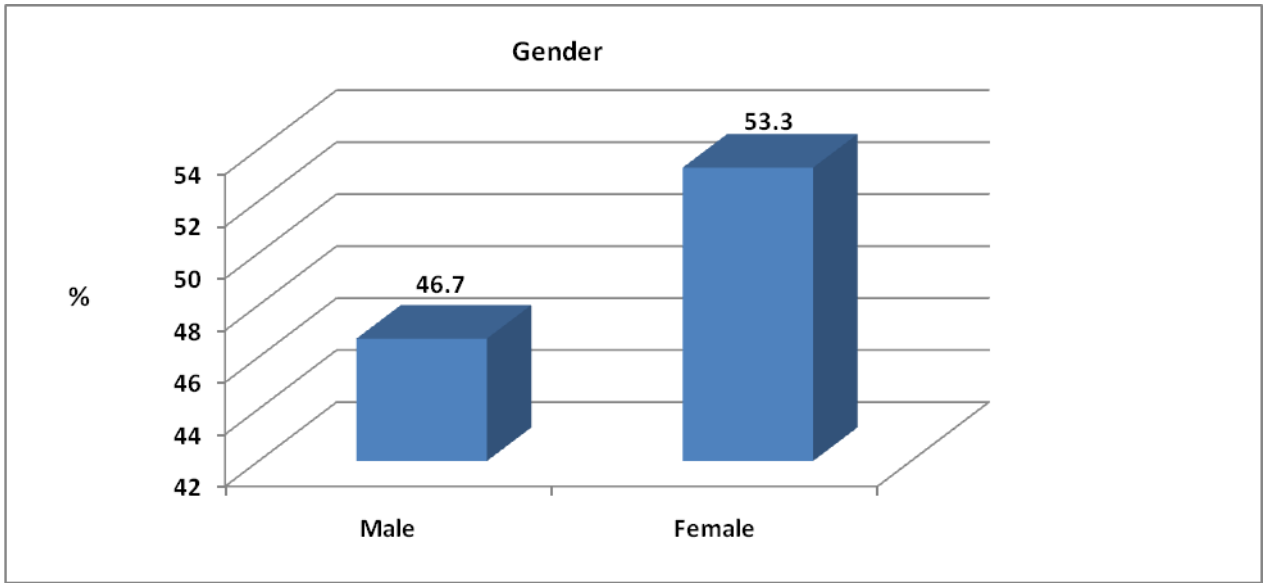
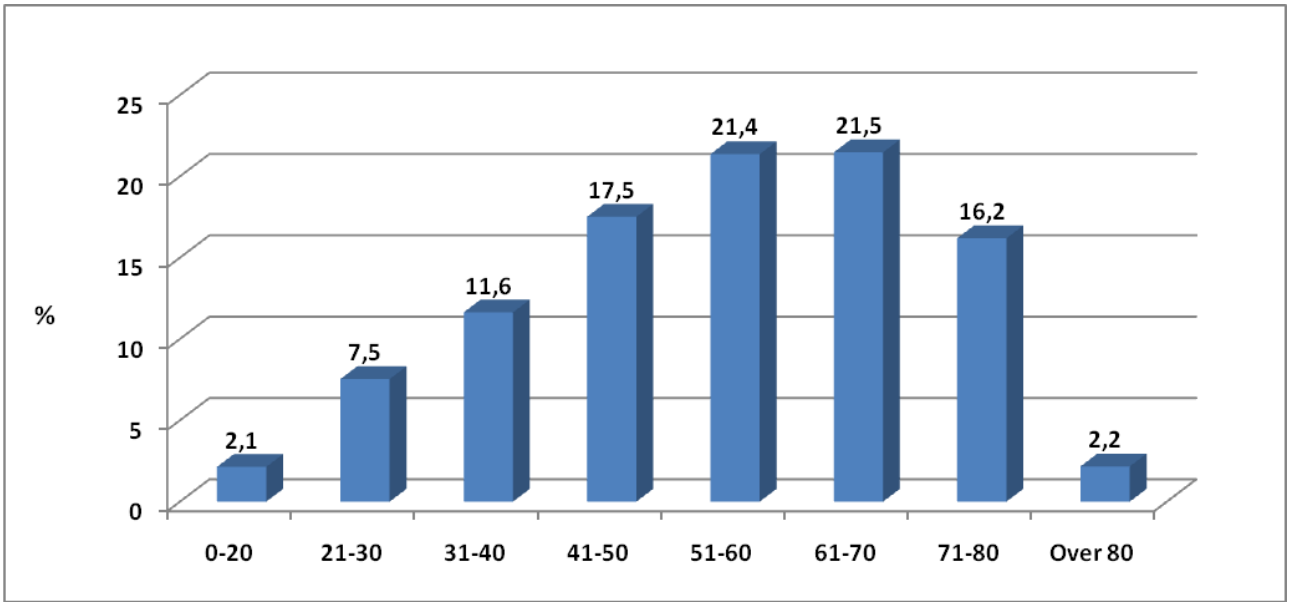
Thymoma Section fields

Thymic Tumors: prospective cases
January 2007- December 2022
N=3558

Demographics: gender and age groups

Gender	Occurrences	Percent
Male	1662	46.7
Female	1896	53.3
Total	**3558**	**100.0**

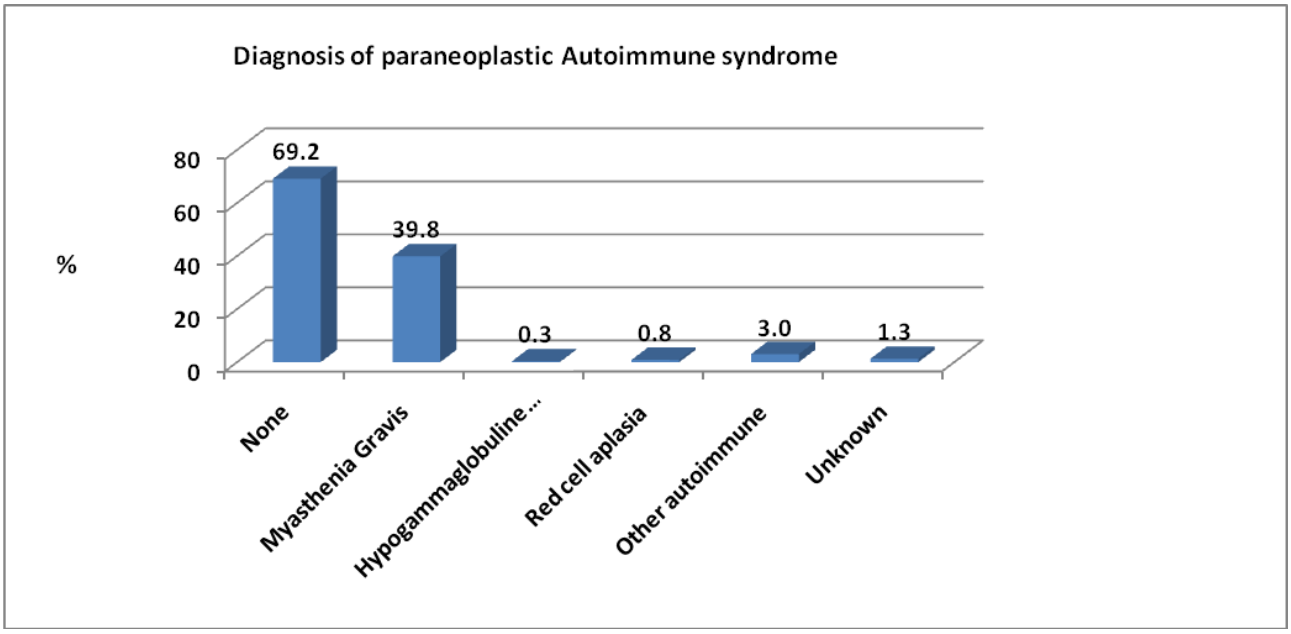




Associated paraneoplastic syndromes

Diagnosis of paraneoplastic -Autoimmune syndrome	Occurrences	Percent
None	1807	69.2
Myasthenia Gravis	1041	39.8
Hypogammaglobulinemia	9	0.3
Red cell aplasia	22	0.8
Other autoimmune	79	3.0
Unknown	34	1.3
Total number of patients	**2613**	**100**

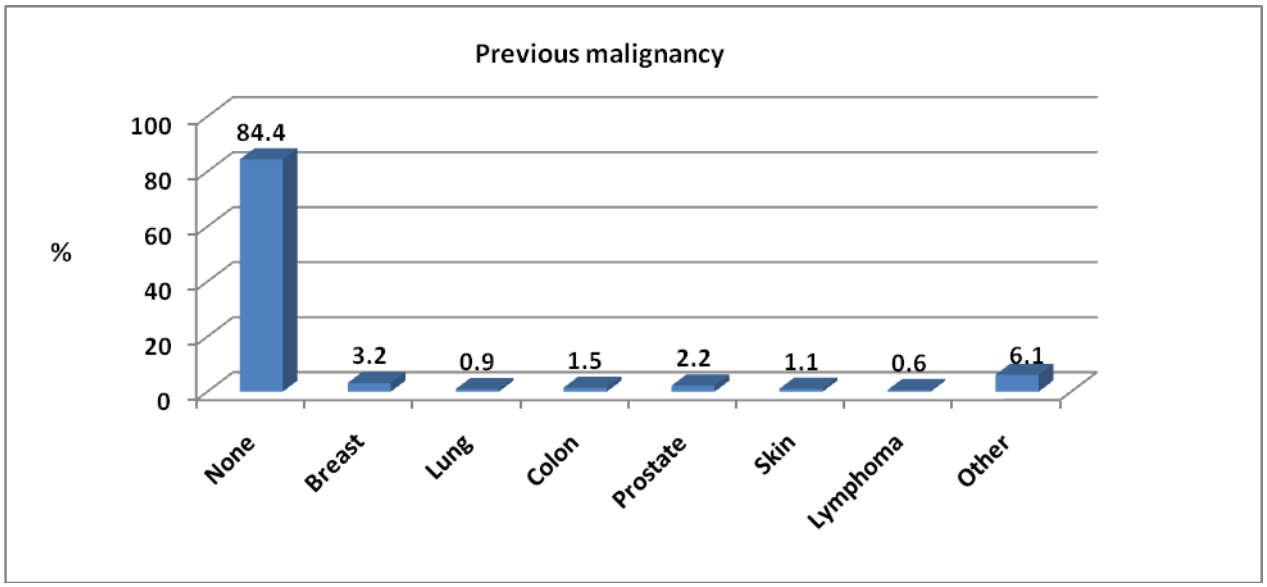
*** Percentages calculated at the net of unknowns cases (N=606; 17%)**



Previous malignancy

Previous malignancy	Occurrences	Percent
None	1545	84.4
Breast	58	3.2
Lung	17	0.9
Colon	27	1.5
Prostate	40	2.2
Skin	20	1.1
Lymphoma	11	0.6
Other	112	6.1
Total number of patients	**1830**	**100**

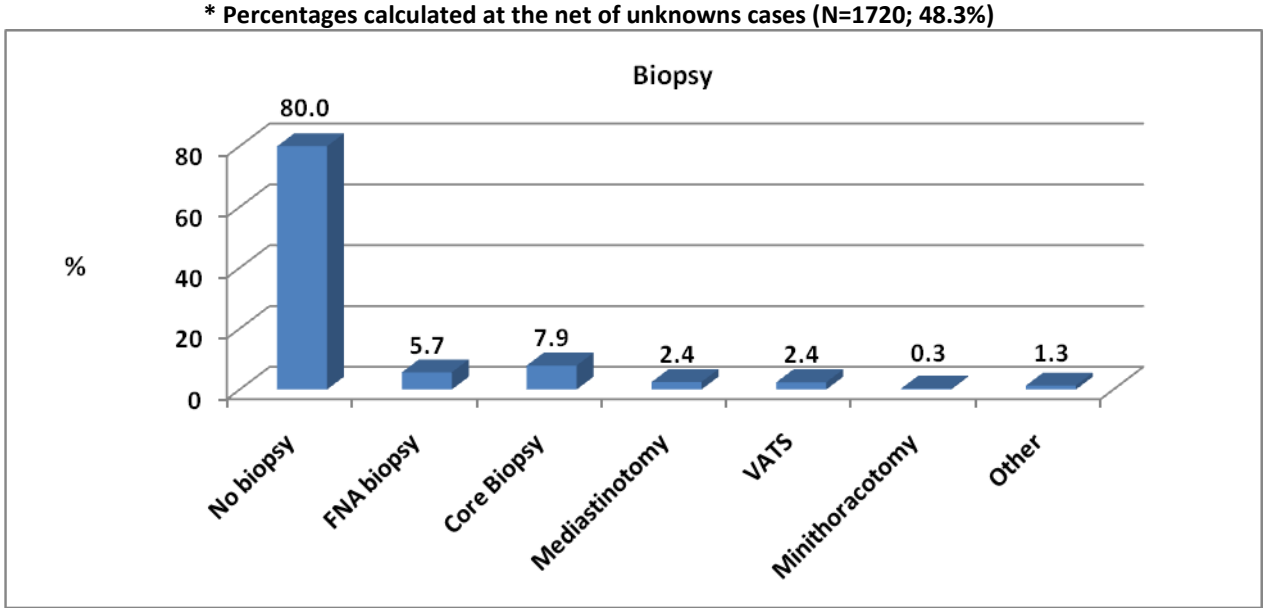
*** Percentages calculated at the net of unknowns cases (N=1747; 49.1%)**



Preoperative diagnosis

Biopsy	Occurrences	Percent
No biopsy	1470	80.0
FNA biopsy	104	5.7
Core Biopsy	145	7.9
Mediastinotomy	45	2.4
VATS	44	2.4
Minithoracotomy	6	0.3
Other	24	1.3
Total	**1838**	**100.0**

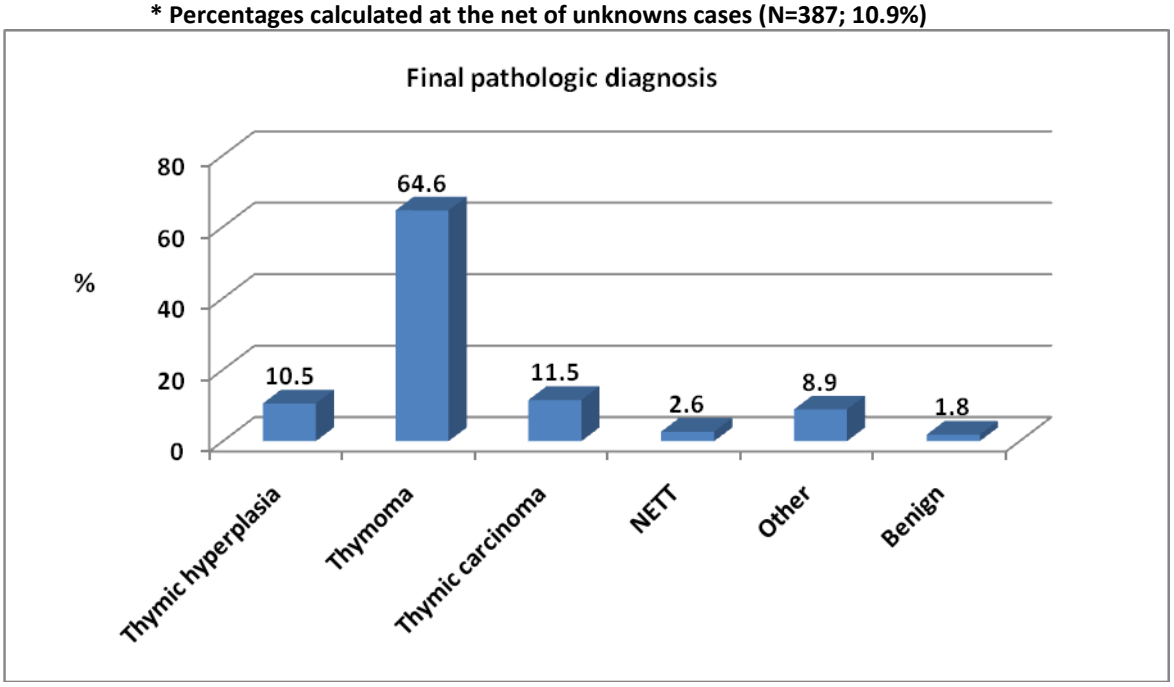
*** Percentages calculated at the net of unknowns cases (N=1720; 48.3%)**



Final pathologic diagnosis

Final pathologic diagnosis	Occurrences	Percent
Thymic hyperplasia	334	10.5
Thymoma	2049	64.6
Thymic carcinoma	365	11.5
NETT	84	2.6
Other	281	8.9
Benign	58	1.8
Total	**3171**	**100.0**

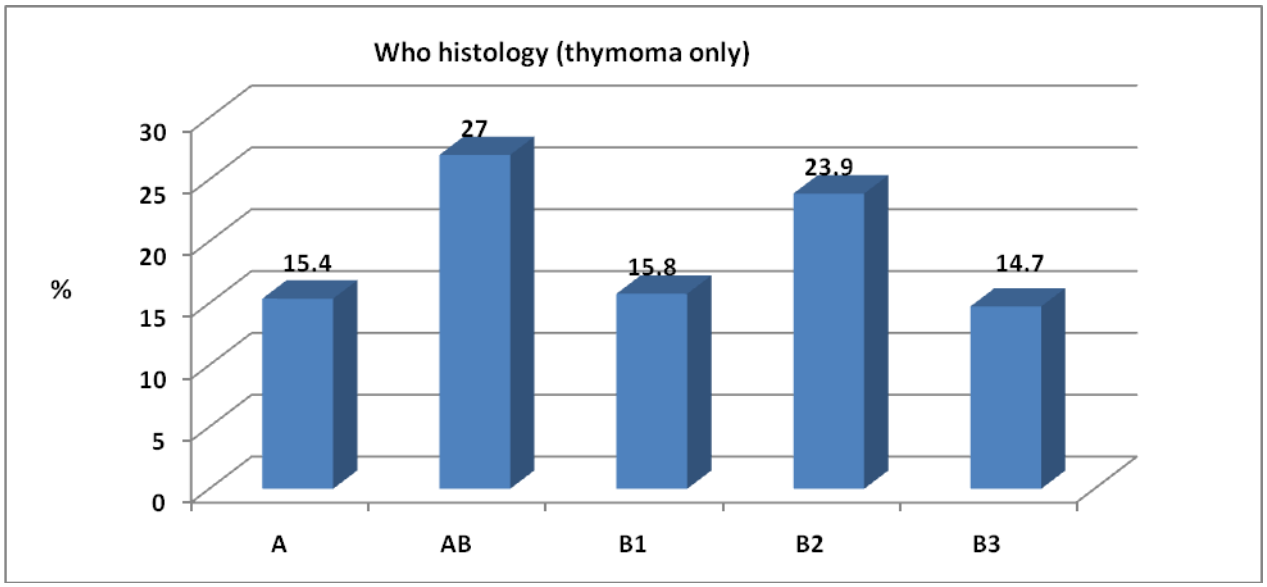
*** Percentages calculated at the net of unknowns cases (N=387; 10.9%)**



WHO histology (thymoma only)

WHO histology	Occurrences	Percent
A	315	15.4
AB	553	27.0
B1	323	15.8
B2	489	23.9
B3	302	14.7
Total	**2049**	**100.0**

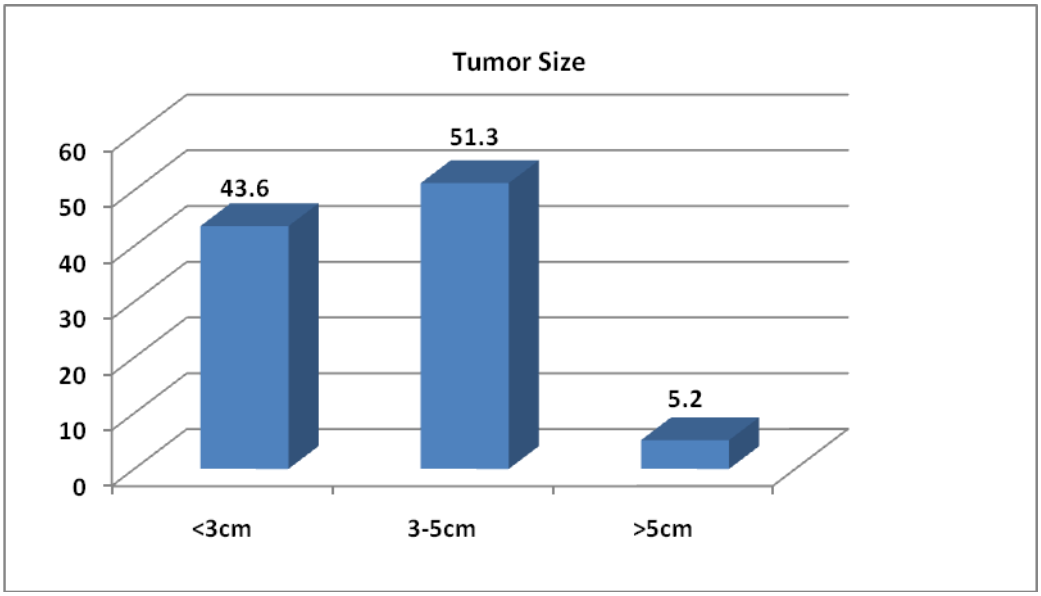
*** Percentages calculated at the net of unknowns cases (N=67;3.2%)**



Tumor size

Tumor size	Occurrences	Percent
<3cm	920	43.6
3-5cm	1083	51.3
>5cm	109	5.2
Total	**2112**	**100.0**

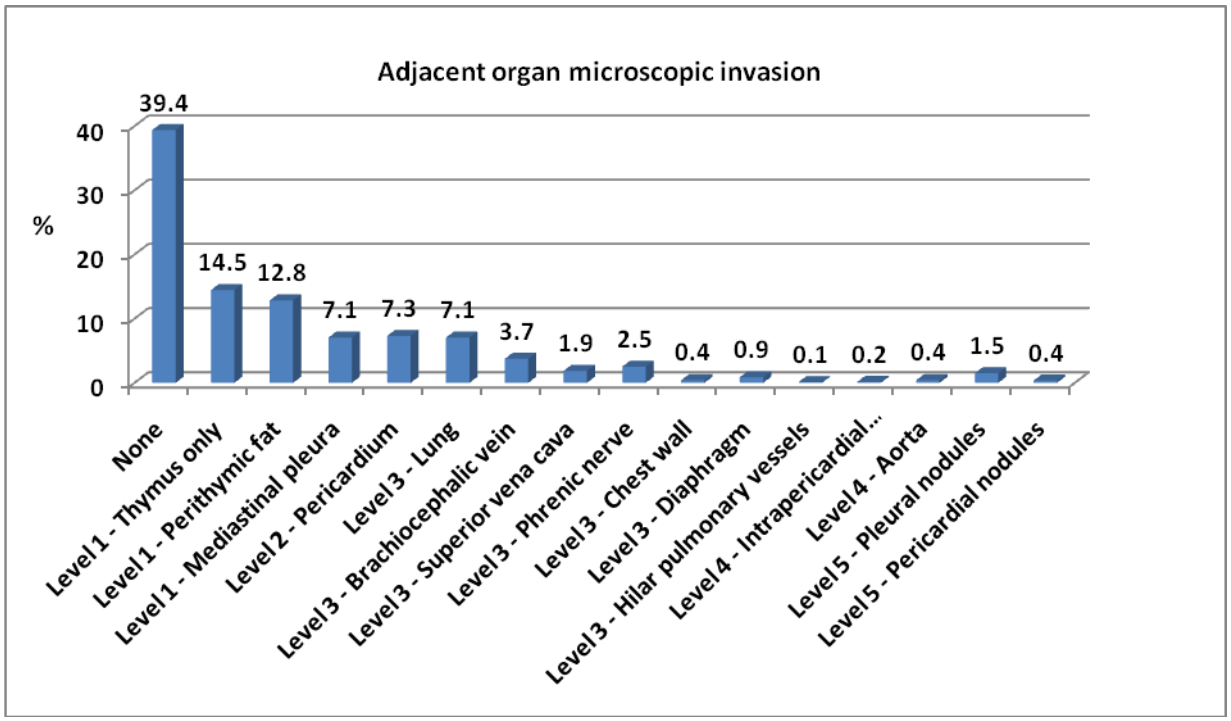
*** Percentages calculated at the net of unknowns cases (N=1440; 40.5%)**



Invasion to surrounding organs

Adjacent organ microscopic invasion	Occurrences	Percent
None	1000	39.4
Level 1 - Thymus only	367	14.5
Level 1 - Perithymic fat	326	12.8
Level 1 - Mediastinal pleura	179	7.1
Level 2 - Pericardium	186	7.3
Level 3 - Lung	179	7.1
Level 3 - Brachiocephalic vein	95	3.7
Level 3 - Superior vena cava	47	1.9
Level 3 - Phrenic nerve	64	2.5
Level 3 - Chest wall	10	0.4
Level 3 - Diaphragm	22	0.9
Level 3 - Hilar pulmonary vessels	3	0.1
Level 4 - Intrapericardial pulmonary artery	4	0.2
Level 4 - Aorta	10	0.4
Level 5 - Pleural nodules	38	1.5
Level 5 - Pericardial nodules	9	0.4
Total number of patients	**2539**	**100**

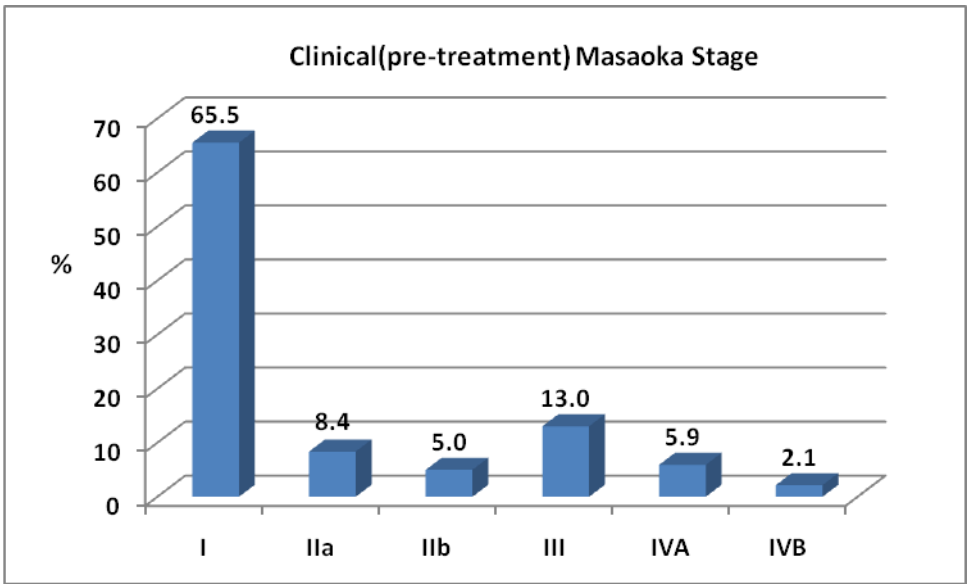
*** Percentages calculated at the net of unknowns cases (N=1650;28.6%)**



Clinical (pre-treatment) stage according to Masaoka-Koga

Clinical (pre-treatment) Masaoka Stage	Occurrences	Percent
I	854	65.5
IIa	109	8.4
IIb	65	5.0
III	170	13.0
IVA	77	5.9
IVB	28	2.1
Total	**1303**	**100.0**

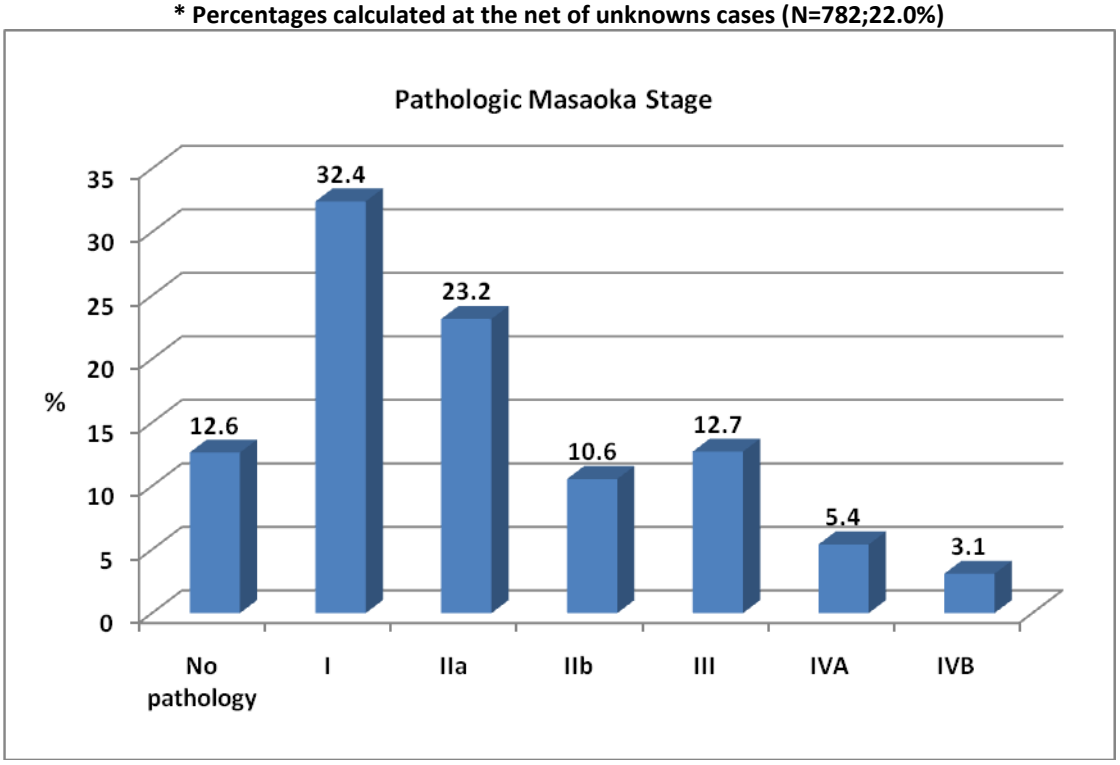
*** Percentages calculated at the net of unknowns cases (N=2255;63.4%)**



Pathologic Masaoka-Koga stage

Pathologic Masaoka Stage	Occurrences	Percent
No pathology	351	12.6
I	900	32.4
IIa	643	23.2
IIb	293	10.6
III	353	12.7
IVA	150	5.4
IVB	86	3.1
Total	**2776**	**100.0**

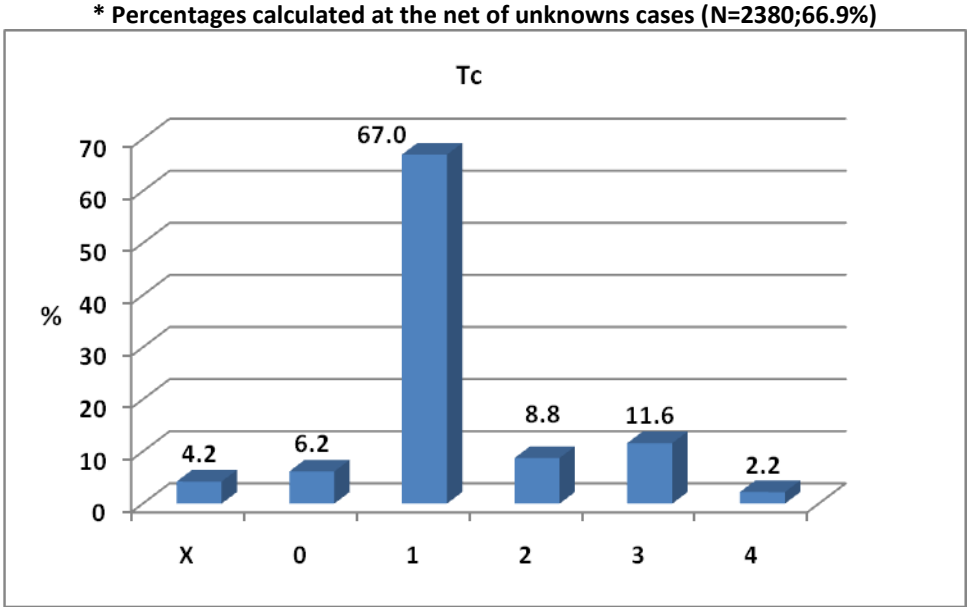
*** Percentages calculated at the net of unknowns cases (N=782;22.0%)**



Clinical TNM Staging

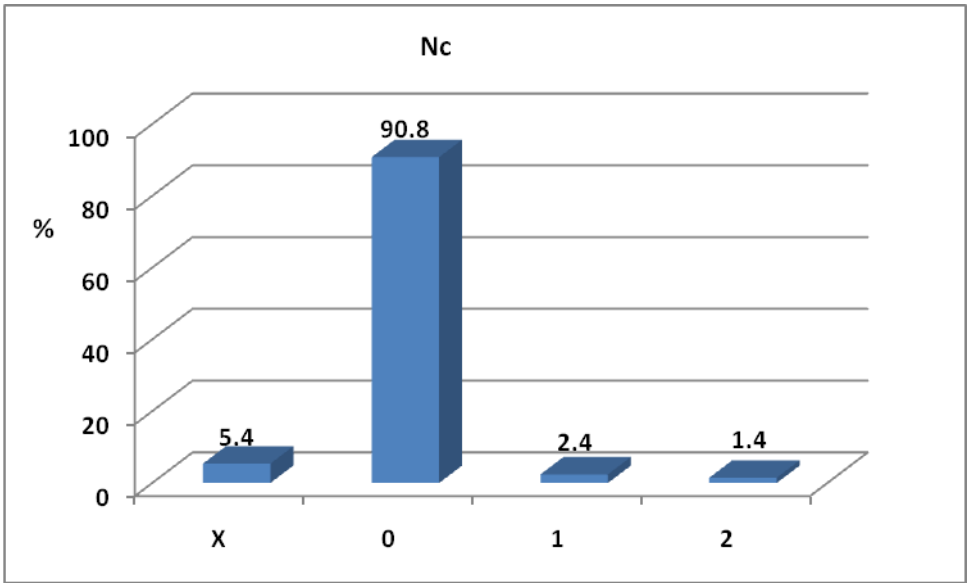
T Clinical	Occurrences	Percent
X	51	4.3
0	81	6.9
1	789	67.0
2	99	8.4
3	132	11.2
4	26	2.2
Total	**1178**	**100.0**

*** Percentages calculated at the net of unknowns cases (N=2380;66.9%)**



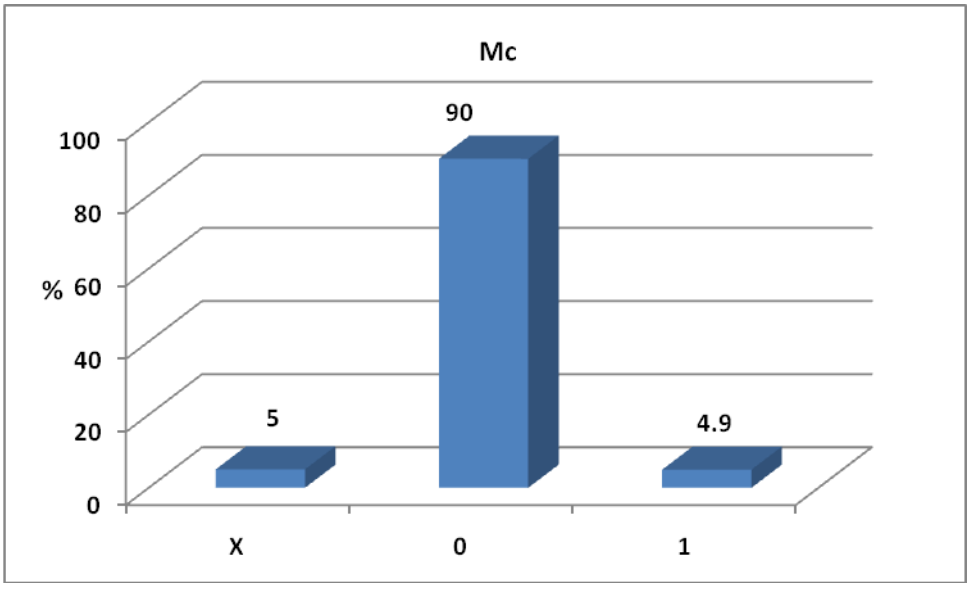
N Clinical	Occurrences	Percent
X	63	5.4
0	1066	90.8
1	28	2.4
2	17	1.4
Total	**1174**	**100.0**

*** Percentages calculated at the net of unknowns cases (N=2384;67%)**



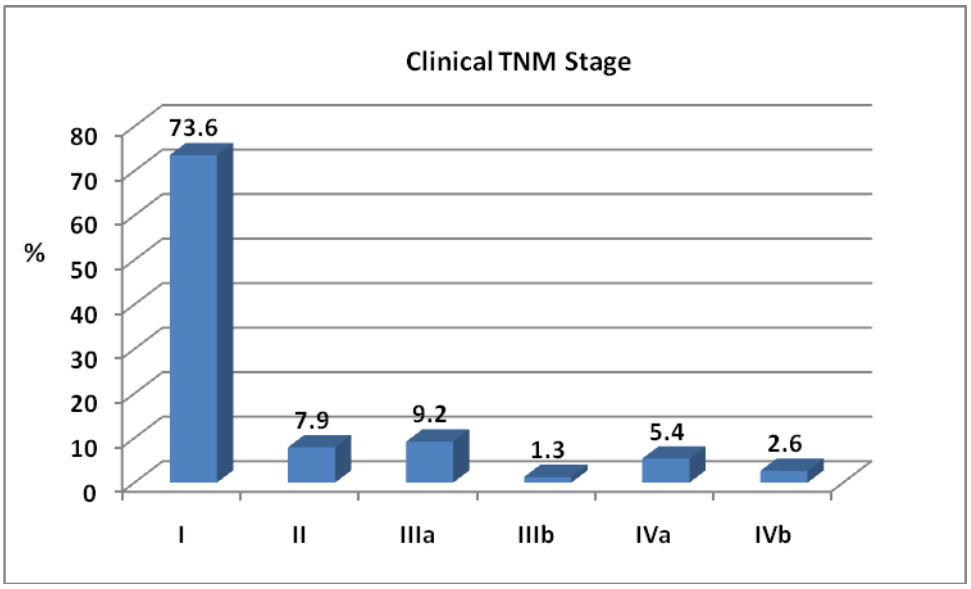
M Clinical	Occurrences	Percent
X	59	5.0
0	1056	90.0
1	58	4.9
Total	**1173**	**100.0**

*** Percentages calculated at the net of unknowns cases (N=2385;67.0%)**



Clinical TNM Stage	Occurrences	Percent
I	751	73.8
II	80	7.9
IIIa	93	9.1
IIIb	12	1.2
IVa	56	5.5
IVb	26	2.6
Total	**1018**	**100.0**

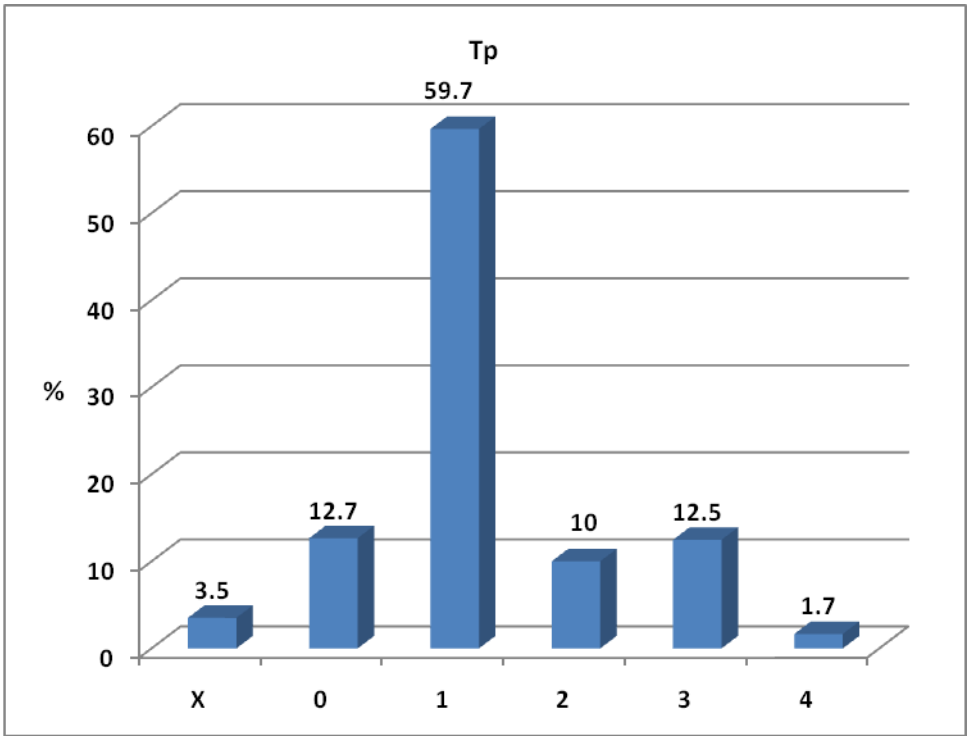
*** Percentages calculated at the net of unknowns cases (N=2540;71.4%)**



Pathologic TNM Staging

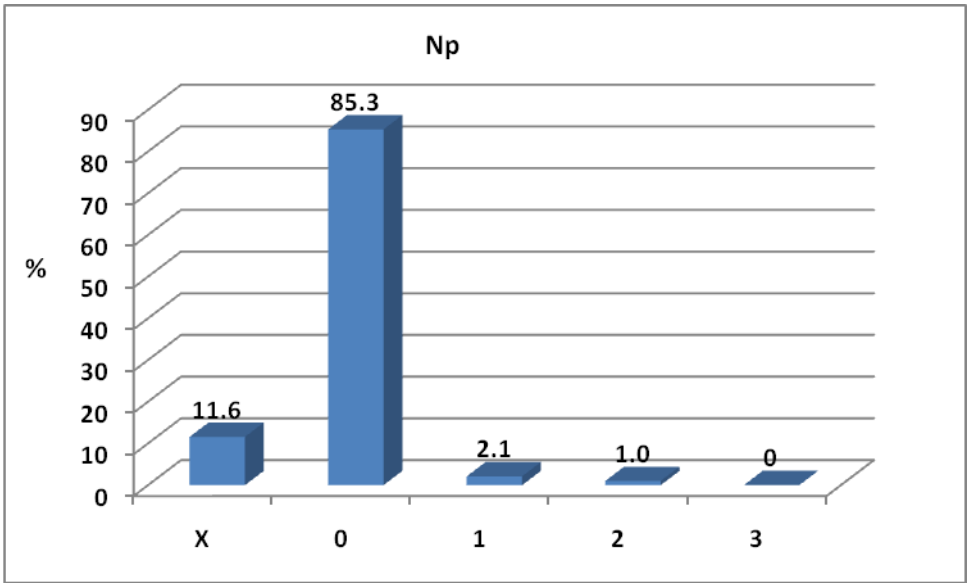
T pathology	Occurrences	Percent
X	74	3.5
0	267	12.7
1	1258	59.7
2	211	10.0
3	263	12.5
4	35	1.7
Total	**2108**	**100.0**

*** Percentages calculated at the net of unknowns cases (N=1450;40.7%)**



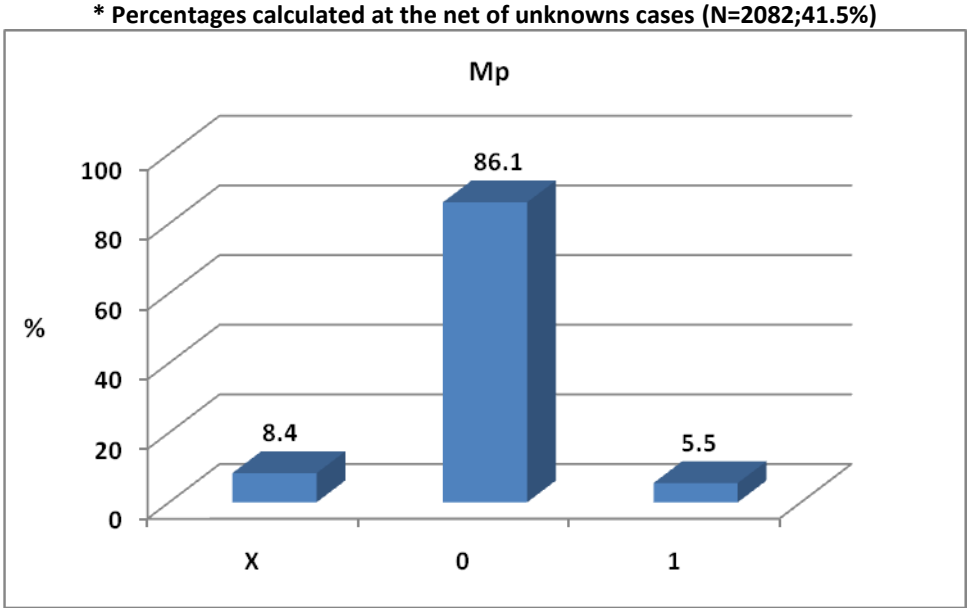
N pathology	Occurrences	Percent
X	220	11.6
0	1621	85.3
1	40	2.1
2	19	1.0
3	0	0
Total	**1900**	**100.0**

*** Percentages calculated at the net of unknowns cases (N=1658;45.6%)**



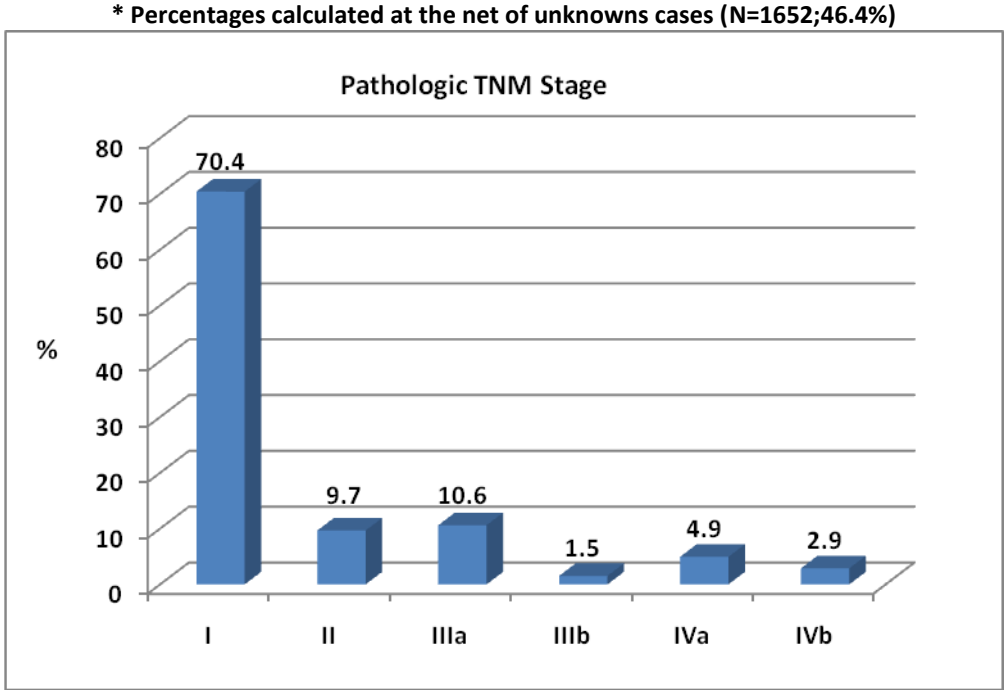
M pathology	Occurrences	Percent
X	174	8.4
0	1793	86.1
1	115	5.5
Total	**2082**	**100.0**

*** Percentages calculated at the net of unknowns cases (N=2082;41.5%)**



Pathologic TNM Stage	Occurrences	Percent
I	1342	70.4
II	184	9.7
IIIa	202	10.6
IIIb	29	1.5
IVa	94	4.9
IVb	55	2.9
Total	**1906**	**100.0**

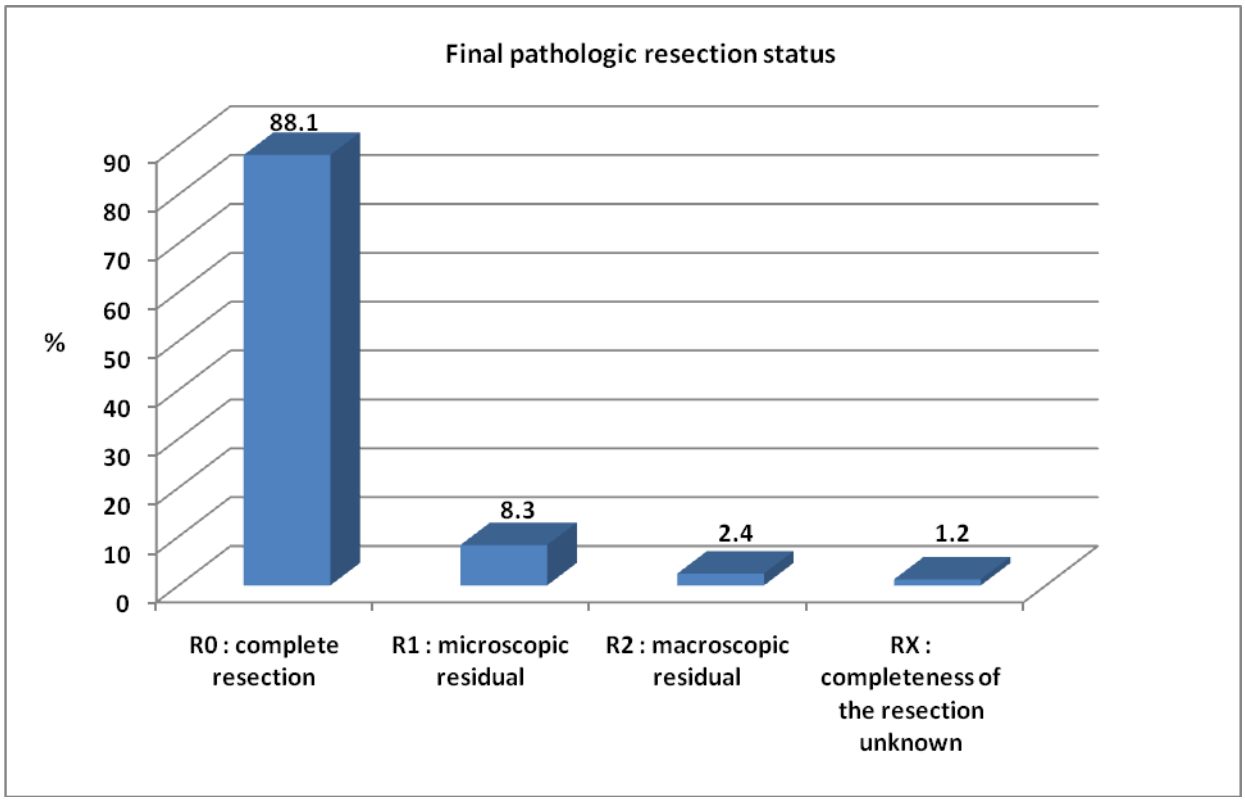
*** Percentages calculated at the net of unknowns cases (N=1652;46.4%)**



Final pathologic resection status

Final pathologic resection status	Occurrences	Percent
R0 : complete resection	2554	88.1
R1 : microscopic residual	240	8.3
R2 : macroscopic residual	70	2.4
RX : completeness of the resection unknown	36	1.2
Total	**2900**	**100.0**

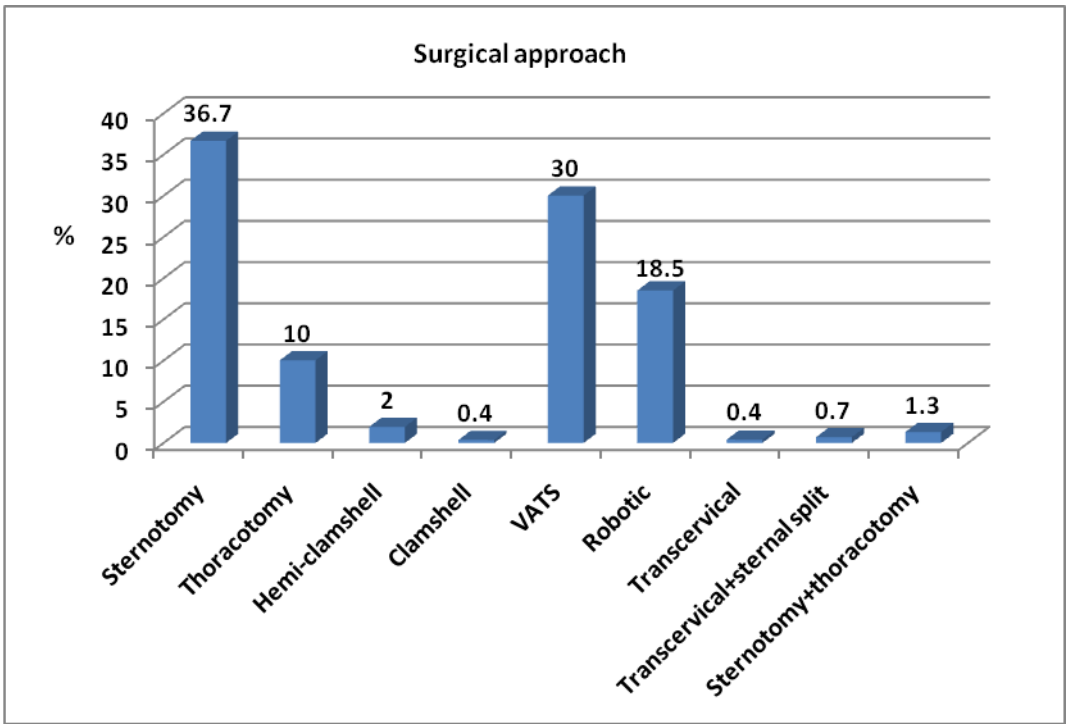
*** Percentages calculated at the net of unknowns cases (N=658;18.5%)**



Surgical approach

Surgical approach	Occurrences	Percent
Sternotomy	995	36.7
Thoracotomy	272	10.0
Hemi-clamshell	53	2.0
Clamshell	10	0.4
VATS	815	30.0
Robotic	502	18.5
Transcervical	11	0.4
Transcervical+sternal split	19	0.7
Sternotomy+thoracotomy	36	1.3
Total	**2713**	**100.0**

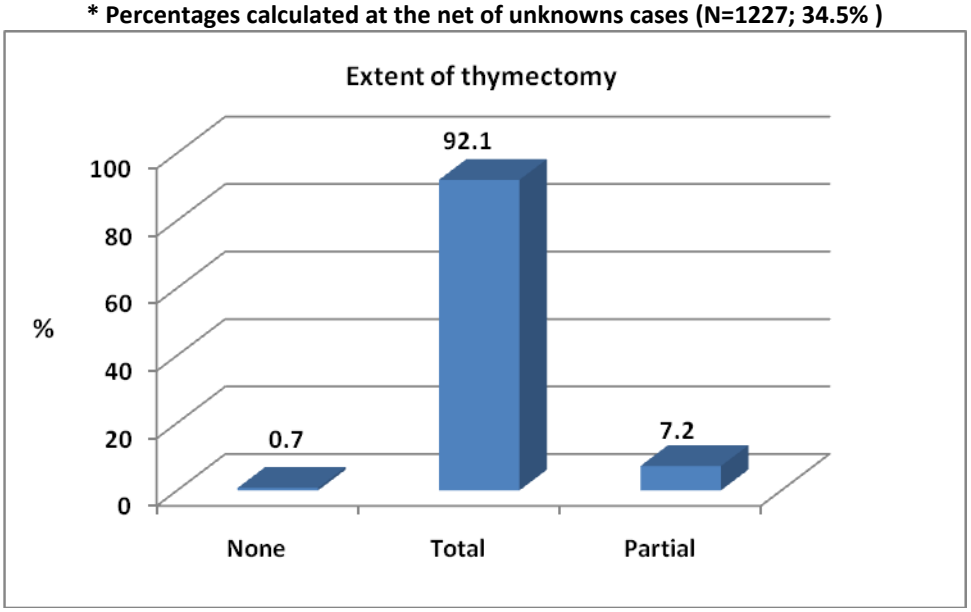
*** Percentages calculated at the net of unknowns cases (N=845; 23.7%)**



Extent of associated thymectomy

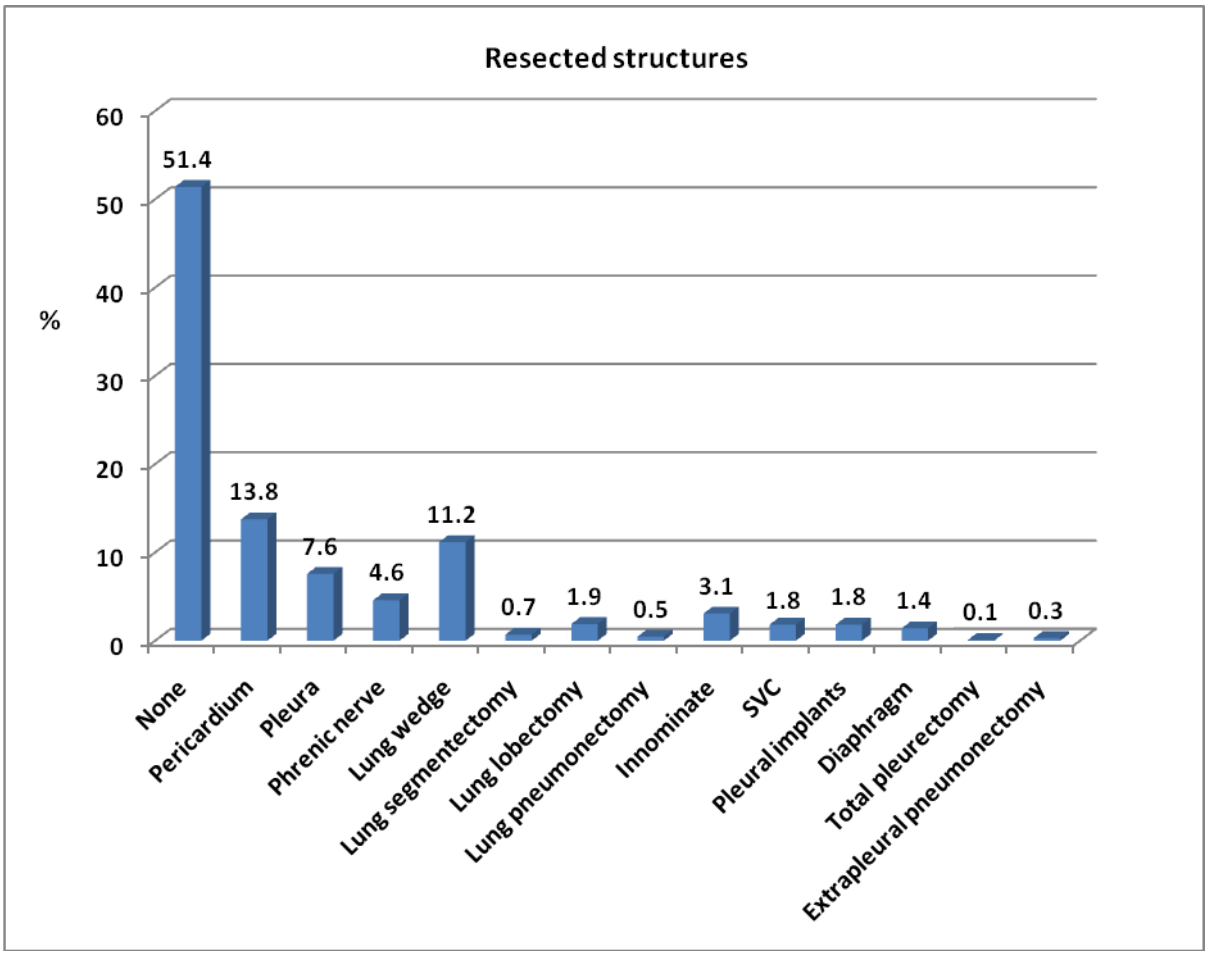
Extent of thymectomy	Occurrences	Percent
None	17	0.7
Total	2146	92.1
Partial	168	7.2
Total	**2331**	**100.0**

*** Percentages calculated at the net of unknowns cases (N=1227; 34.5%)**



Resected structures associated with thymic tumor resection

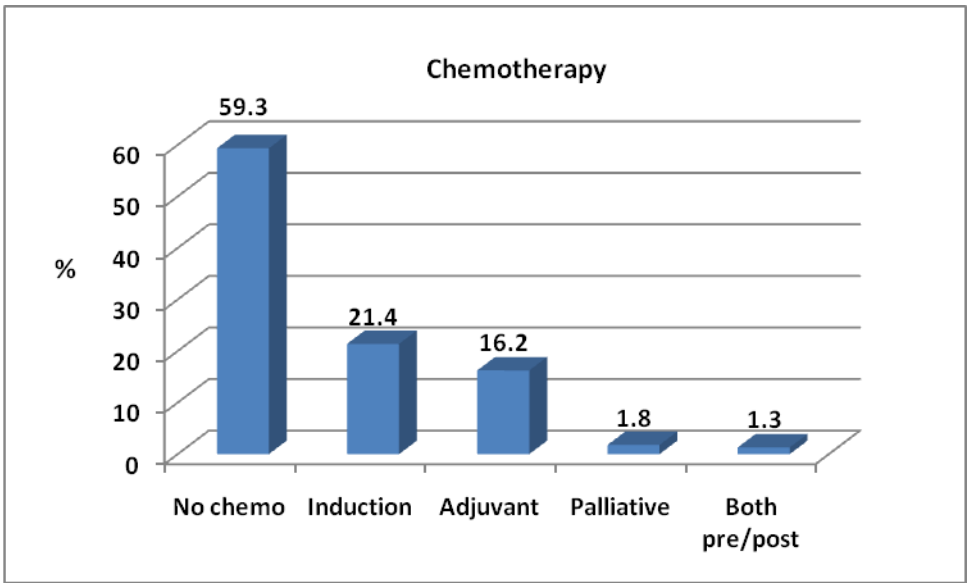
Resected structures	Occurrences	Percent
None	1357	51.4
Pericardium	363	13.8
Pleura	200	7.6
Phrenic nerve	121	4.6
Lung wedge	295	11.2
Lung segmentectomy	18	0.7
Lung lobectomy	50	1.9
Lung pneumonectomy	12	0.5
Innominate	81	3.1
SVC	48	1.8
Pleural implants	48	1.8
Diaphragm	37	1.4
Total pleurectomy	2	0.1
Extrapleural pneumonectomy	8	0.3
Total number of patients	**2640**	**100**



Chemotherapy

Chemotherapy	Occurrences	Percent
No chemo	369	59.3
Induction	133	21.4
Adjuvant	101	16.2
Palliative	11	1.8
Both pre/post	8	1.3
Total	**622**	**100.0**

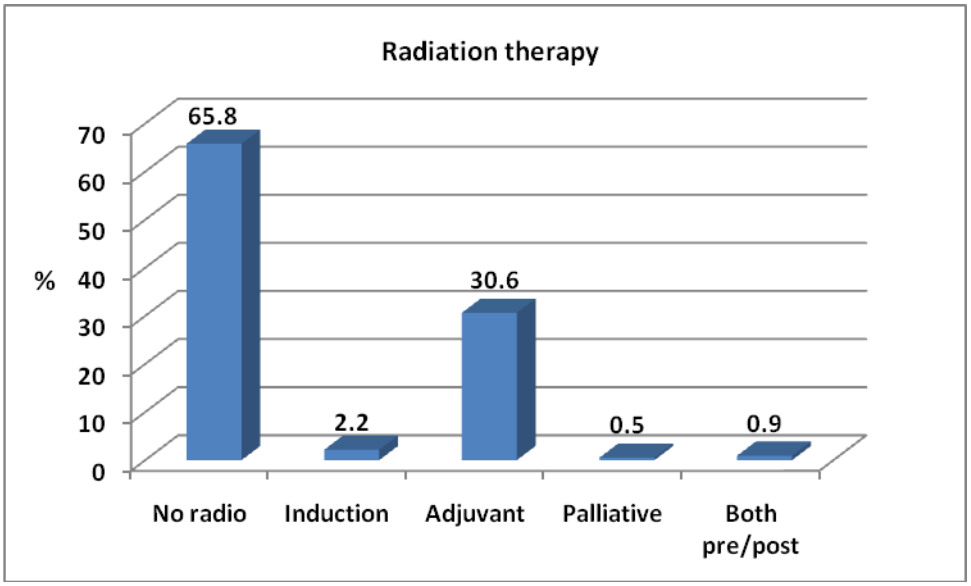
*** Percentages calculated at the net of unknowns cases (N=2936;82.5%)**



Radiotherapy

Radiation therapy	Occurrences	Percent
No radiotherapy	640	65.8
Induction	21	2.2
Adjiuvant	298	30.6
Palliative	5	0.5
Both pre(post	9	0.9
Total	**973**	**100.0**

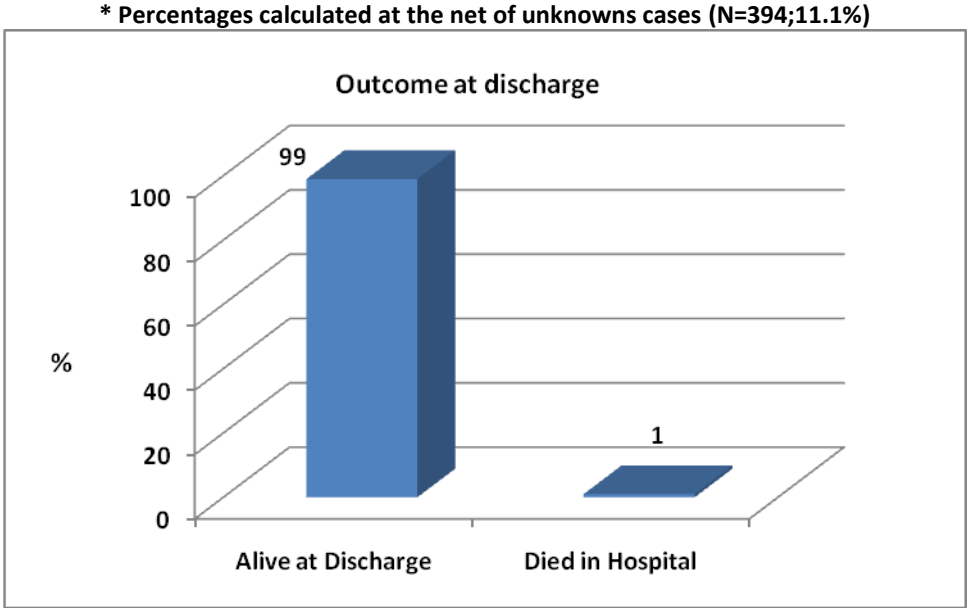
*** Percentages calculated at the net of unknowns cases (N=2585;72.7%)**



Outcome at hospital discharge

Outcome at Discharge	Occurrences	Percent
Alive at Discharge	3132	99.0
Died in Hospital	32	1.0
Total	**3164**	**100.0**

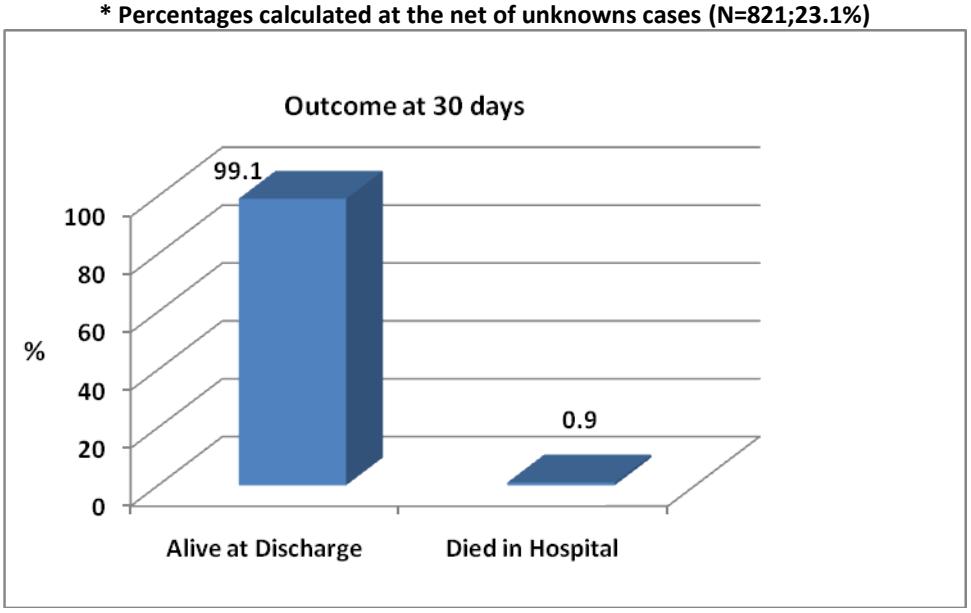
*** Percentages calculated at the net of unknowns cases (N=394;11.1%)**



Outcome at 30 days

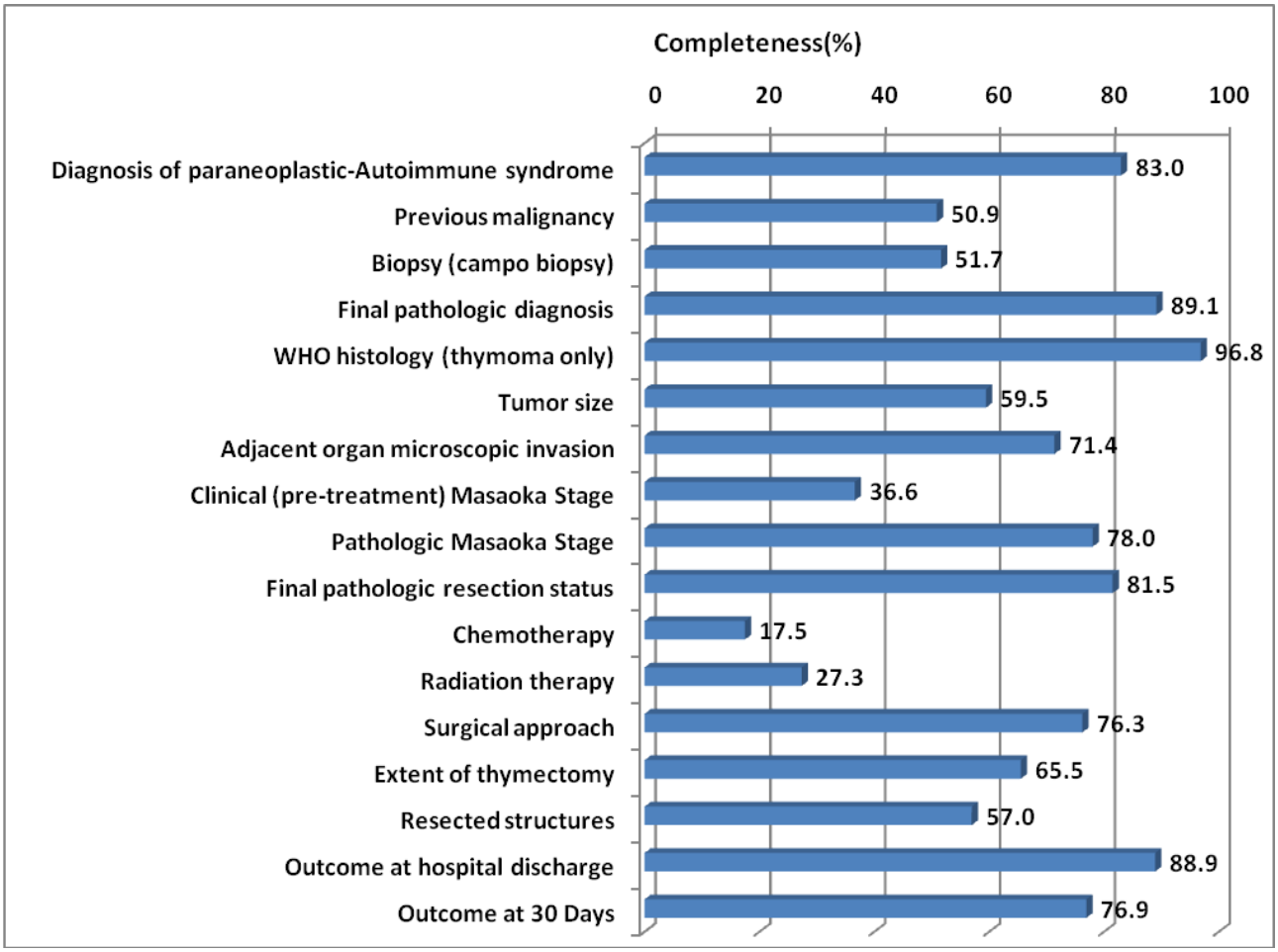
Outcome at 30 Days	Occurrences	Percent
Alive at Discharge	2711	99.1
Died in Hospital	26	0.9
Total	**2737**	**100.0**

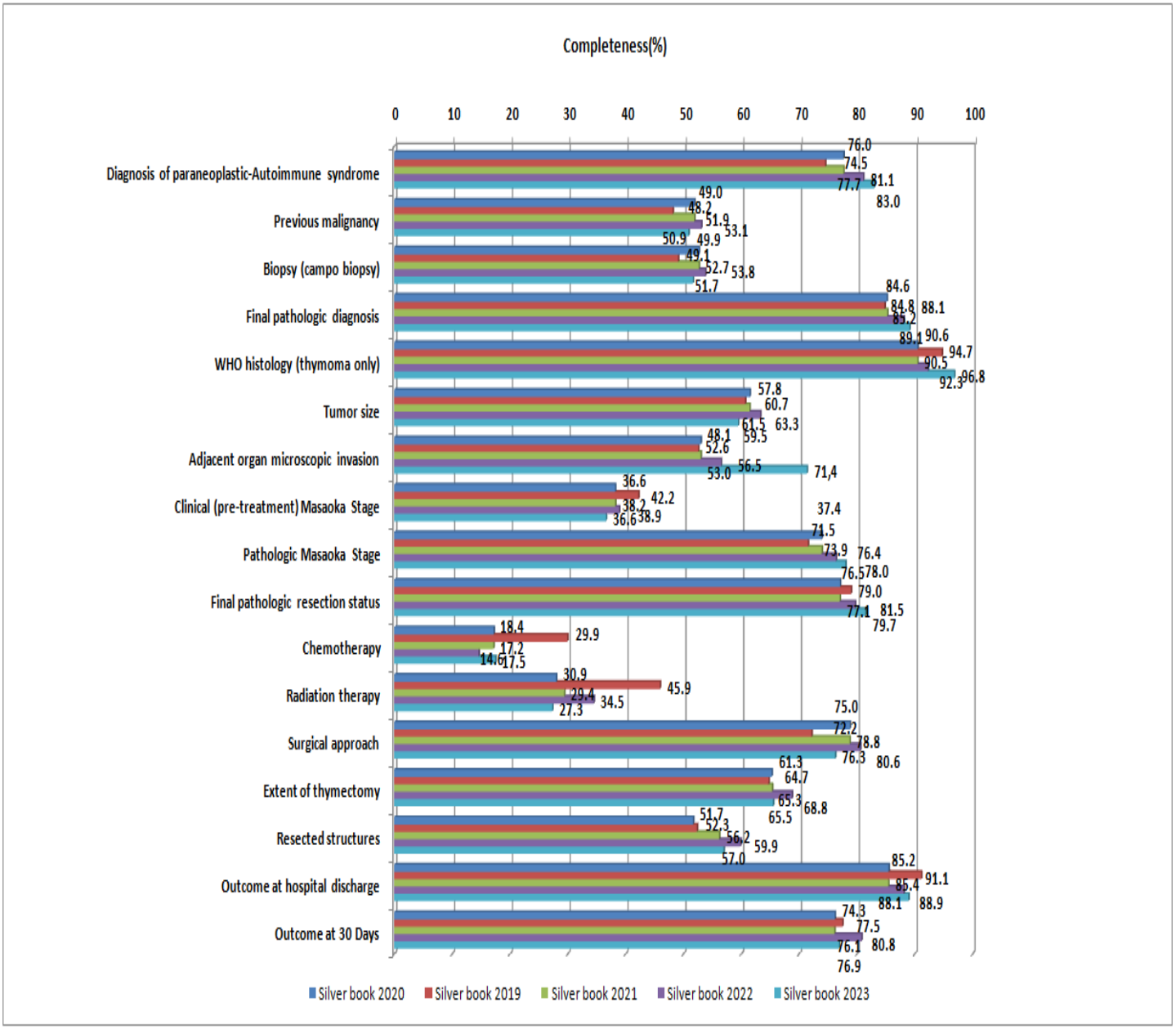
*** Percentages calculated at the net of unknowns cases (N=821;23.1%)**



Data Completeness

Name of Field	Unknown (%)	Completeness(%)
Diagnosis of paraneoplastic-Autoimmune syndrome	17.0	83.0
Previous malignancy	49.1	50.9
Biopsy (campo biopsy)	48.3	51.7
Final pathologic diagnosis	10.9	89.1
WHO histology (thymoma only)	3.2	96.8
Tumor size	40.5	59.5
Adjacent organ microscopic invasion	28.6	71.4
Clinical (pre-treatment) Masaoka Stage	63.4	36.6
Pathologic Masaoka Stage	22.0	78.0
Final pathologic resection status	18.5	81.5
Chemotherapy	82.5	17.5
Radiation therapy	72.7	27.3
Surgical approach	23.7	76.3
Extent of thymectomy	34.5	65.5
Resected structures	43.0	57.0
Outcome at hospital discharge	11.1	88.9
Outcome at 30 Days	23.1	76.9




Completeness(%)
0
10
20
30
40
50
60
70
80
90
100
Diagnosis of paraneoplastic-Autoimmune syndrome
76.0
74.5
77.7
81.1
83.0
Previous malignancy
49.0
48.2
51.9
50.9
49.9
53.1
Biopsy (campo biopsy)
49.1
52.7
53.8
51.7
Final pathologic diagnosis
84.6
84.8
88.1
85.2
WHO histology (thymoma only)
89.1
90.6
94.7
90.5
92.3
96.8
Tumor size
57.8
60.7
61.5
63.3
Adjacent organ microscopic invasion
48.1
52.6
53.0
56.5
59.5
71,4
Clinical (pre-treatment) Masaoka Stage
36.6
42.2
38.2
36.6
38.9
37.4
Pathologic Masaoka Stage
71.5
73.9
76.4
76.5
78.0
Final pathologic resection status
79.0
77.1
81.5
79.7
Chemotherapy
18.4
29.9
17.2
14.6
17.5
Radiation therapy
30.9
45.9
29.4
34.5
27.3
Surgical approach
75.0
72.2
78.8
76.3
80.6
Extent of thymectomy
61.3
64.7
65.3
68.8
65.5
Resected structures
51.7
52.3
56.2
59.9
57.0
Outcome at hospital discharge
85.2
91.1
85.4
88.1
88.9
Outcome at 30 Days
74.3
77.5
76.1
80.8
76.9
Silver book 2020
Silver book 2019
Silver book 2021
Silver book 2022
Silver book 2023

PART 4

MESOTHELIOMA SECTION

(Database users only)

Message from Clinical Leader of the ESTS Mesothelioma Registry

Dear ESTS members and mesothelioma DB contributors

We now have collected nearly 2500 patients diagnosed with mesothelioma. This is one of the biggest society registry and we need your contribution to improve quality data and increase the number of patients enrolled. We have worked together with ETOP to publish a real world data experience on mesothelioma. Recently immunotherapy has been introduced into clinical practice and more than ever we need more data on mesothelioma patients. The database can contribute to validate the upcoming results of MARS2 trial and also to validate the next edition of TNM staging.

I encouraged to submit all your mesothelioma cases and to propose any potential study we can perform using the ESTS mesothelioma registry

Best regards

Dr. Andrea Billè

Chair of the ESTS Mesothelioma Working Group

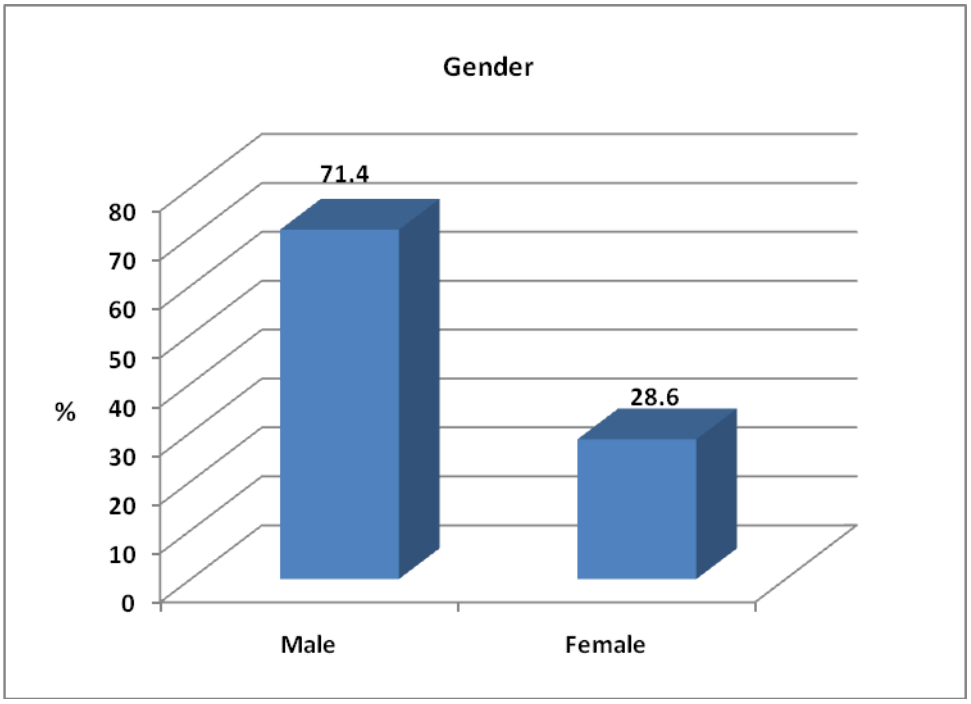
Andrea.Bille@gstt.nhs.uk

Mesothelioma Section fields

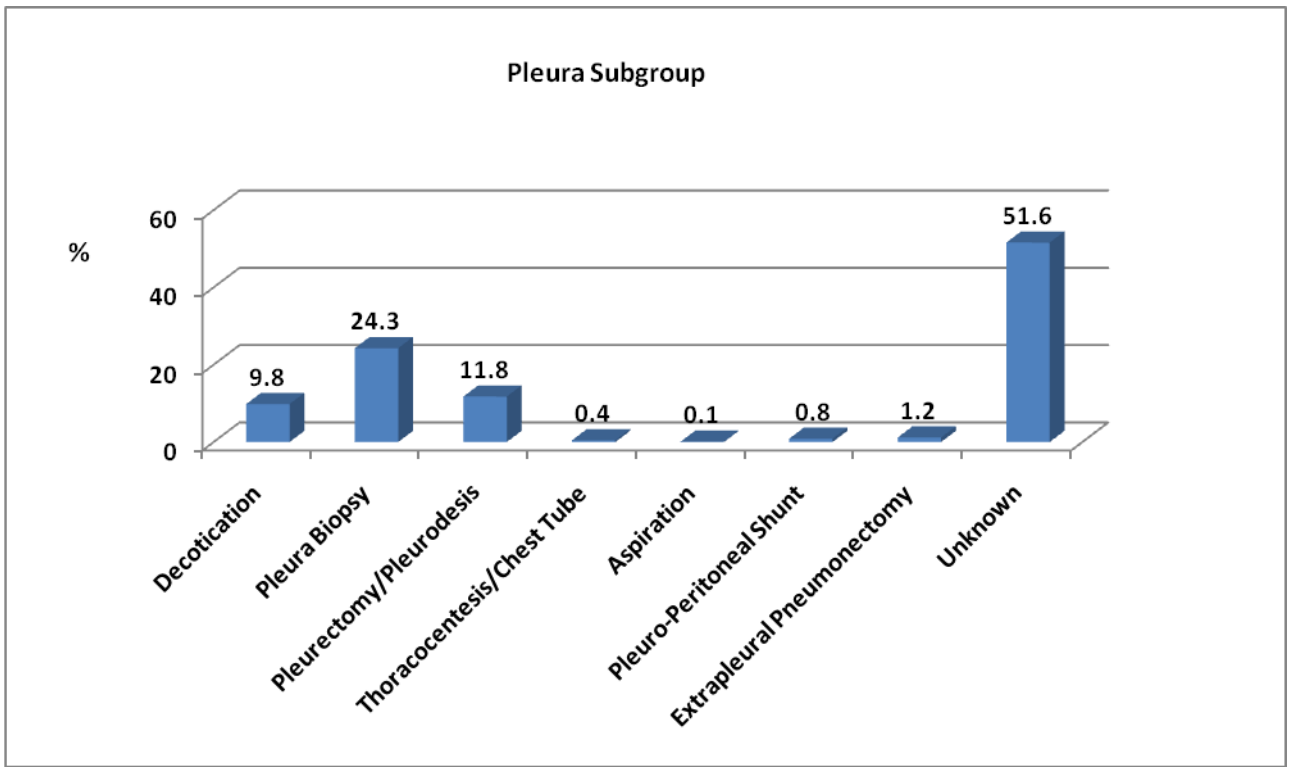
Group definition: Pleura – Diagnosis : Mesothelioma; prospective cases
January 1990- May 2023
N=2475

Demographics: gender

Gender	Occurrences	Percent
Male	1768	71.4
Female	707	28.6
Total	**2475**	**100**

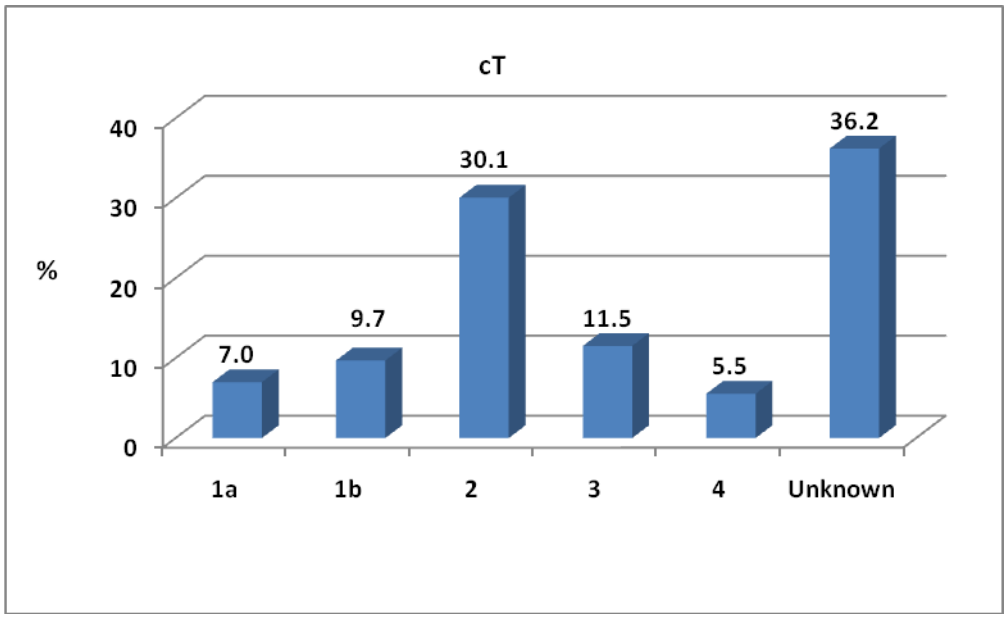


Pleura Subgroup	Occurrences	Percent
Decotication	243	9.8
Pleura Biopsy	601	24.3
Pleurectomy/Pleurodesis	291	11.8
Thoracocentesis/Chest Tube	11	0.4
Aspiration	2	0.1
Pleuro-Peritoneal Shunt	21	0.8
Extrapleural Pneumonectomy	29	1.2
Unknown	1277	51.6
Total	**2475**	**100.0**

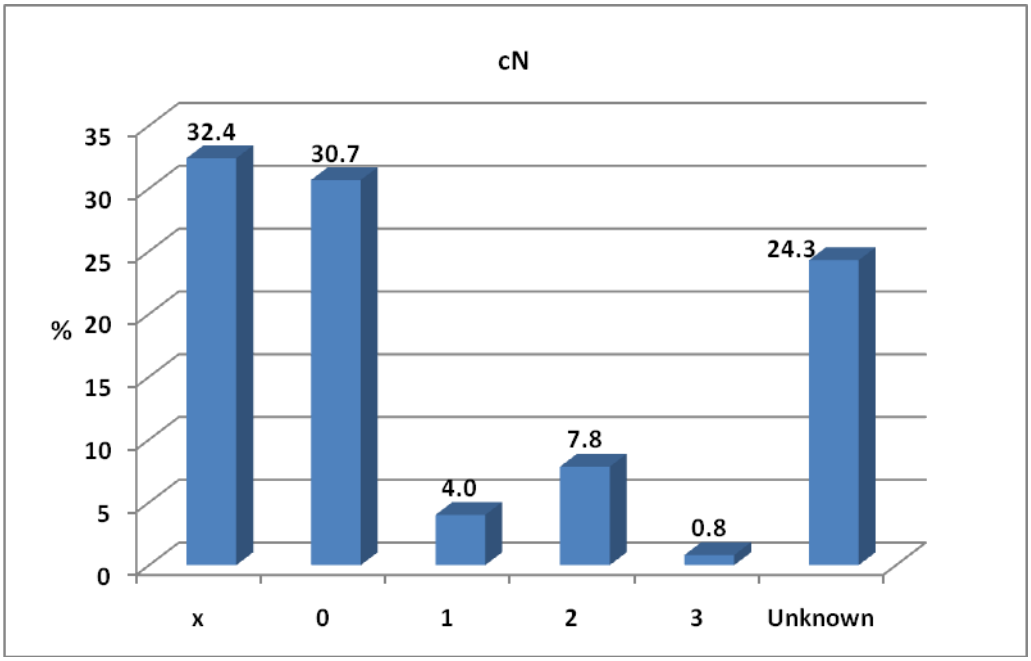


Clinical Staging : cT,cN,cM

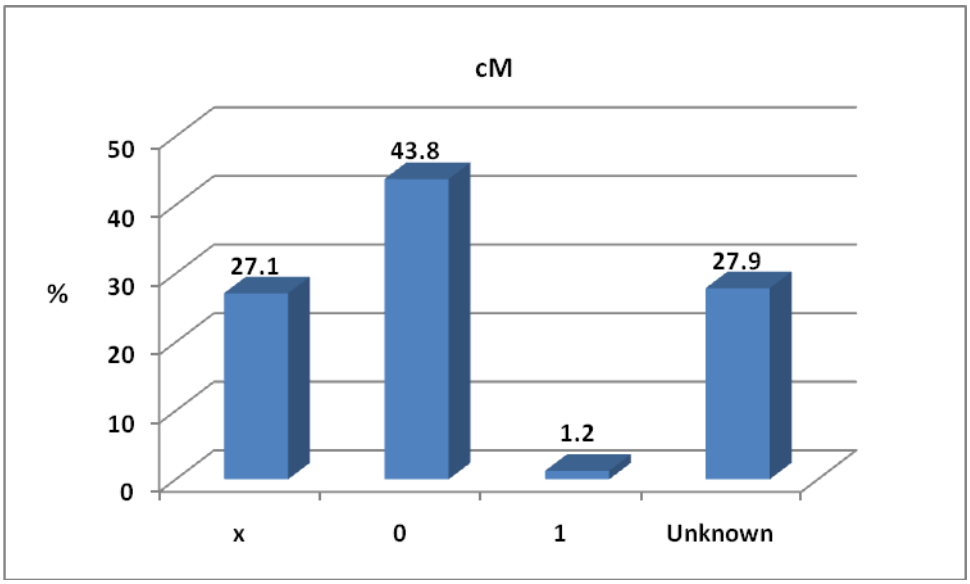
cT	Occurrences	Percent
1a	173	7.0
1b	240	9.7
2	744	30.1
3	285	11.5
4	137	5.5
Unknown	896	36.2
Total	**2475**	**100.0**



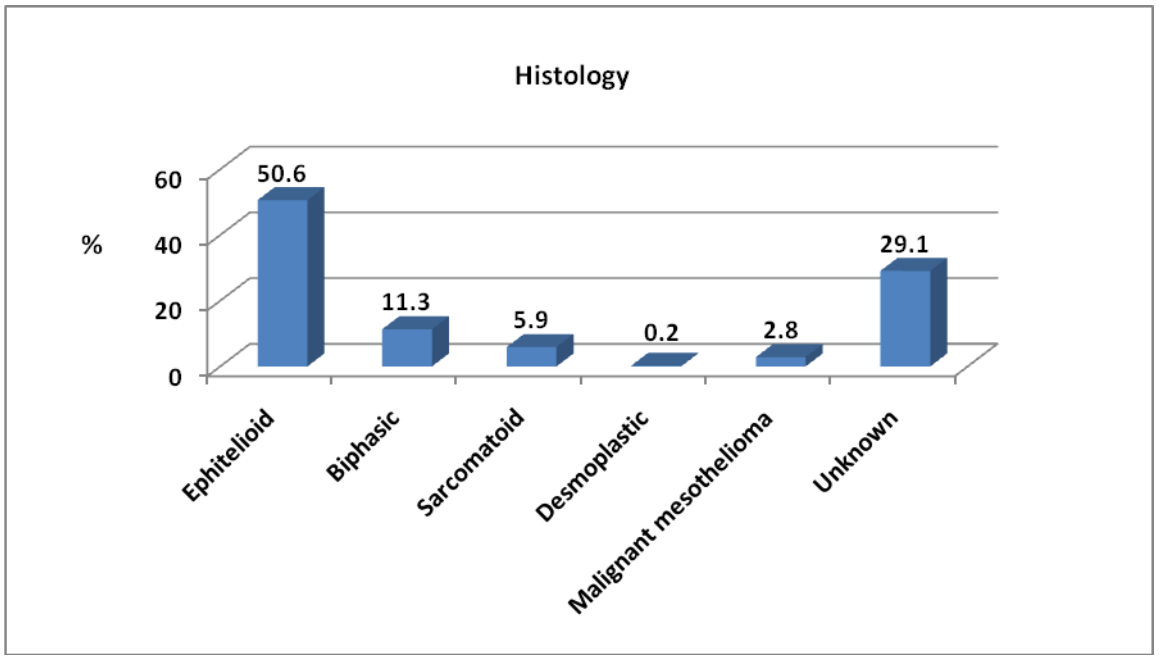
cN	Occurrences	Percent
X	802	32.4
0	759	30.7
1	99	4.0
2	194	7.8
3	20	0.8
Unknown	601	24.3
Total	**2475**	**100.0**



cM	Occurrences	Percent
X	661	27.1
0	1067	43.8
1	30	1.2
Unknown	679	27.9
Total	**2475**	**100.0**

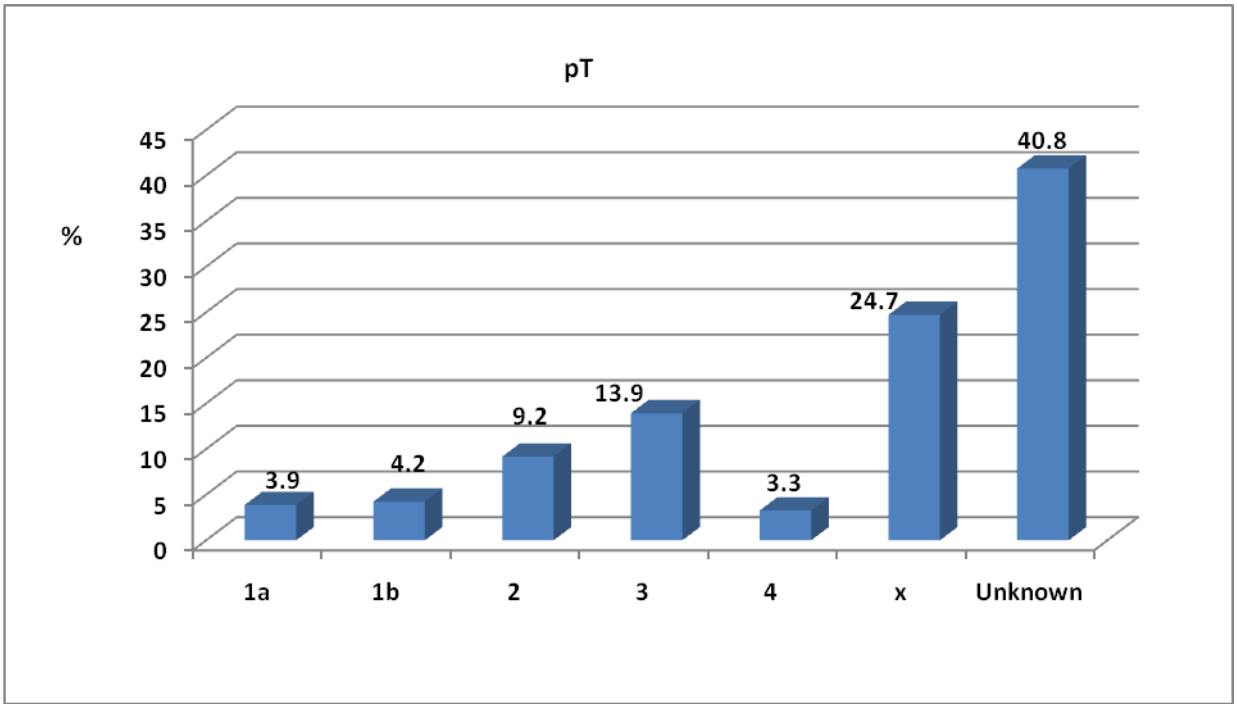


Histology	Occurrences	Percent
Ephitelioid	1253	50.6
Biphasic	280	11.3
Sarcomatoid	146	5.9
Desmoplastic	6	0.2
Malignant mesothelioma	70	2.8
Unknown	720	29.1
Total	**2475**	**100.0**

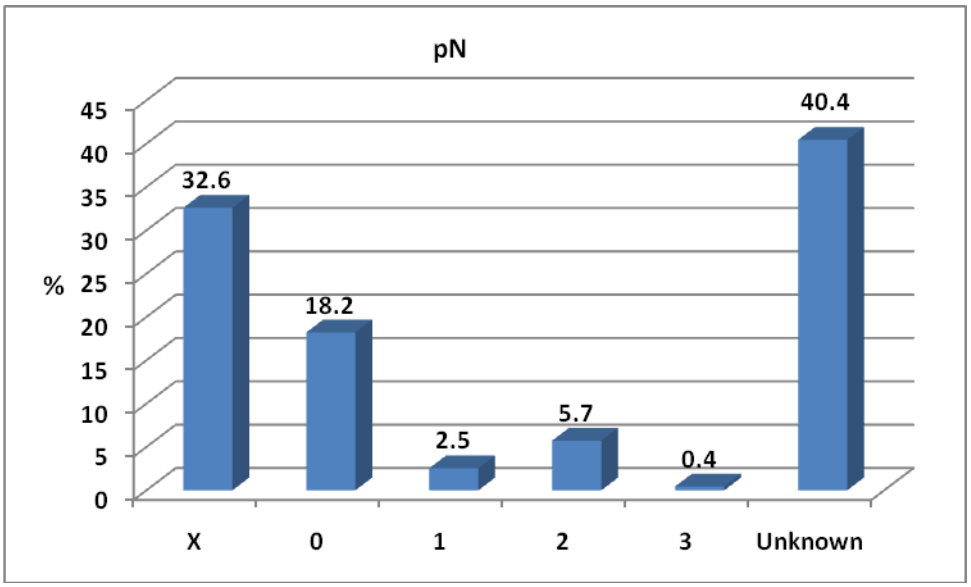


Pathological Staging : pT,pN,pM

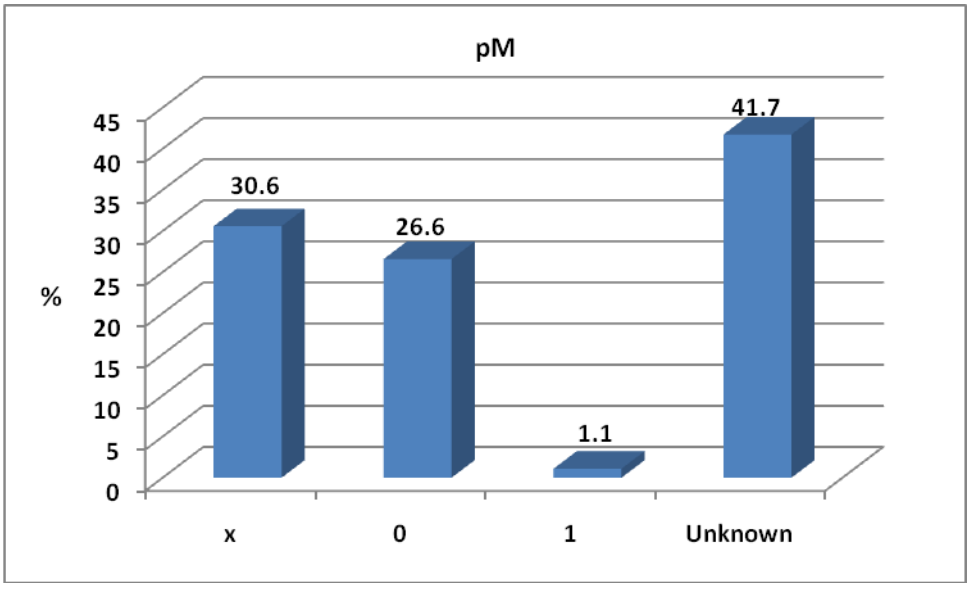
pT	Occurrences	Percent
1a	96	3.9
1b	105	4.2
2	227	9.2
3	345	13.9
4	81	3.3
X	612	24.7
Unknown	1009	40.8
Total	**2475**	**100.0**



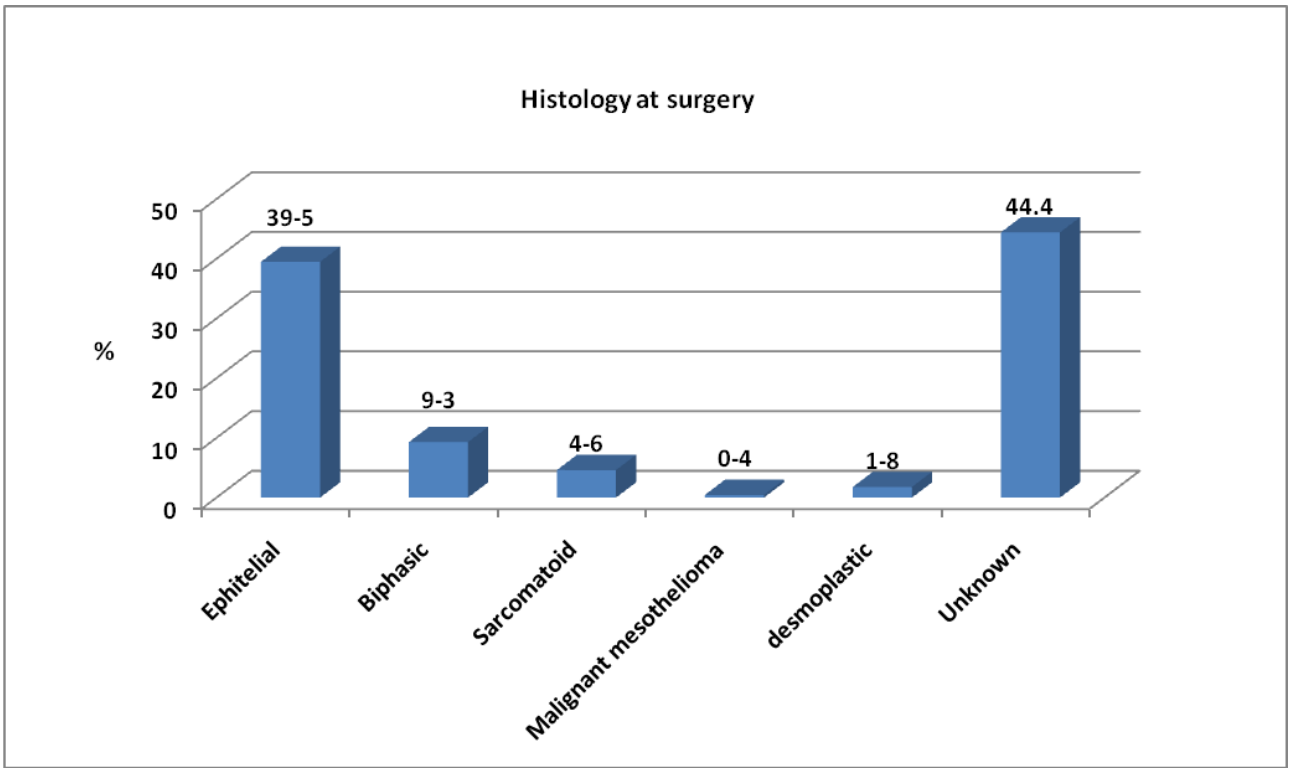
pN	Occurrences	Percent
X	751	30.8
0	642	26.3
1	25	1.0
2	1019	41.8
3	751	30.8
Unknown	642	26.3
Total	**2475**	**100.0**



pM	Occurrences	Percent
X	757	30.6
0	658	26.6
1	27	1.1
Unknown	1033	41.7
Total	**2475**	**100.0**



Histology at surgery	Occurrences	Percent
Ephitelial	977	39.5
Biphasic	230	9.3
Sarcomatoid	114	4.6
Malignant mesothelioma	11	0.4
desmoplastic	44	1.8
Unknown	1099	44.4
Total	**2475**	**100.0**

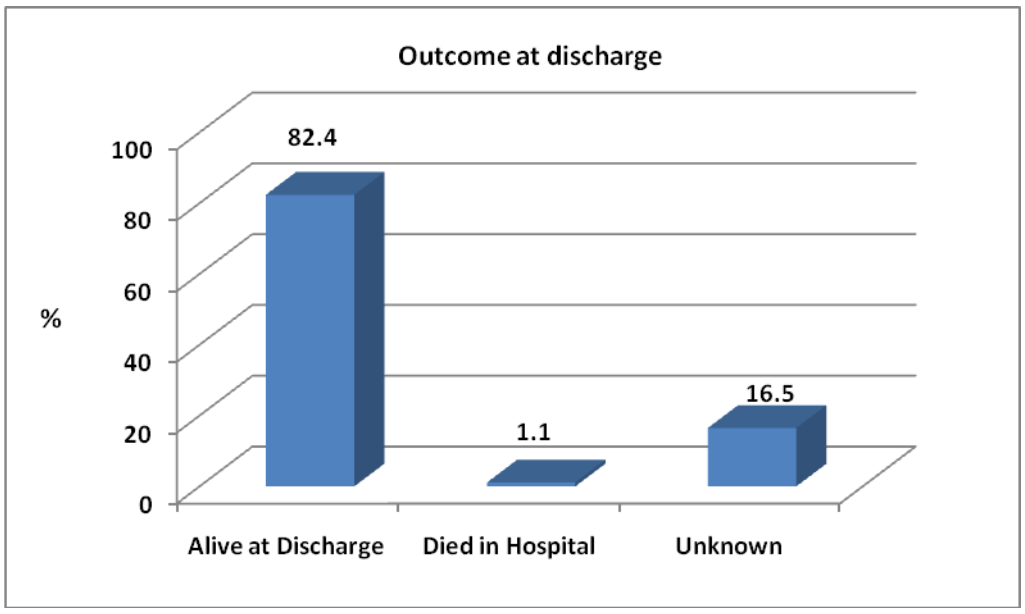


First Treatment at sequence	Occurrences	Percent
None	123	5.0
Surgery	369	14.9
Chemotherapy	379	15.3
Radiotherapy	7	0.3
Other	7	0.3
Unknown	1590	64.2
Total	**2475**	**100.0**

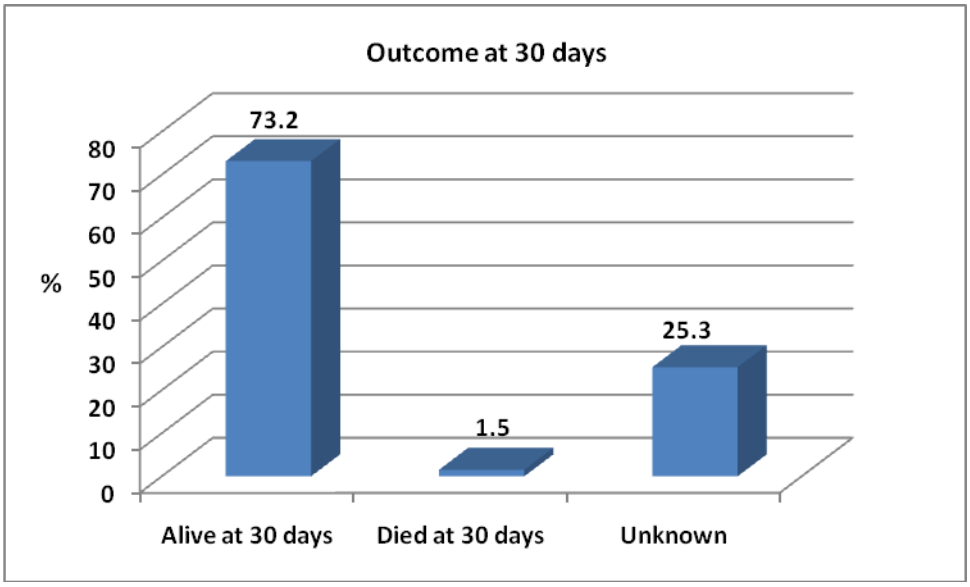
Second Treatment at sequence	Occurrences	Percent
None	178	7.2
Surgery	138	5.6
Chemotherapy	250	10.1
Radiotherapy	27	1.1
Other	10	0.4
Unknown	1872	75.6
Total	**2475**	**100.0**

Third Treatment at sequence	Occurrences	Percent
None	246	9.9
Surgery	7	0.3
Chemotherapy	27	1.1
Radiotherapy	88	3.6
Other	19	0.8
Unknown	2088	84.4
Total	**2475**	**100.0**

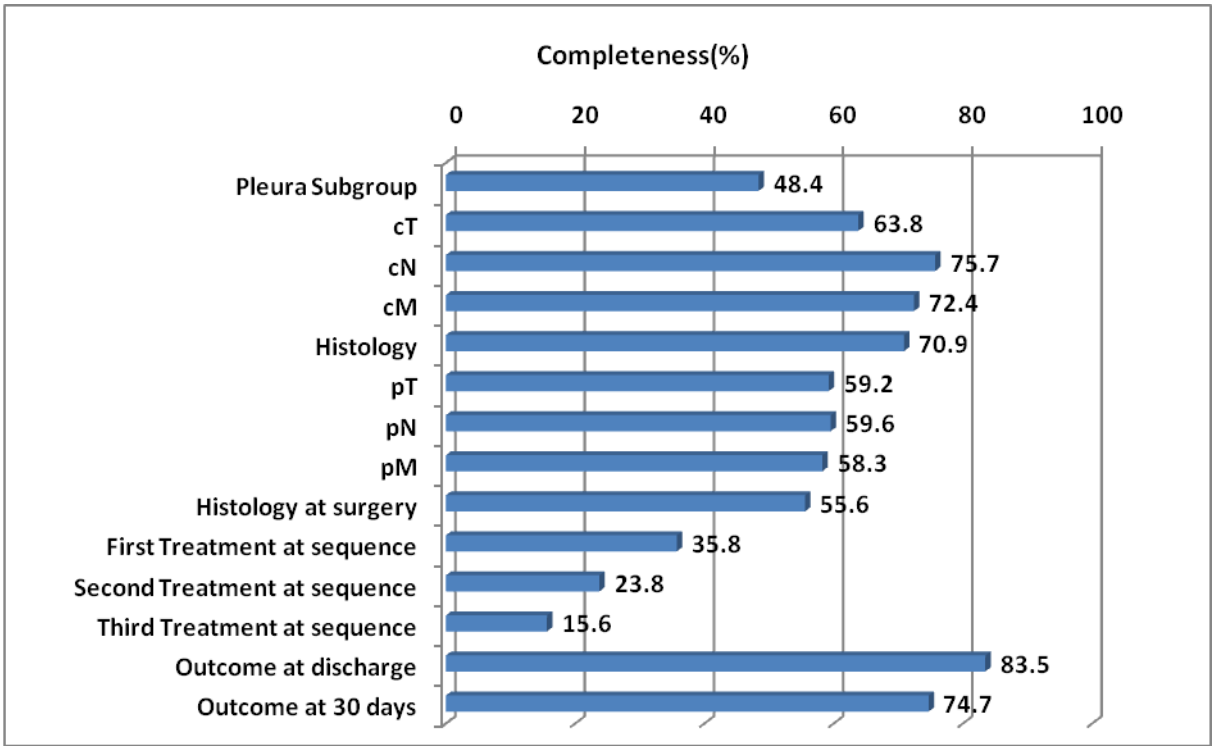
Outcome at discharge	Occurrences	Percent
Alive at Discharge	2039	82.4
Died in Hospital	27	1.1
Unknown	409	16.5
Total	**2475**	**100.0**



Outcome at 30 days	Occurrences	Percent
Alive at 30 days	1812	73.2
Died at 30 days	37	1.5
Unknown	626	25.3
Total	**2475**	**100.0**



Name of Field	Unknown (%)	Completeness(%)
Pleura Subgroup	51.6	48.4
cT	36.2	63.8
cN	24.3	75.7
cM	27.6	72.4
Histology	29.1	70.9
pT	40.8	59.2
pN	40.4	59.6
pM	41.7	58.3
Histology at surgery	44.4	55.6
First Treatment at sequence	64.2	35.8
Second Treatment at sequence	76.2	23.8
Third Treatment at sequence	84.4	15.6
Outcome at discharge	16.5	83.5
Outcome at 30 days	25.3	74.7



PART 5

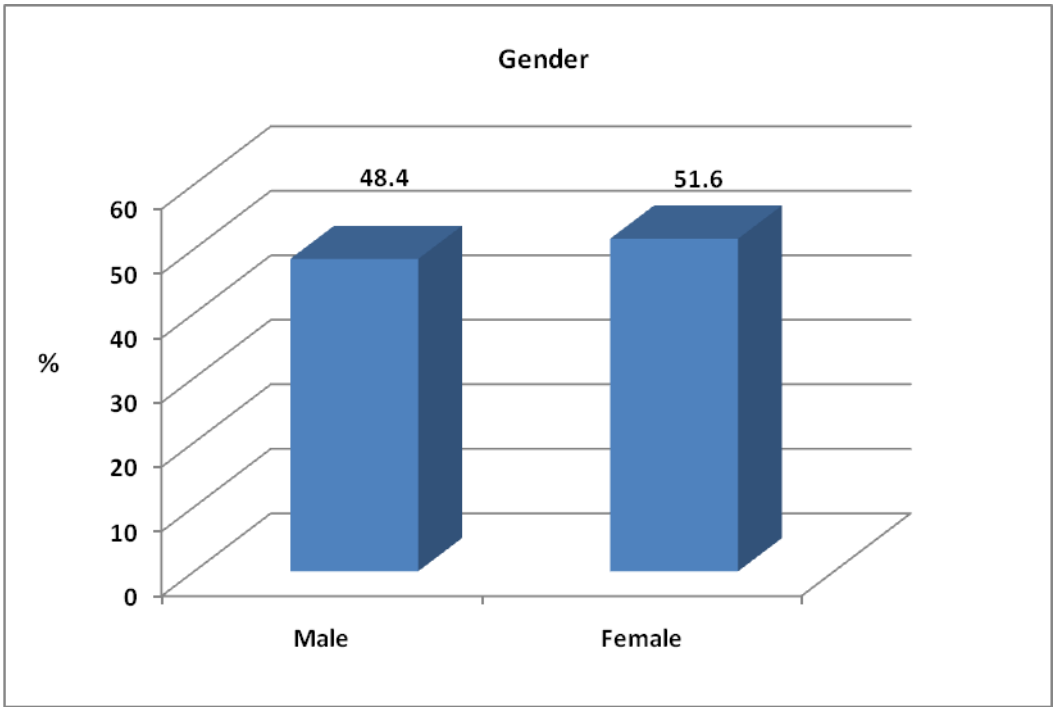
NETTS SECTION
(Database users only)

NETTS Section fields

Group Definition : Lung And Diagnosis : Lung Cancer (NSCLC)
January 1980- December 2022
N=1720

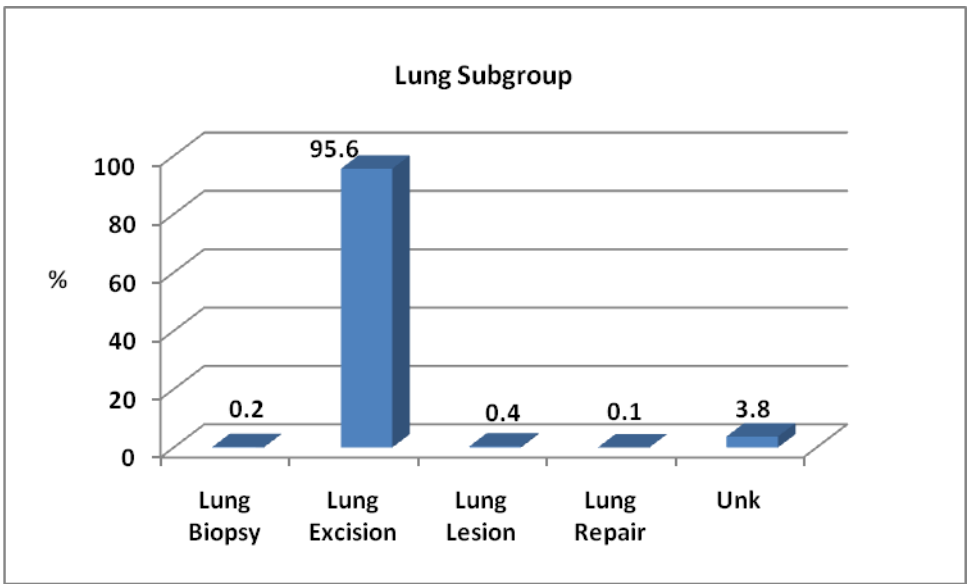
Demographics: gender

Gender	Occurrences	Percent
Male	833	48.4
Female	887	51.6
Total	1720	100



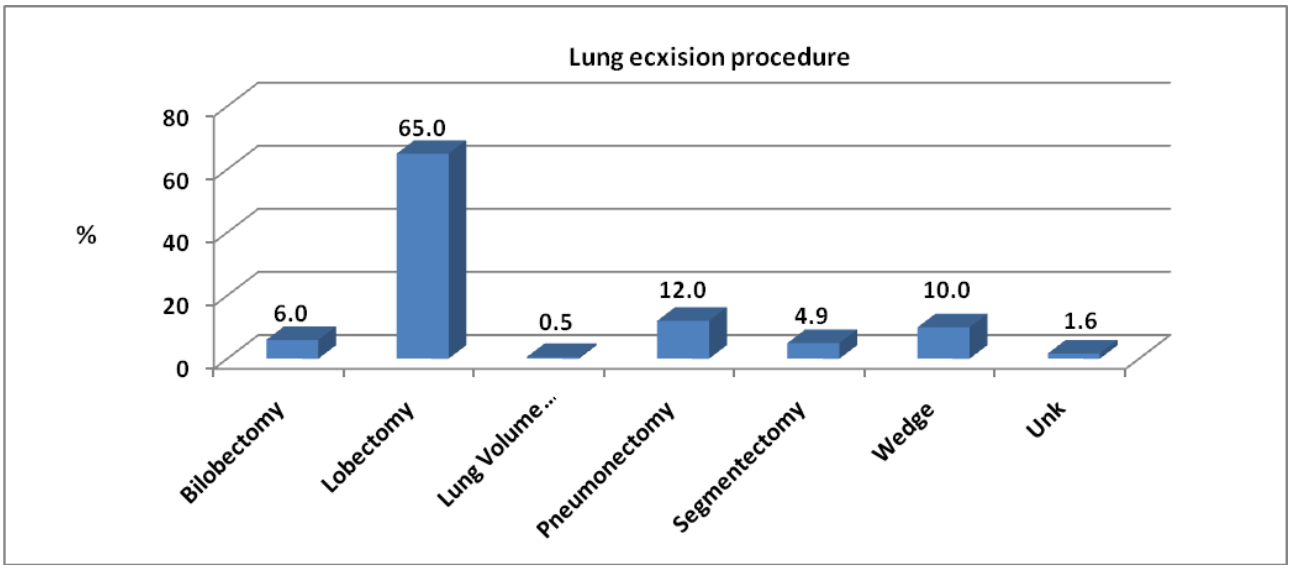
Lung Subgroup

Lungsubgroup	Occurrences	Percent
Lung Biopsy	3	0.2
Lung Excision	1644	95.6
Lung Lesion	7	0.4
Lung Repair	1	0.1
Unk	65	3.8
Total	1720	100



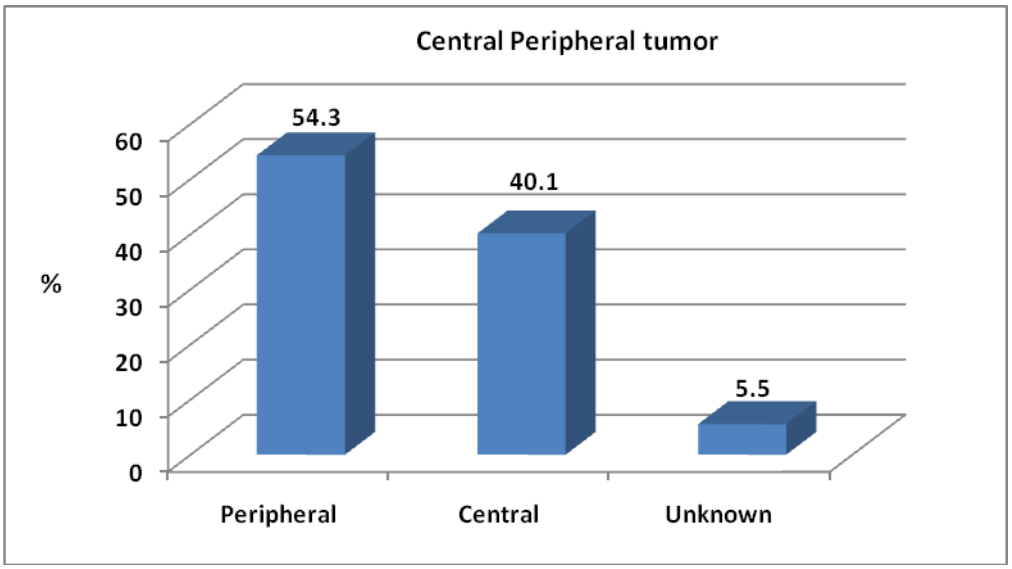
Lung Excision Procedure

Lung excision procedure	Occurrences	Percent
Bilobectomy	98	6.0
Lobectomy	1068	65.0
Lung Volume Reduction	9	0.5
Pneumonectomy	197	12.0
Segmentectomy	81	4.9
Wedge	164	10.0
Unk	27	1.6
Total	1644	100



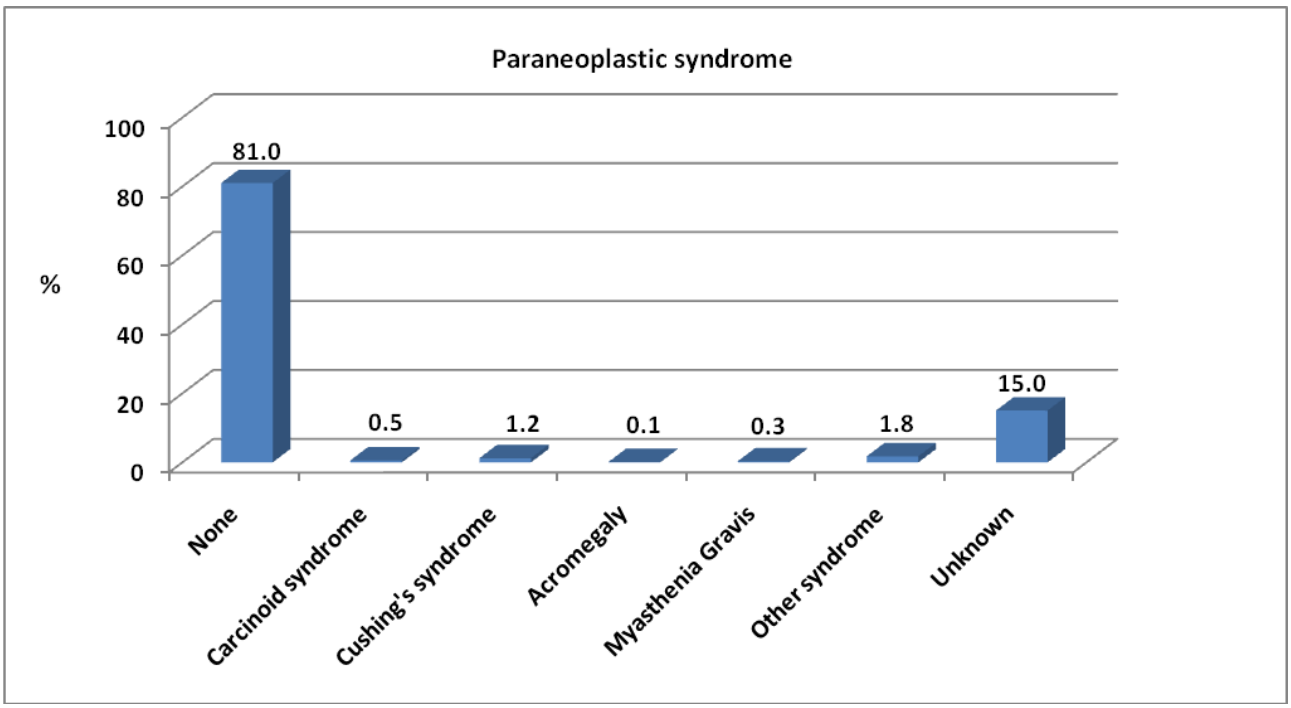
Central or peripheral tumor

centralperipheraltumor	Occurrences	Percent
Peripheral	893	54.3
Central	660	40.1
Unknown	91	5.5
Total	1644	100



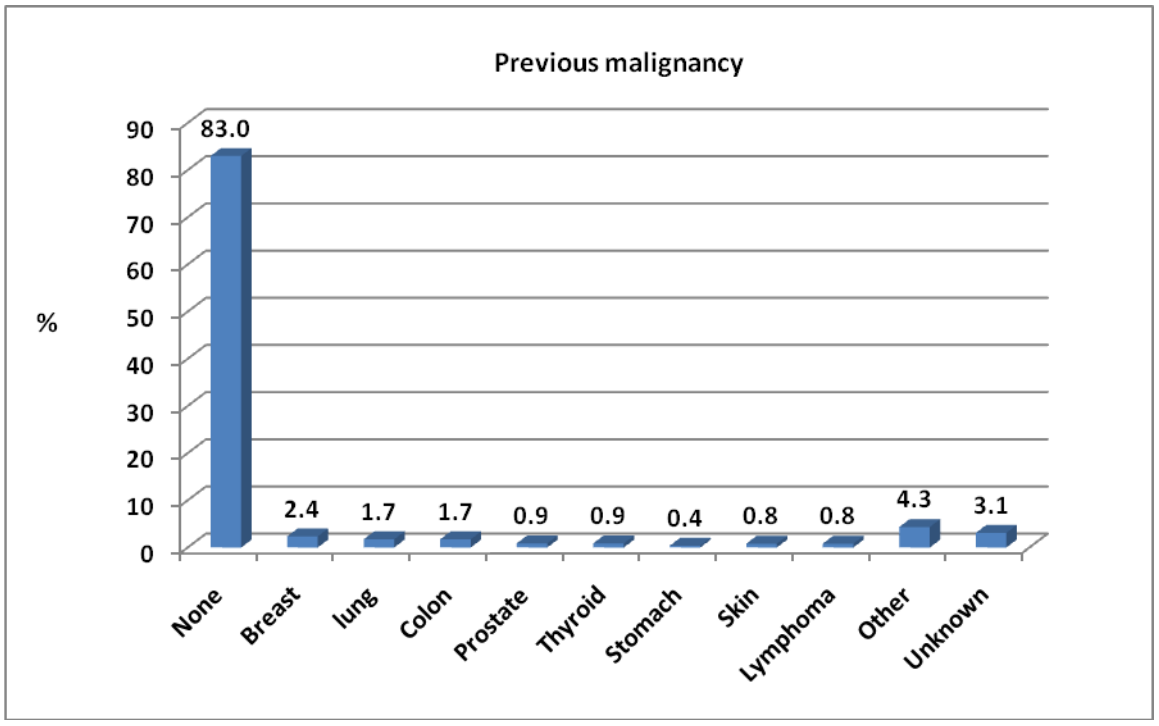
Paraneoplastic syndrome

paraneoplasticsyndrome	Occurrences	Percent
None	1332	81.0
Carcinoid syndrome	9	0.5
Cushing's syndrome	20	1.2
Acromegaly	2	0.1
Myasthenia Gravis	5	0.3
Other syndrome	29	1.8
Unknown	247	15.0
Total	1644	100



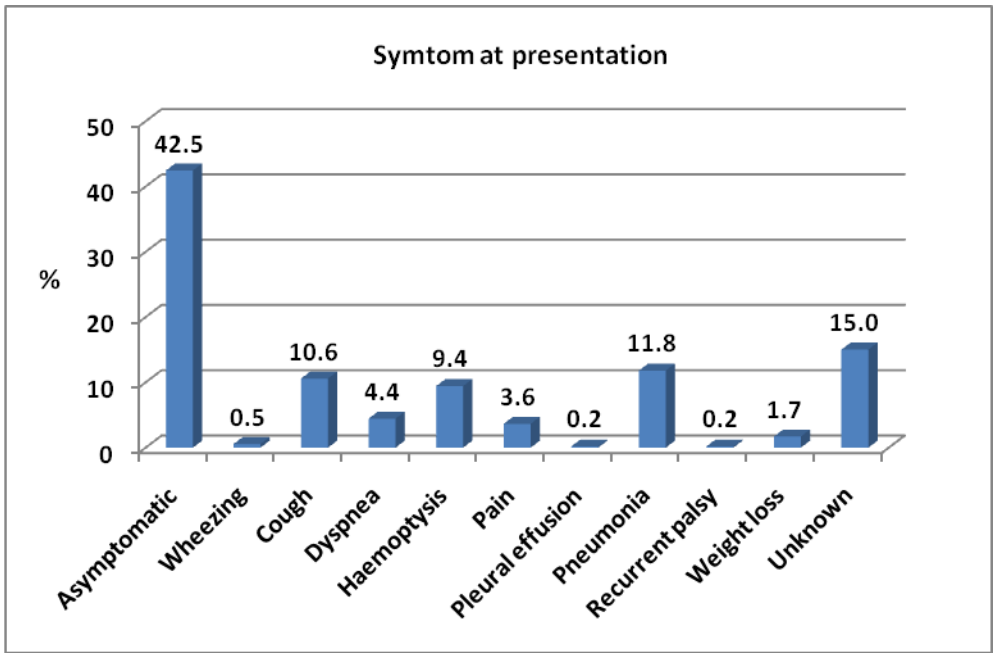
Previous Malignancy

previous malignancy	Occurrences	Percent
None	1365	83.0
Breast	38	2.3
lung	28	1.7
Colon	28	1.7
Prostate	14	0.9
Thyroid	14	0.9
Stomach	6	0.4
Skin	13	0.8
Lymphoma	13	0.8
Other	70	4.3
Unknown	55	3.3
Total	1644	100



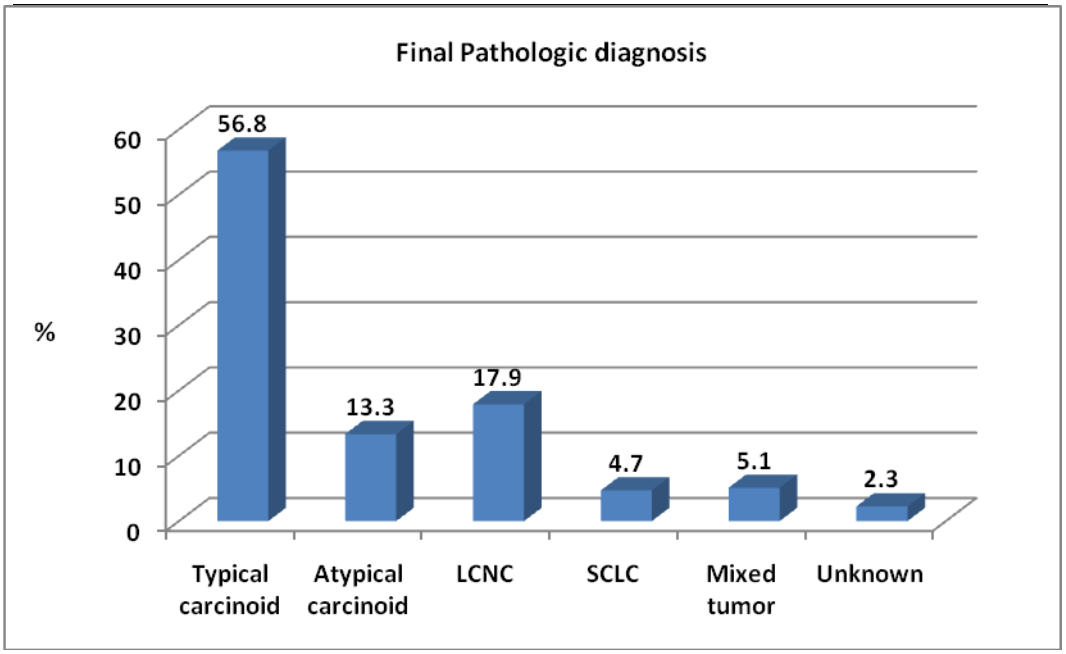
Symptom at presentation

symptomsatpresentation	Occurrences	Percent
Asymptomatic	698	42.5
Wheezing	9	0.5
Cough	174	10.6
Dyspnea	73	4.4
Haemoptysis	155	9.4
Pain	60	3.6
Pleural effusion	3	0.2
Pneumonia	194	11.8
Recurrent palsy	3	0.2
Weight loss	28	1.7
Unknown	247	15.0
Total	1644	100



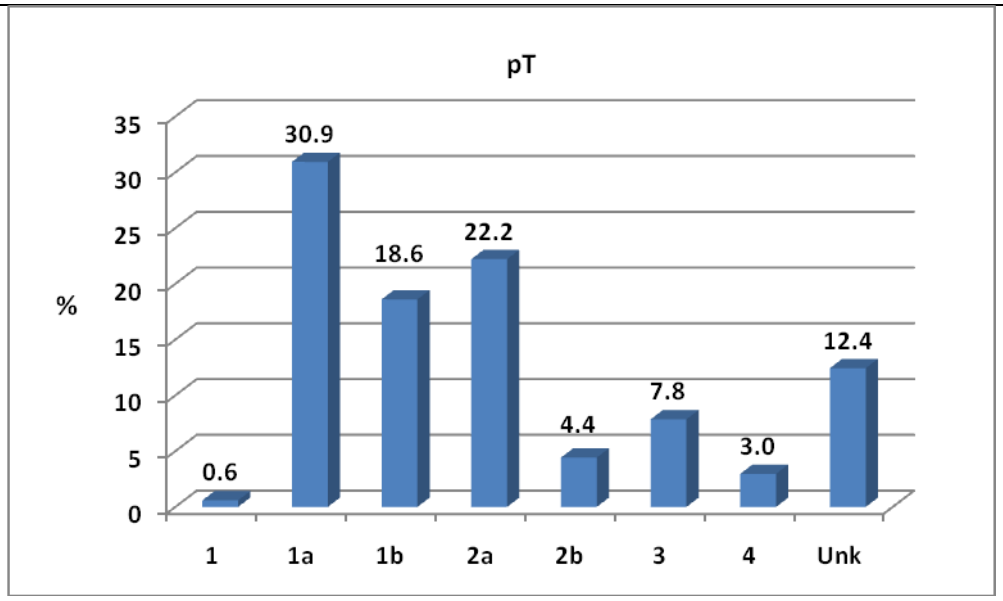
Final pathologic diagnosis

finalpathologicdiagnosis	Occurrences	Percent
Typical carcinoid	933	56.8
Atypical carcinoid	219	13.3
LCNC	294	17.9
SCLC	77	4.7
Mixed tumor	84	5.1
Unknown	37	2.3
Total	1644	100

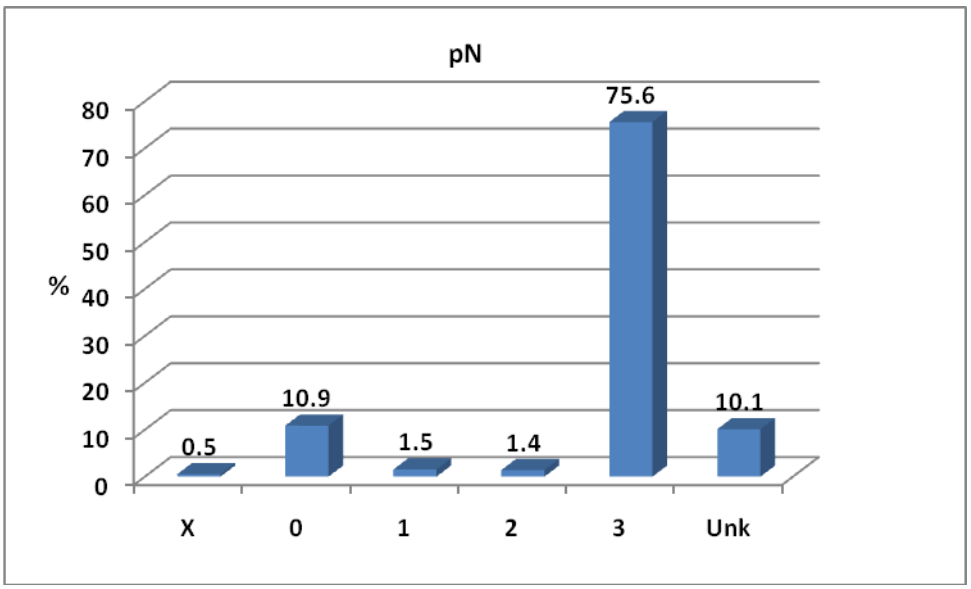


Pathological Staging (On all Lung Subgroup) : pT,pN,pM

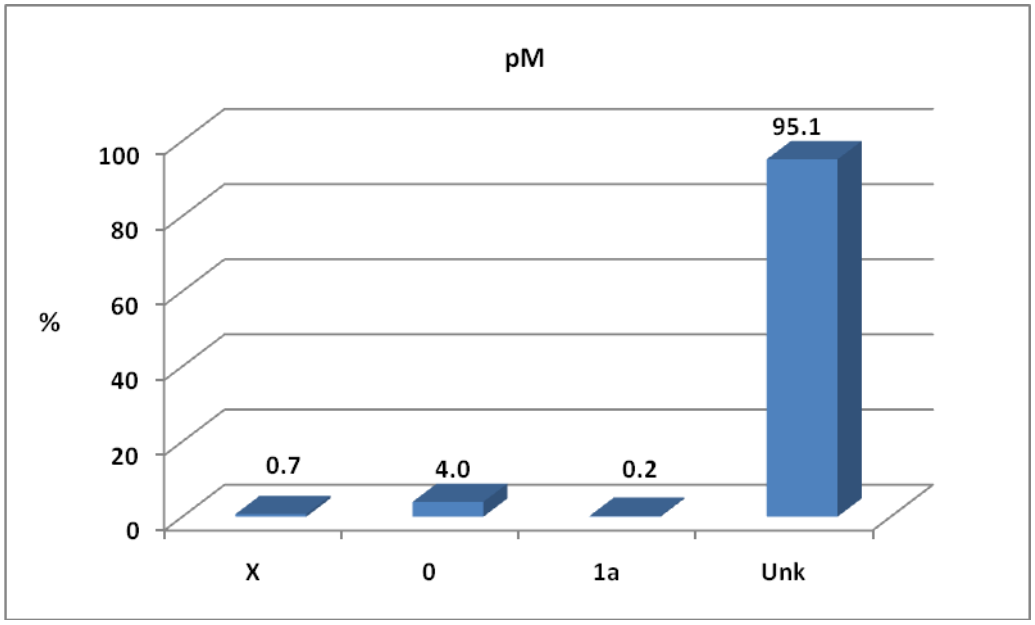
pT	Occurrences	Percent
1	10	0.6
1a	532	30.9
1b	320	18.6
2a	382	22.2
2b	76	4.4
3	135	7.8
4	51	3.0
Unk	214	12.4
Total	**1720**	**100.0**



pN	Occurrences	Percent
X	9	0.5
0	187	10.9
1	26	1.5
2	24	1.4
3	1300	75.6
Unk	174	10.1
Total	**1720**	**100.0**

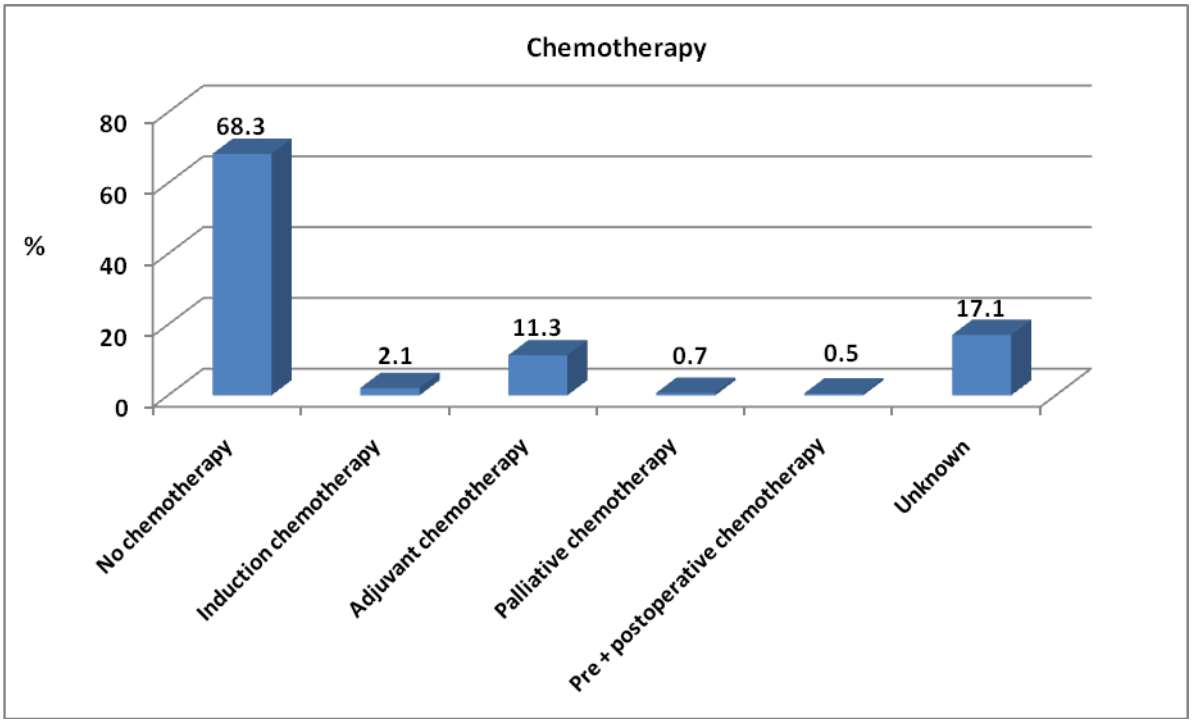


pM	Occurrences	Percent
X	12	0.7
0	68	4.0
1a	4	0.2
Unk	1636	95.1
Total	**1720**	**100.0**


pM
%
100
80
60
40
20
0
95.1
0.7
4.0
0.2
X
0
1a
Unk

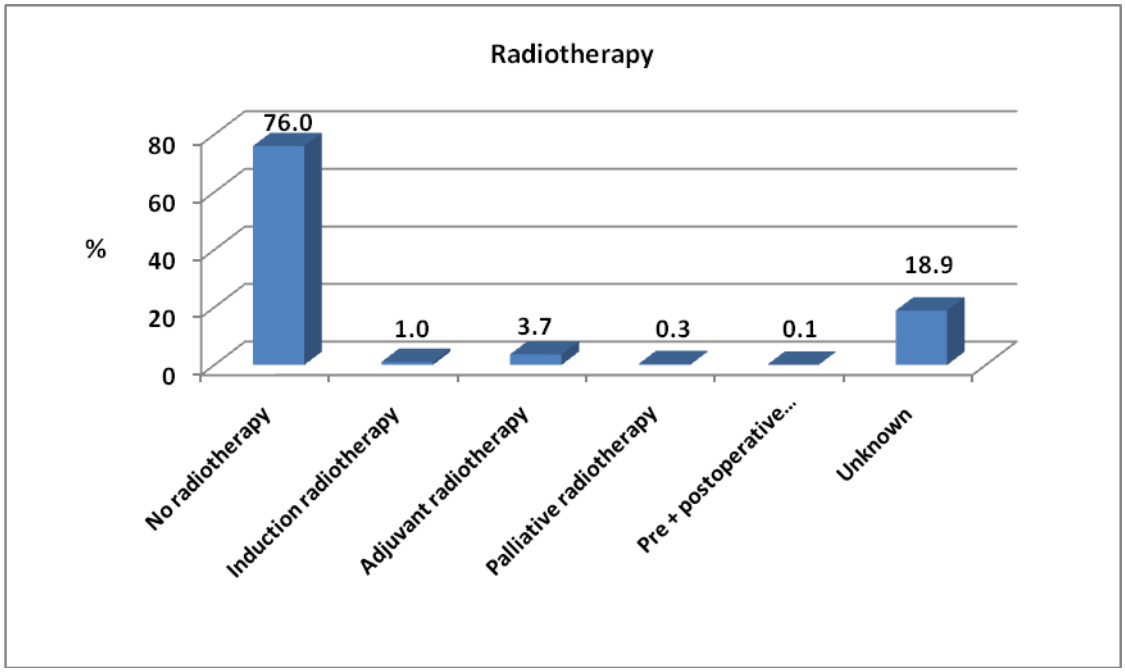
Chemotherapy

chemotherapy	Occurrences	Percent
No chemotherapy	1174	68.3
Induction chemotherapy	36	2.1
Adjuvant chemotherapy	195	11.3
Palliative chemotherapy	12	0.7
Pre + postoperative chemotherapy	9	0.5
Unknown	294	17.1
Total	1720	100



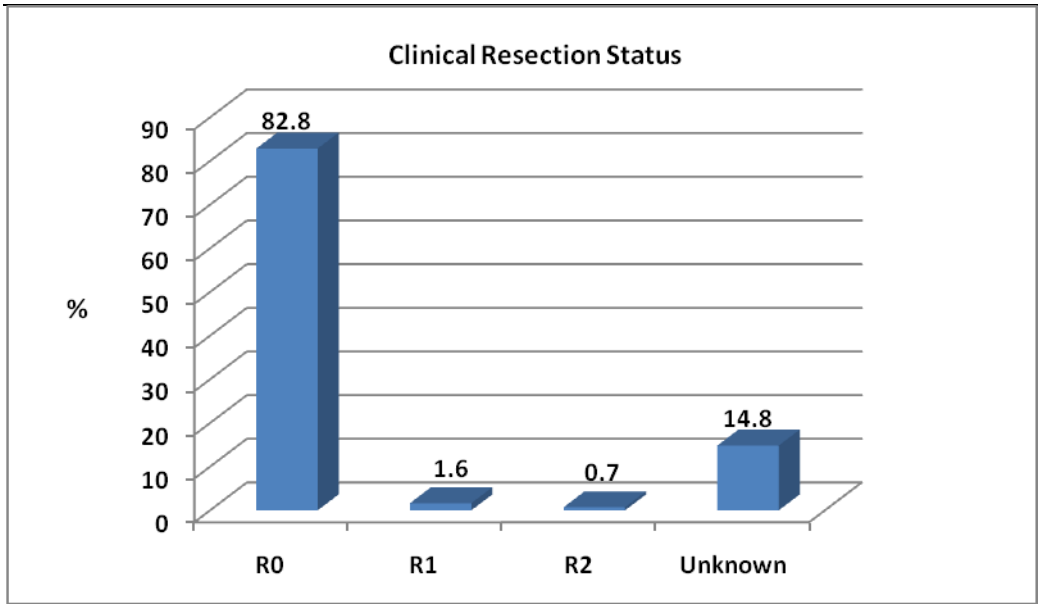
Radiotherapy

Radiotherapy	Occurrences	Percent
No radiotherapy	1307	76.0
Induction radiotherapy	18	1.0
Adjuvant radiotherapy	63	3.7
Palliative radiotherapy	6	0.3
Pre + postoperative radiotherapy	1	0.1
Unknown	325	18.9
Total	1720	100



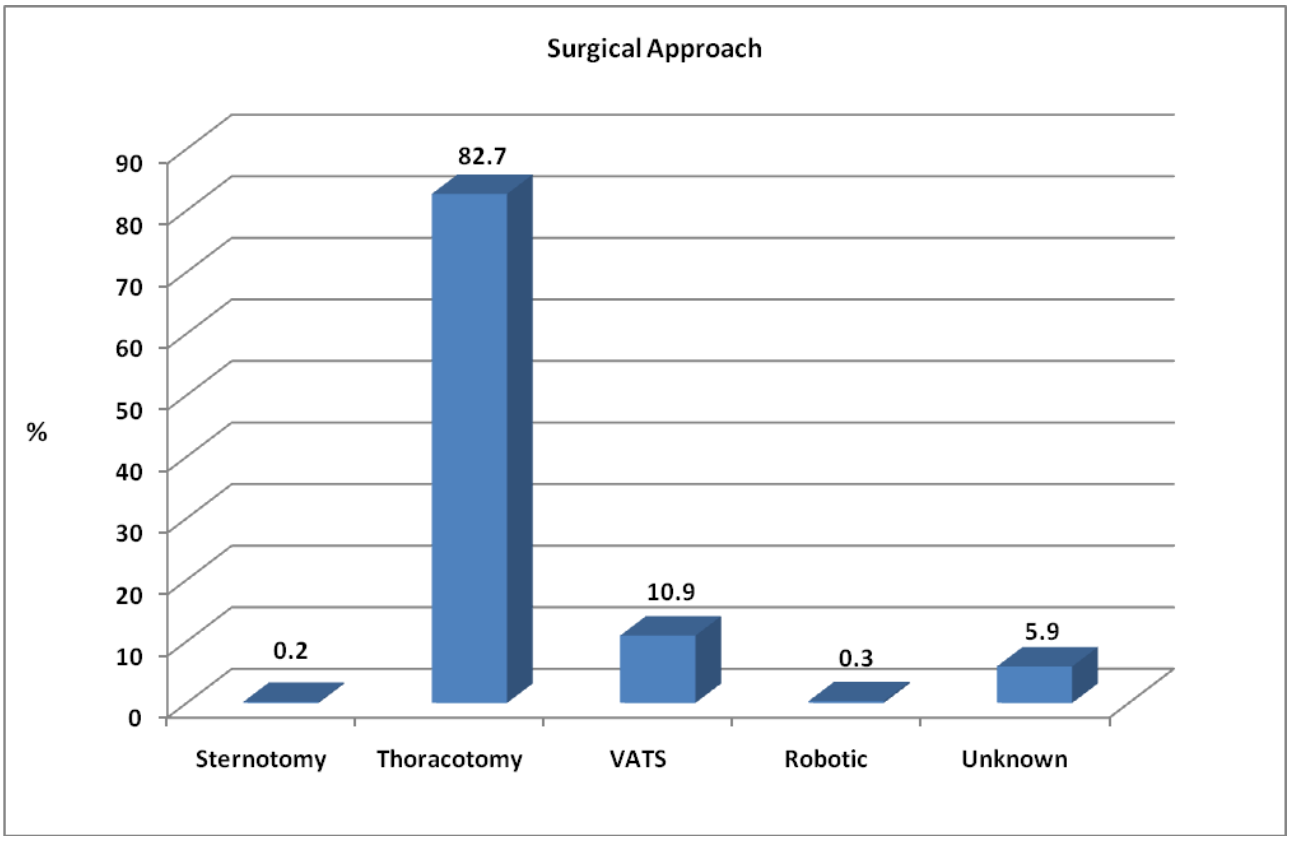
Clinical Resection Status

Clinical Resection Status	Occurrences	Percent
R0	1425	82.8
R1	28	1.6
R2	12	0.7
Unknown	255	14.8
Total	1720	100



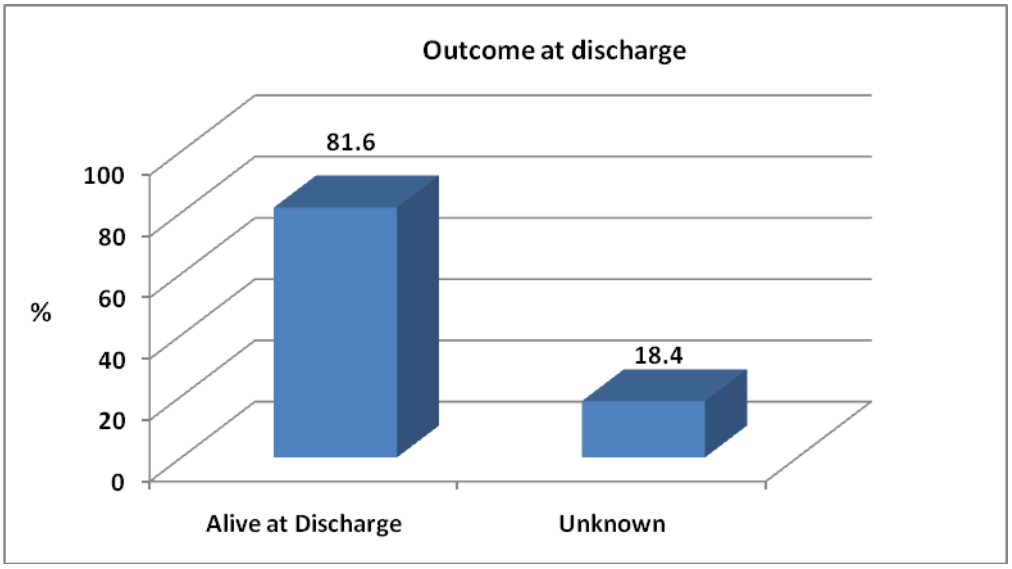
Surgical Approach

Surgical Approach	Occurrences	Percent
Sternotomy	3	0.2
Thoracotomy	1422	82.7
VATS	188	10.9
Robotic	5	0.3
Unknown	102	5.9
Total	1720	100



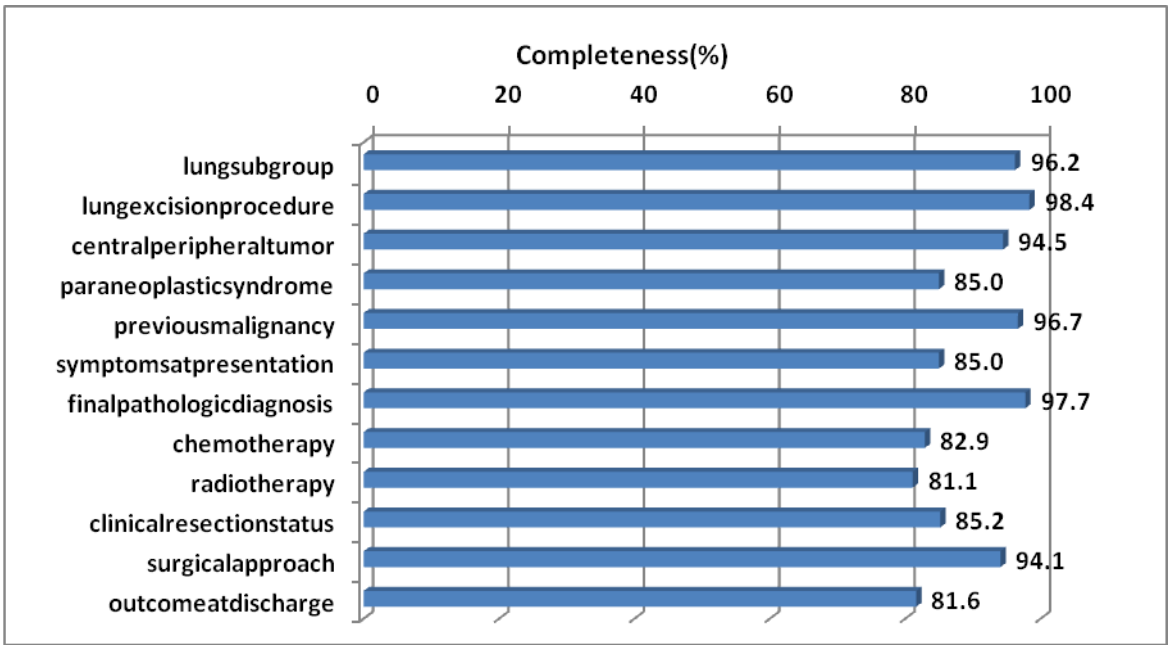
Outcome at discharge

Surgical Approach	Occurrences	Percent
Alive at Discharge	1404	81.6
Unknown	316	18.4
Total	1720	100



Data Completeness

Name of Field	Unknown (%)	Completeness(%)
lungsubgroup	3.8	96.2
lungexcisionprocedure	1.6	98.4
centralperipheraltumor	5.5	94.5
paraneoplasticsyndrome	15.0	85.0
previousmalignancy	3.3	96.7
symptomsatpresentation	15.0	85.0
finalpathologicdiagnosis	2.3	97.7
chemotherapy	17.1	82.9
radiotherapy	18.9	81.1
clinicalresectionstatus	14.8	85.2
surgicalapproach	5.9	94.1
outcomeatdischarge	18.4	81.6



PART 6

CHEST WALL SECTION
(Database users only)

Message from Clinical Leader of ESTS Chest Wall Registry

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Joint Clinic Head
University Hospitals Leuven

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Hans Van Veer, MD, FEBS-OGSurg

Chair of the Chest Wall Working Group – ESTS.

Dear members,

With great honour I will take over the lead of the Chest Wall Working group of prof. José Ribas who led the working group throughout the middle of the corona pandemic.

One of the most important tasks to pursue, is further tweaking of the dataset so the future analyses can be of interest for the chest wall community.
Last year, just less than 100 new cases have been added to the dataset, of which you will find some more detail on the next pages. Chest wall deformities still count for the majority of cases present in the dataset.

As I believe that a database is extremely useful, but only when the collected data are well thought over, we will go into debate which extra fields should be added in the perspective of further analyzing our practices. We also need to further define and refine the intended content of the data fields that are already present, as to make sure that there is no misinterpretation of the transferred data during the input process. Once fields have been chosen and their content strictly defined, the quality of the output will enhance as well.
To achieve this goal, we will also work on collaboration with other associations involved in care for patients with chest wall trauma and deformities as to maximize data transparency and interpretation.

As such I am convinced that more surgeons and institutions will find their way to the Chest Wall chapter of the ESTS database with a further beneficial evolution on the dataset of our subspeciality.

I look forward to work together with you on this mission!

Best regards,

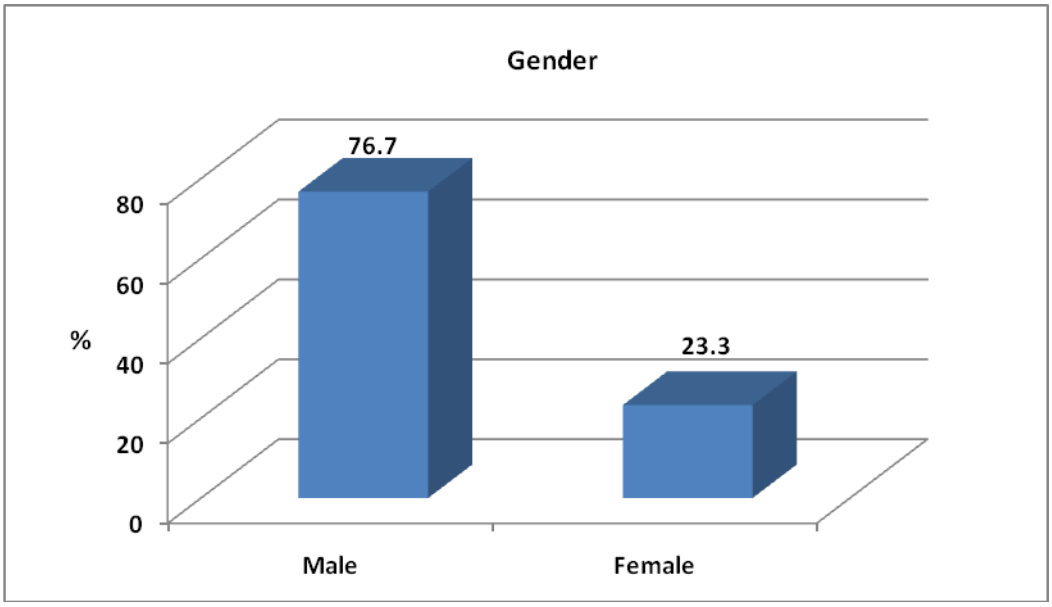
Hans Van Veer
hans.vanveer@uzleuven.be

CHEST WALL Section fields

Group Definition Chest Wall
January 2003- December 2022
N=1568

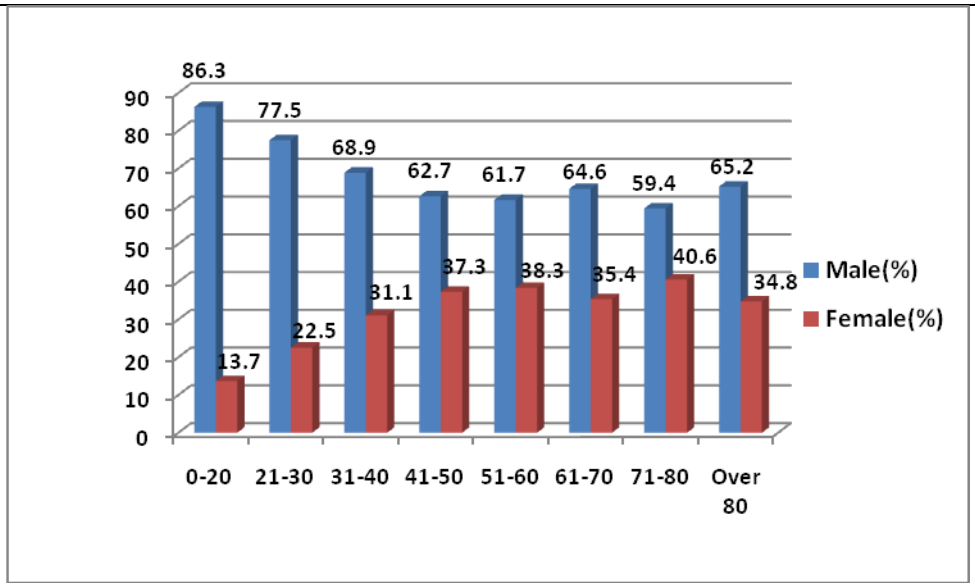
Demographics: gender

Gender	Occurrences	Percent
Male	1203	76.7
Female	365	23.3
Total	1568	100



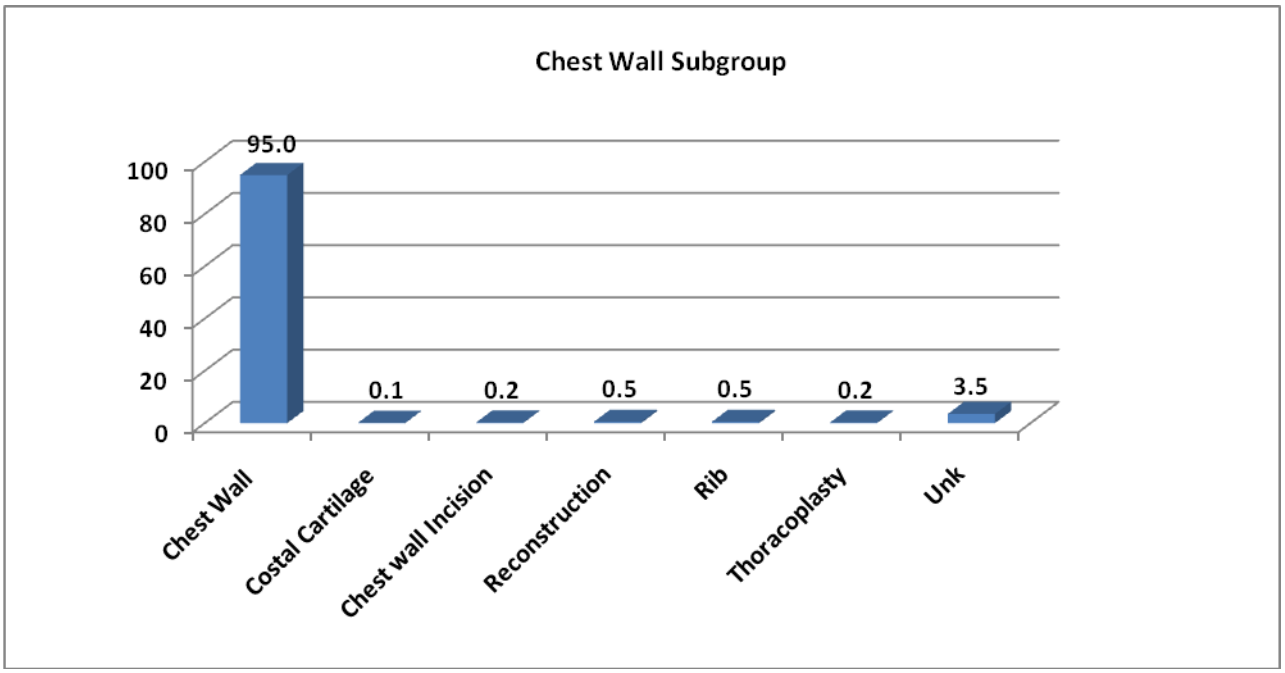
Age Group

Age Group	Male(%)	Female(%)
0-20	86.3	13.7
21-30	77.5	22.5
31-40	68.9	31.1
41-50	62.7	37.3
51-60	61.7	38.3
61-70	64.6	35.4
71-80	59.4	40.6
Over 80	65.2	34.8



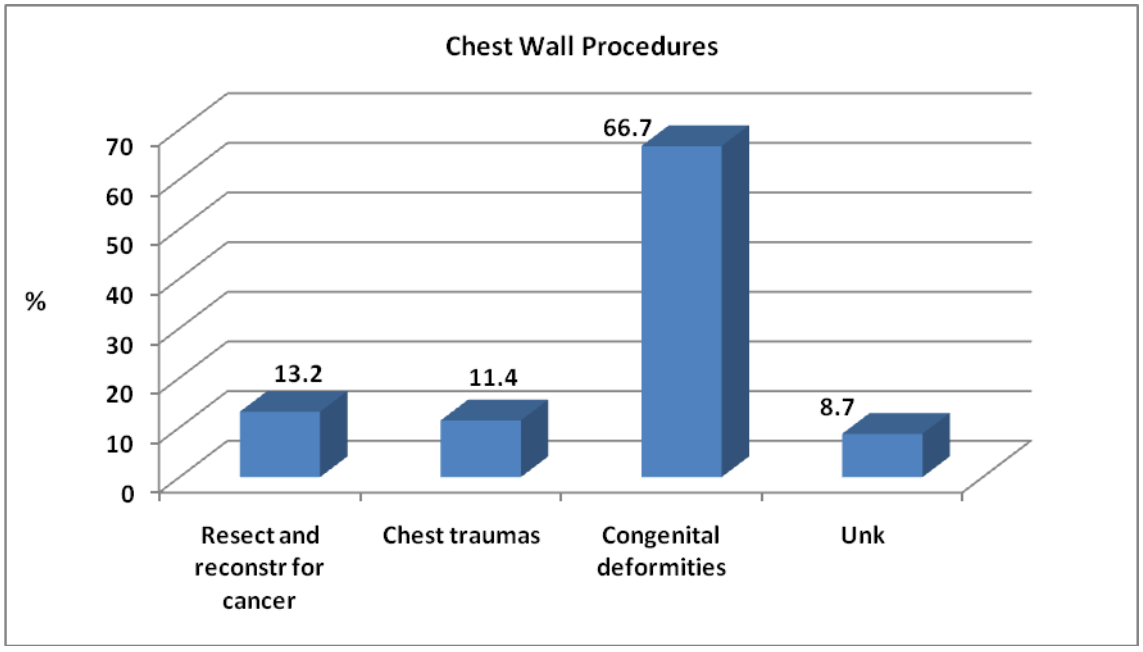
Chest Wall Subgroup

Chestwallsubgroup	Occurrences	Percent
Chest Wall	1489	95.0
Costal Cartilage	2	0.1
Chest wall Incision	3	0.2
Reconstruction	8	0.5
Rib	8	0.5
Thoracoplasty	3	0.2
Unk	55	3.5
Total	1568	100



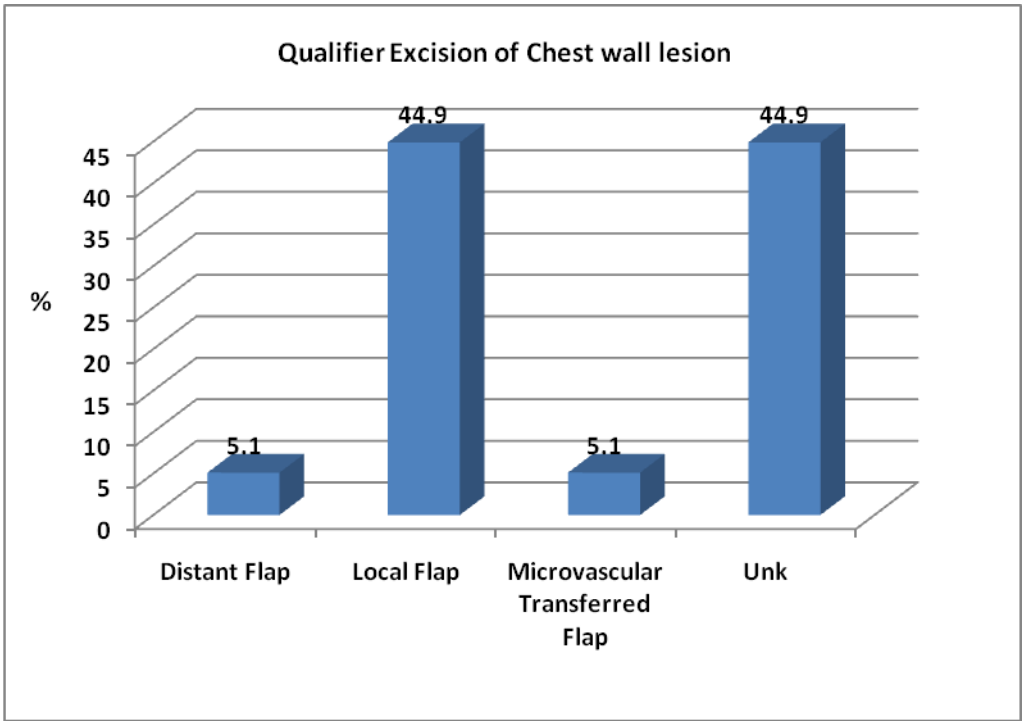
Chest Wall Procedures

Chest Wall procedures	Occurrences	Percent
Resect and reconstr for cancer	196	13.2
Chest traumas	170	11.4
Congenital deformities	993	66.7
Unk	130	8.7
Total	1489	100



On Group Resect and reconstr Cancer

qualifierexcisionofchestwalllesion	Occurrences	Percent
Distant Flap	10	5.1
Local Flap	88	44.9
Microvascular Transferred Flap	10	5.1
Unk	88	44.9
Total	196	100

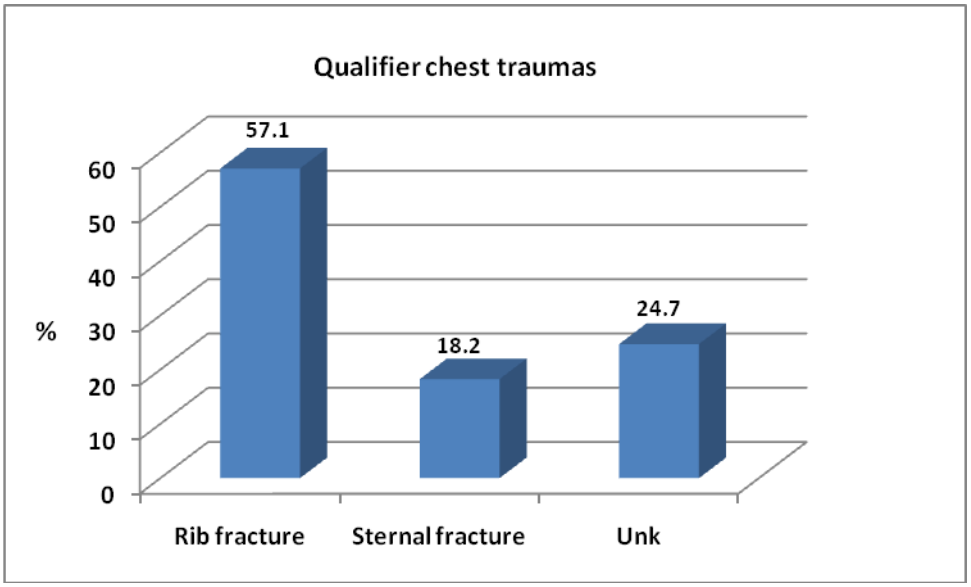


VATS

vats	Occurrences	Percent
No	172	87.8
Yes	15	7.7
Unk	9	4.6
Total	196	100

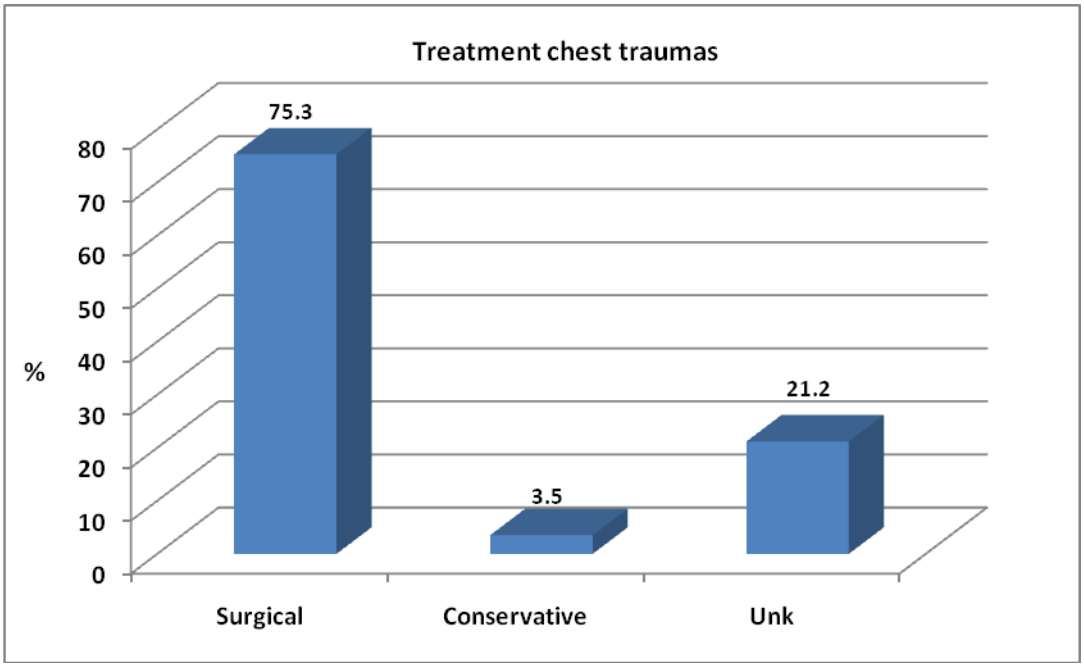
On Group Chest Traumas

qualifierchestrraumas	Occurrences	Percent
Rib fracture	97	57.1
Sternal fracture	31	18.2
Unk	42	24.7
Total	170	100



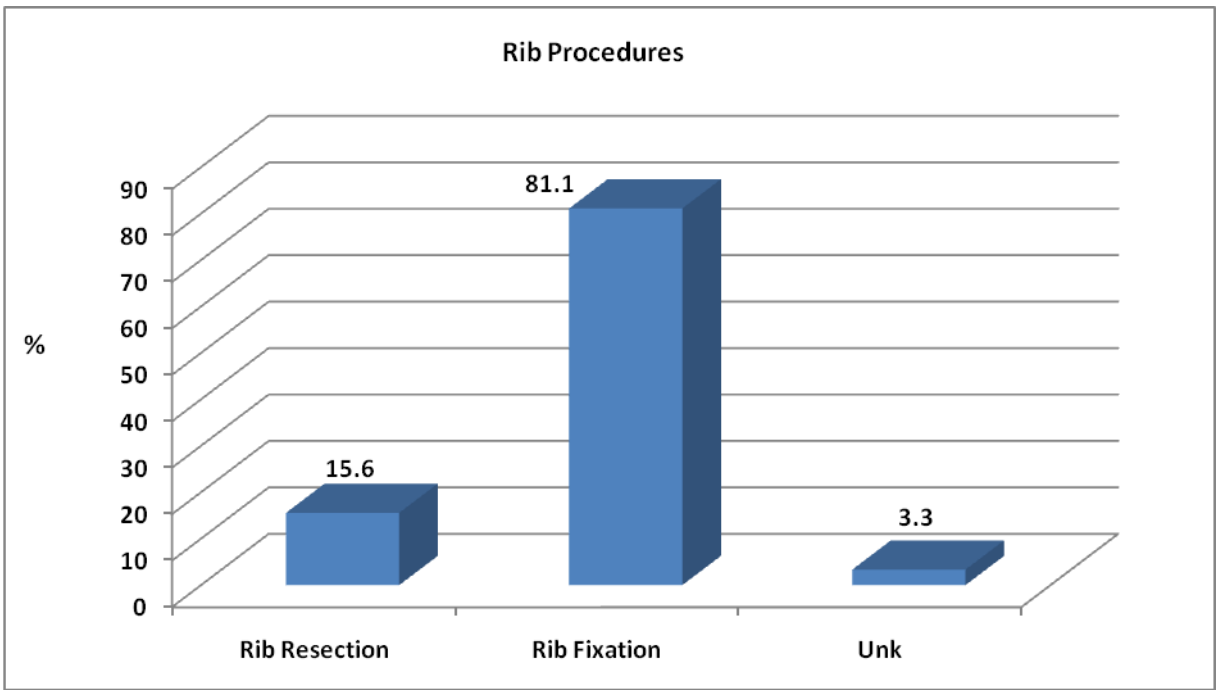
Treatment chest Traumas

Treatment chest traumas	Occurrences	Percent
Surgical	128	75.3
Conservative	6	3.5
Unk	36	21.2
Total	170	100



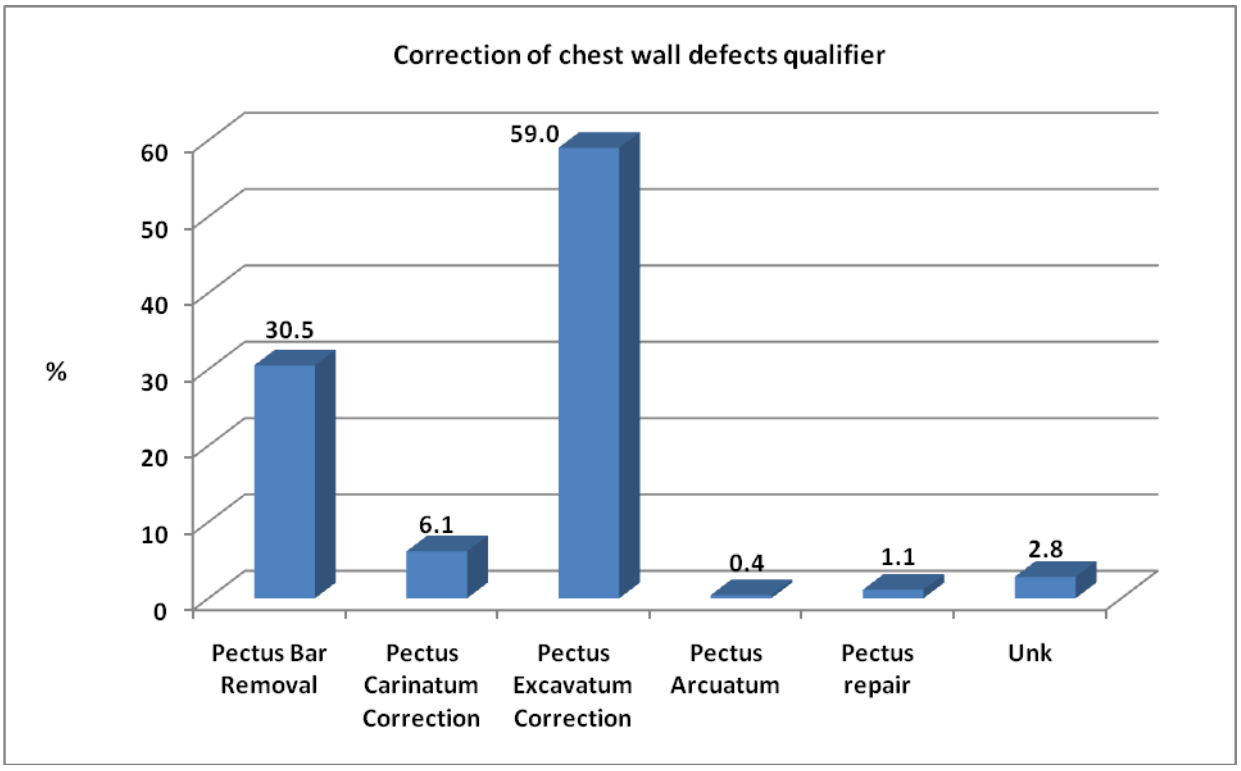
On Group Rib Fracture And Surgical

Rib procedures	Occurrences	Percent
Rib Resection	14	15.6
Rib Fixation	73	81.1
Unk	3	3.3
Total	90	100



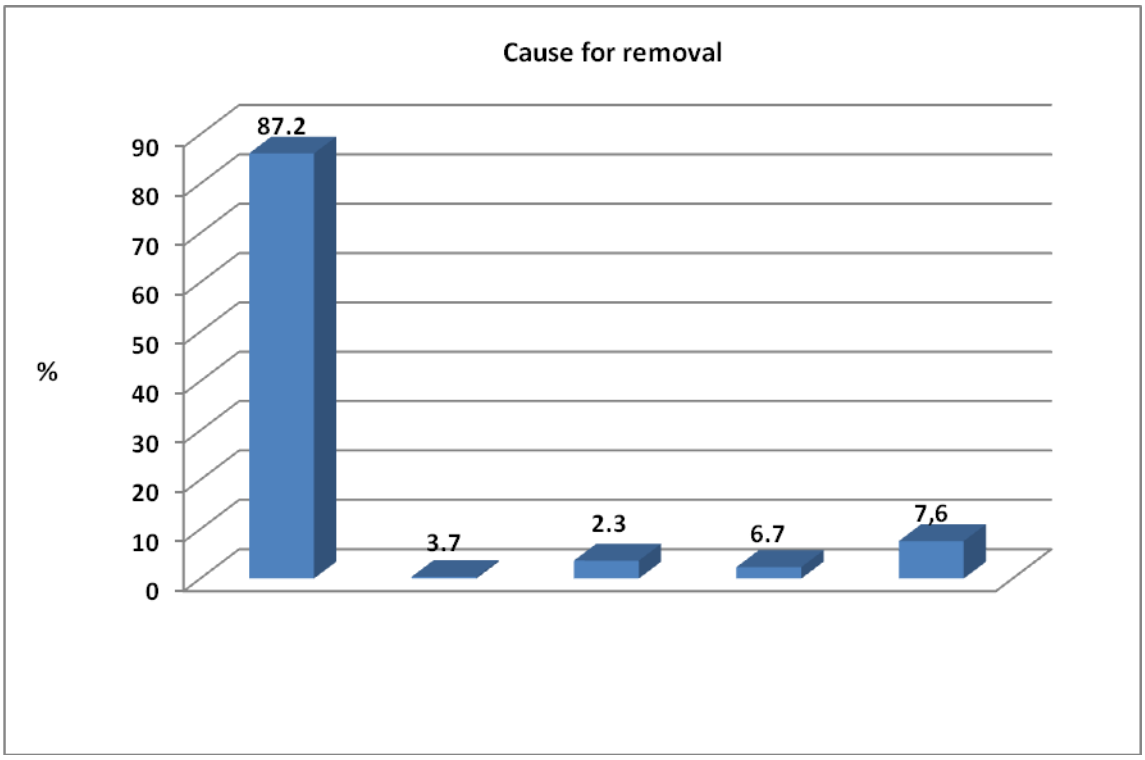
On Group Congenital deformities

Correction of chest wall defectsqualifier	Occurrences	Percent
Pectus Bar Removal	303	30.5
Pectus Carinatum Correction	61	6.1
Pectus Excavatum Correction	586	59.0
Pectus Arcuatum	4	0.4
Pectus repair	11	1.1
Unk	28	2.8
Total	**993**	**100.0**



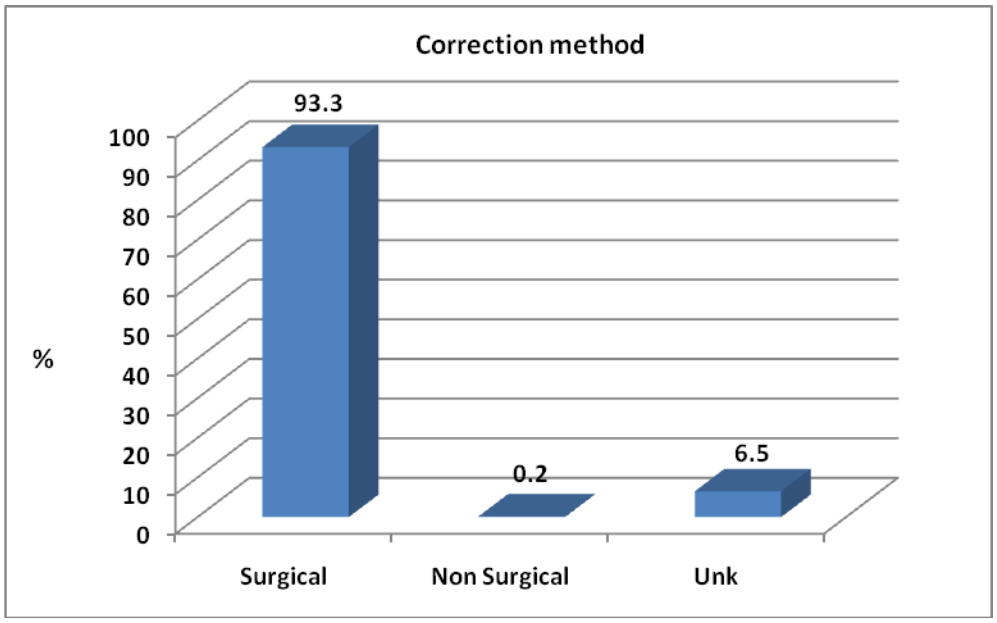
On Group Pectus Bar Removal

Cause for removal	Occurrences	Percent
End of planned treatment	260	87.2
Repeated dislodgement	11	3.7
Chronic pain	7	2.3
Unk	20	6.7
Total	**298**	**100.0**



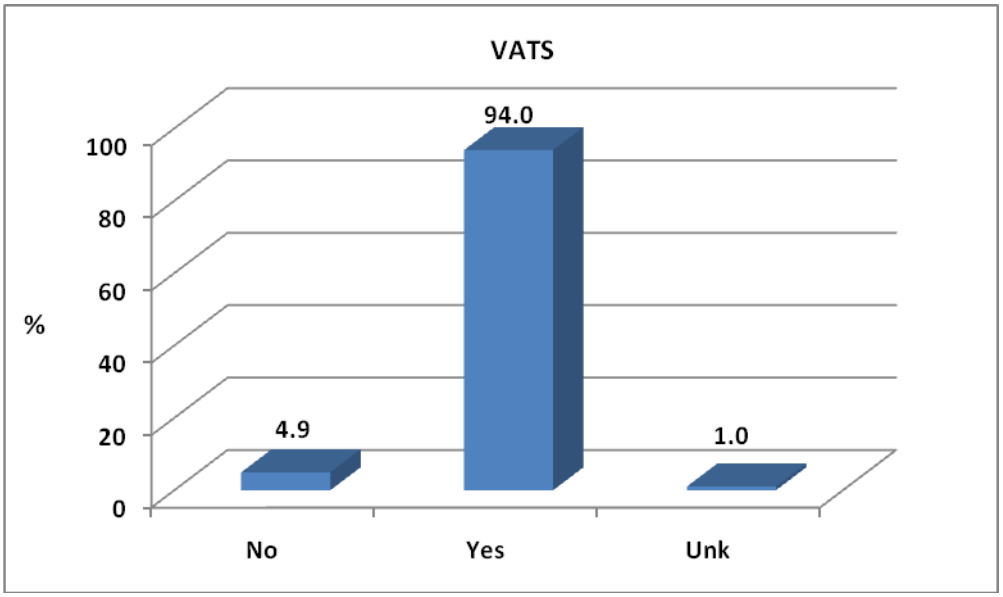
On Group Pectus Excavatum Correction

Correction method	Occurrences	Percent
Surgical	547	93.3
Non Surgical	1	0.2
Unk	38	6.5
Total	586	100



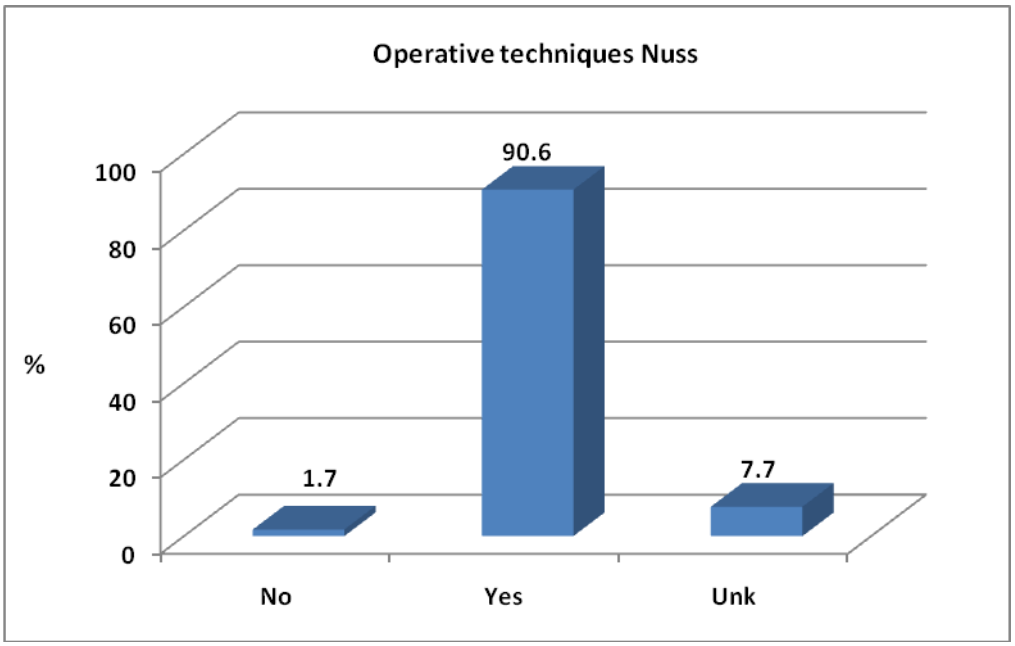
VATS

vats	Occurrences	Percent
No	29	4.9
Yes	551	94.0
Unk	6	1.0
Total	586	100



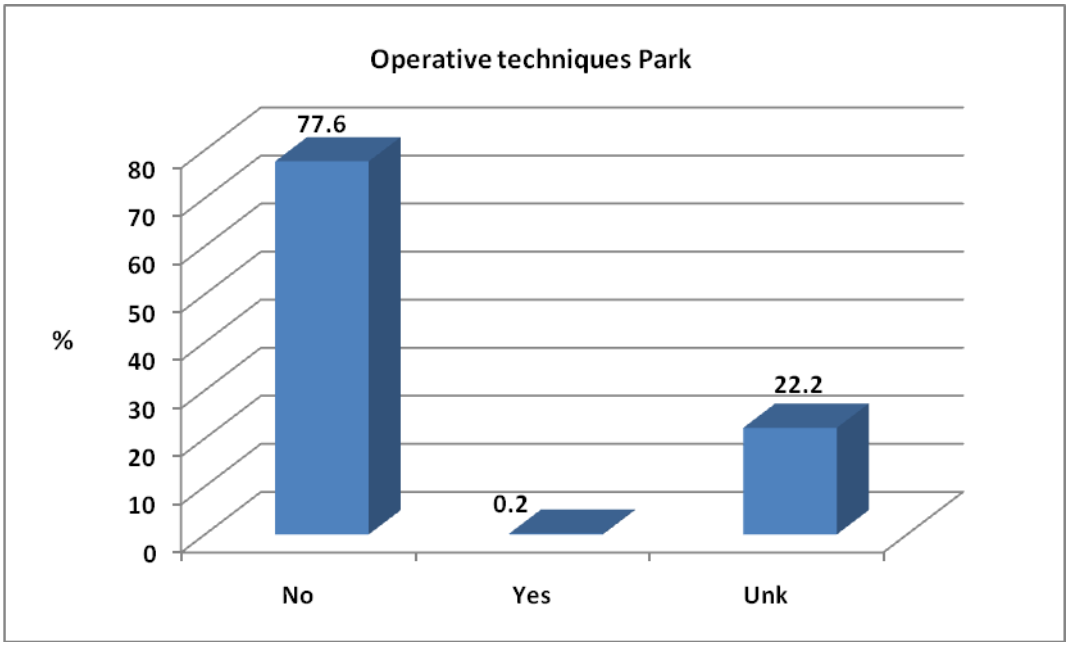
Operative technique Nuss

Operative techniques Nuss	Occurrences	Percent
No	10	1.7
Yes	531	90.6
Unk	45	7.7
Total	586	100



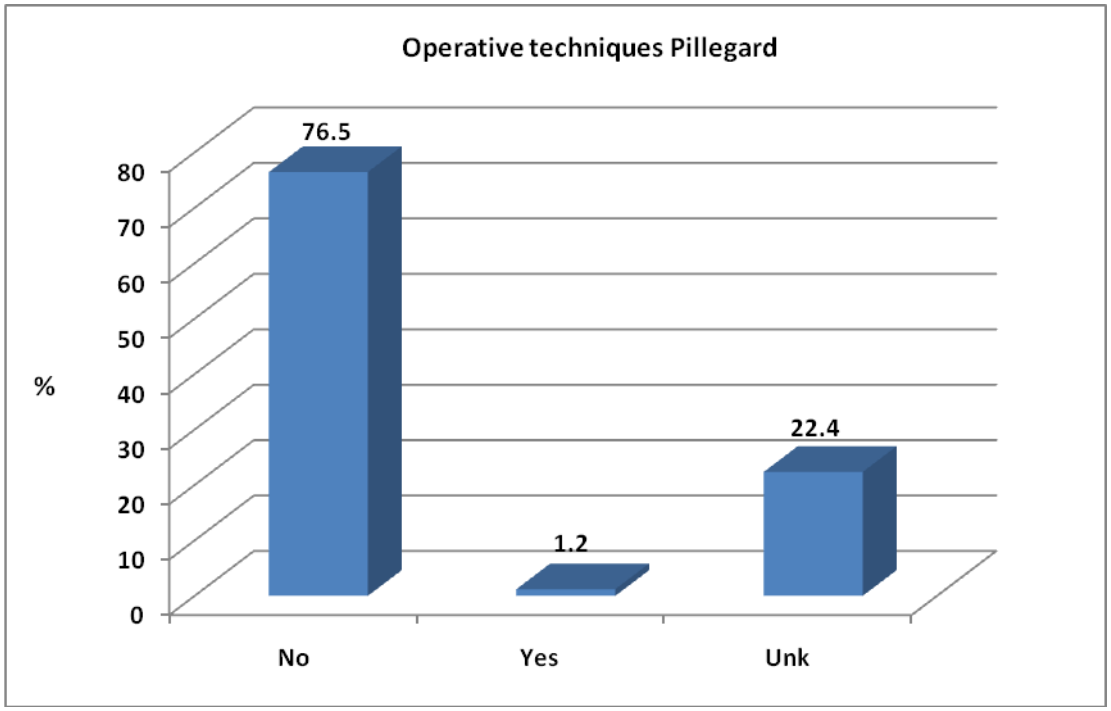
Operative Technique Park

Operative technique Park	Occurrences	Percent
No	455	77.6
Yes	1	0.2
Unk	130	22.2
Total	586	100



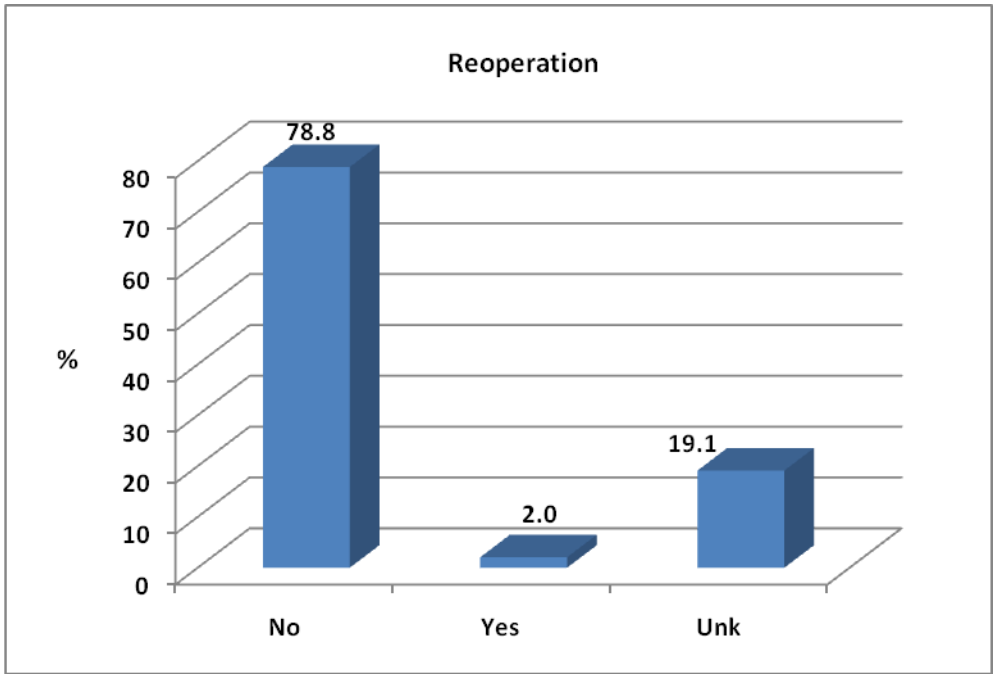
Operative Technique Pillegard

Operative technique Pillegard	Occurrences	Percent
No	448	76.5
Yes	7	1.2
Unk	131	22.4
Total	586	100



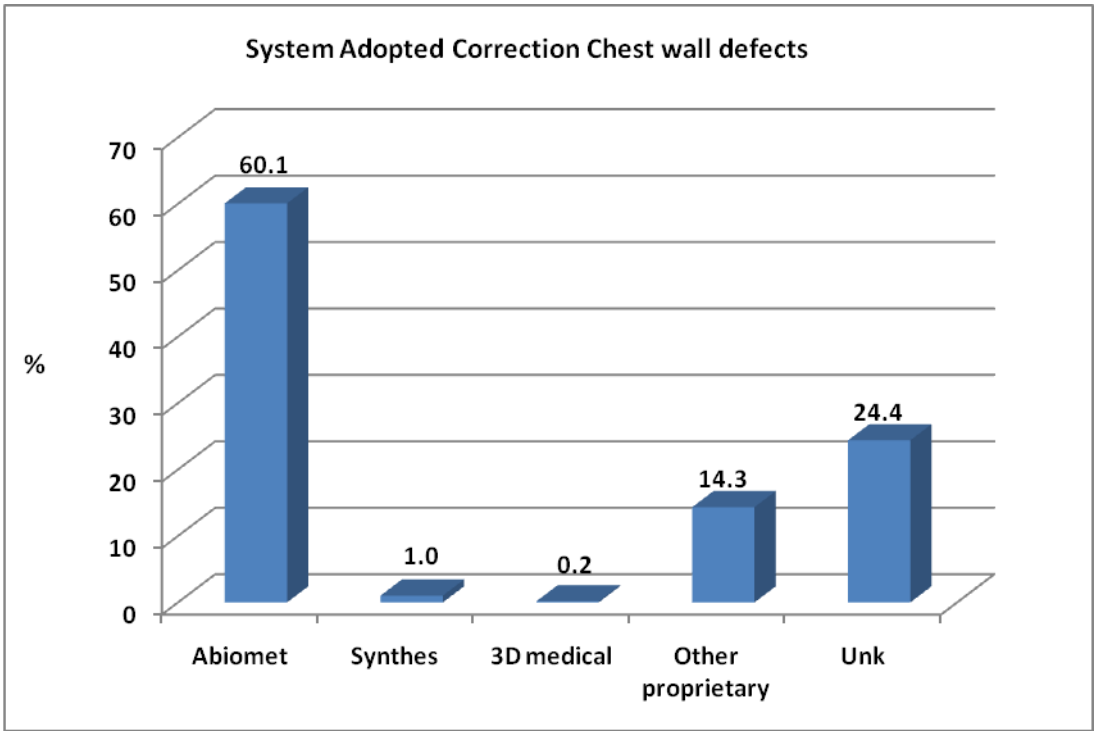
Reoperation

Reoperation	Occurrences	Percent
No	462	78.8
Yes	12	2.0
Unk	112	19.1
Total	586	100



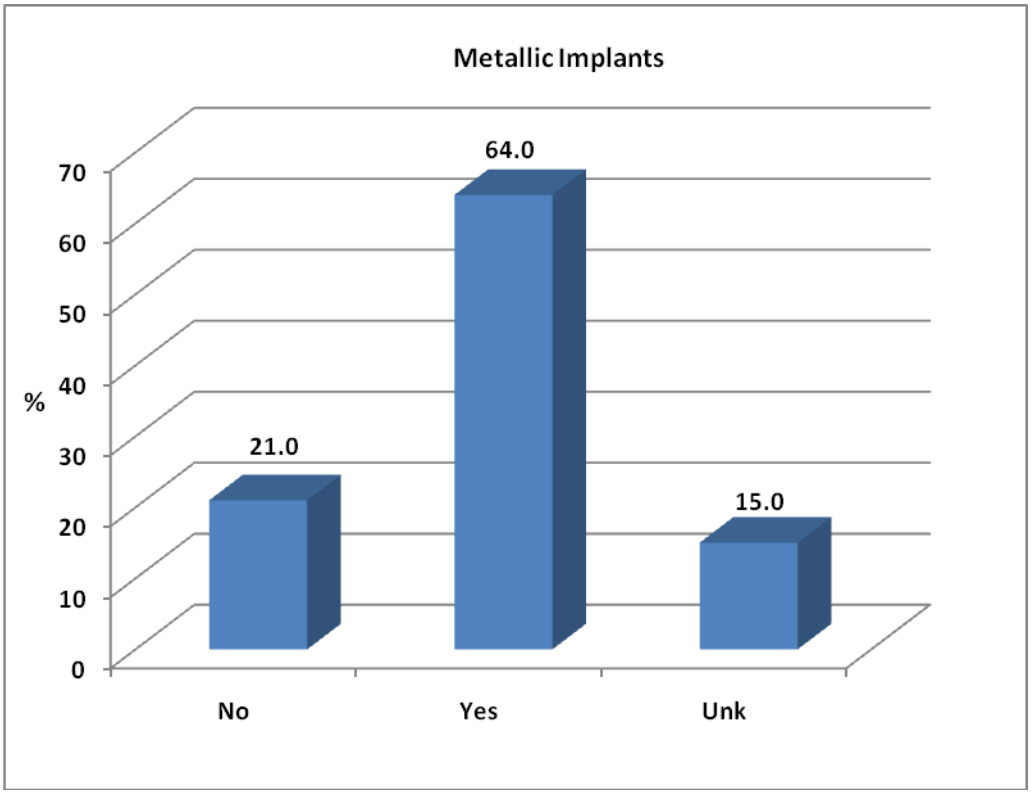
System Adopted Correction chest wall defects

systemadoptedcorrectioncwalldefects	Occurrences	Percent
Abiomet	352	60.1
Synthes	6	1.0
3D medical	1	0.2
Other proprietary	84	14.3
Unk	143	24.4
Total	586	100



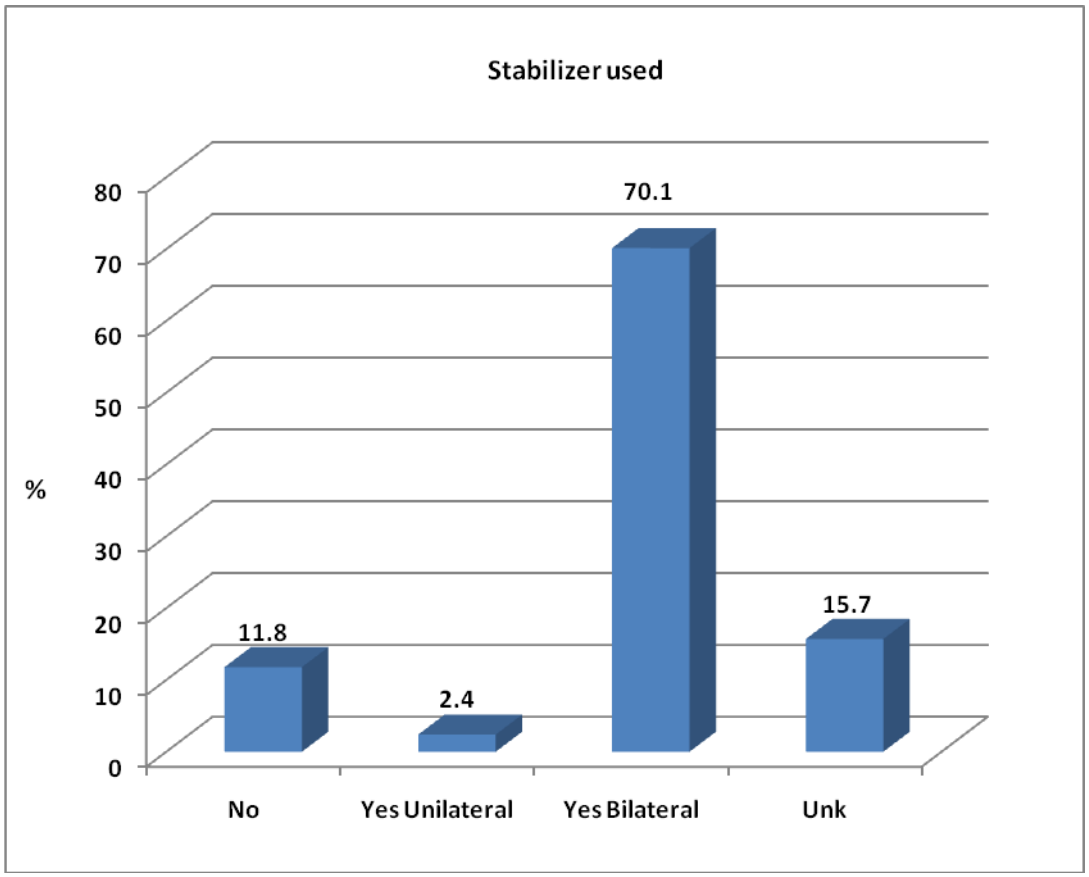
Metallic Implants

Metallic implants	Occurrences	Percent
No	123	21.0
Yes	375	64.0
Unk	88	15.0
Total	586	100



Stabilizer used

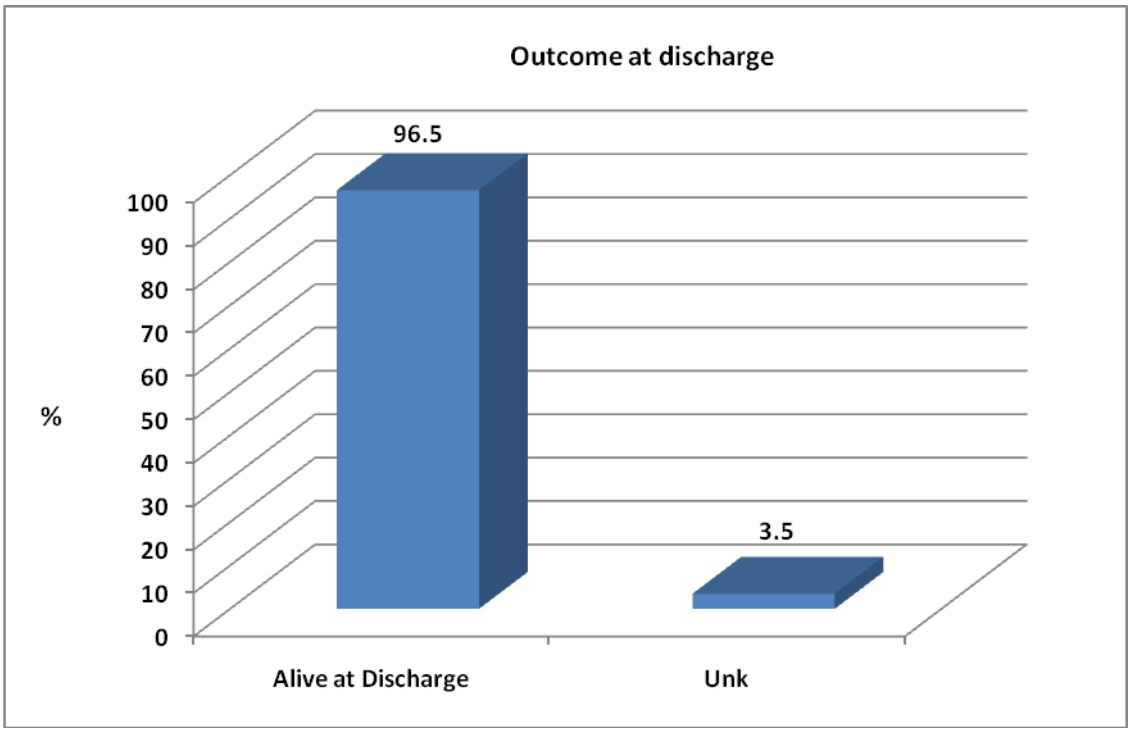
Stabilizer used	Occurrences	Percent
No	69	11.8
Yes Unilateral	14	2.4
Yes Bilateral	411	70.1
Unk	92	15.7
Total	586	100



Outcome at discharge (On Group Pectus Excavatum Correction - Surgical)

Outcome at discharge	Occurrences	Percent
Alive at Discharge°	528	96.5
Unk	19	3.5
Total	547	100

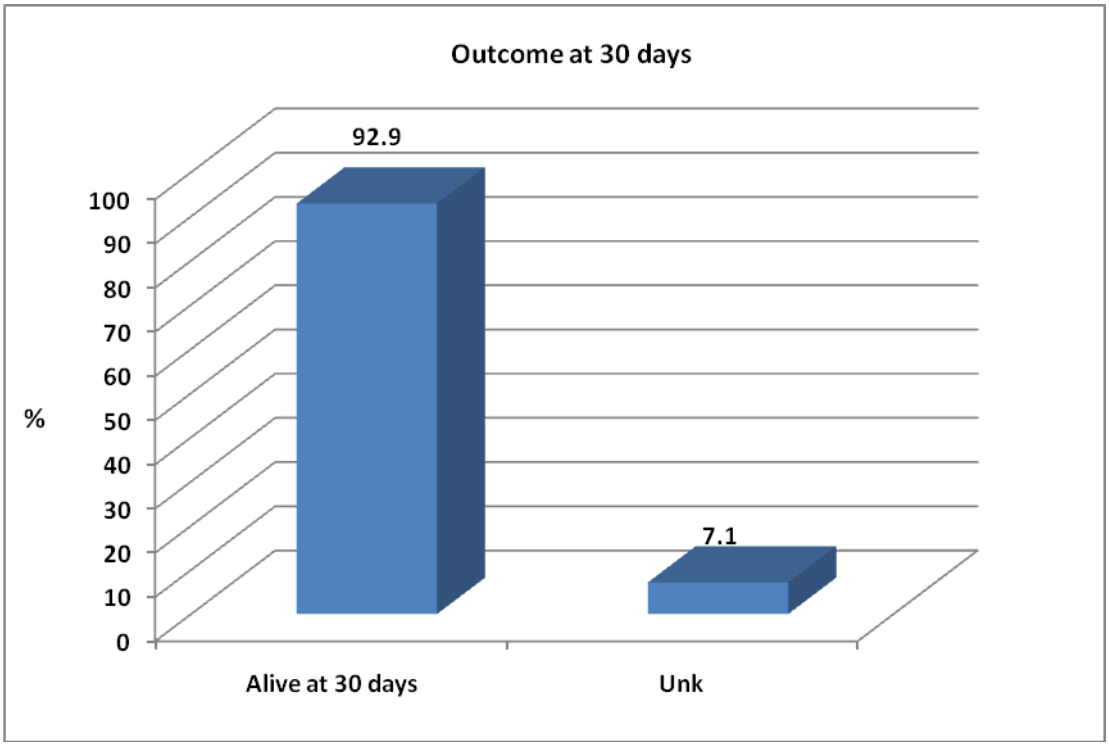
(°): Units with less than 500 patients included, results must be interpreted with caution



Outcome at 30 days (On Group Pectus Excavatum Correction - Surgical)

Outcome at 30 days	Occurrences	Percent
Alive at 30 days°	508	92.9
Unk	39	7.1
Total	547	100

(°): Units with less than 500 patients included, results must be interpreted with caution



Data Completeness

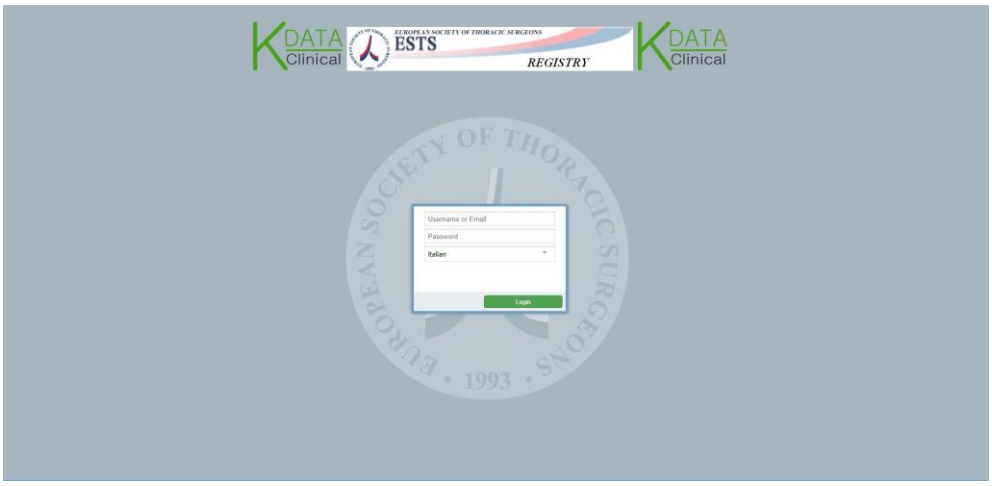
Name of Field	Unknown (%)	Completeness(%)
Chestwallsubgroup	3.5	96.5
Chest Wall procedures	8.7	91.3
qualifierexcisionofchestwalllesion (RCC)	44.9	55.1
vats (RCC)	4.6	95.4
Treatment chest traumas	21.2	78.8
Rib procedures (RF + Surgical)	3.3	96.7
Correction of chest wall defectsqualifier	2.8	97.2
Cause for removal(Pectus B.Removal)	7.6	92.4
Correction method(Pectus E.Correction)	6.5	93.5
vats (Pectus E.Correction + Surgical)	1.0	99.0
Operative techniques Nuss	7.7	92.3
Operative technique Park	22.2	77.8
Operative technique Pillegard	22.4	77.6
Reoperation	19.1	80.9
systemadoptedcorrectioncwalldefects	24.4	75.6
Metallic implants	15.0	85.0
Stabilizer used	15.7	84.3
Outcome at discharge (Pectus Ex. Correction + surgical)	3.5	96.5
Outcome at 30 days (Pectus Ex. Correction + surgical)	7.1	92.9

Appendix 1: Database format and submission of data

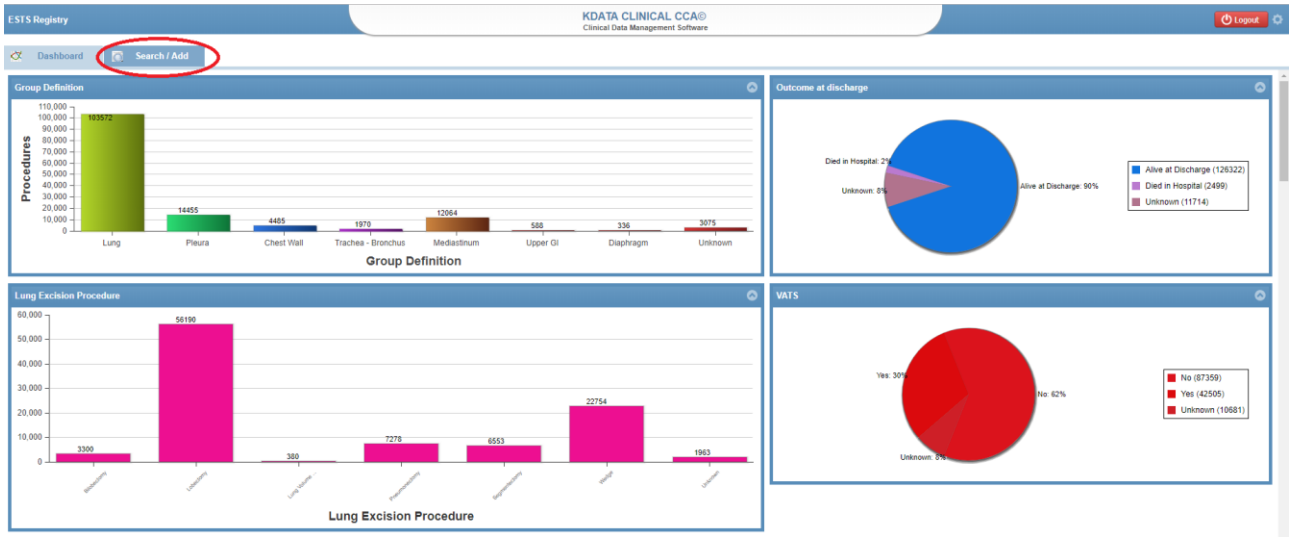
The first step is to request and obtain a login account through the relevant link found in the ESTS homepage (http//www.ests.org) or by directly sending an email to one of the members of the Database Committee. Once you have a valid login account you can proceed through the following data entry interface (accessible through https://ests.kdataclinical.it).

The KData logon screen shown below has been engineered to provide enhanced security facilities:

- Limiting users to 3 logon attempts before locking the user-account
- Giving information on previously successful and unsuccessful logon attempts
- Requiring users to have an eight-character password that contains at least one uppercase character, one lowercase character and one digit.

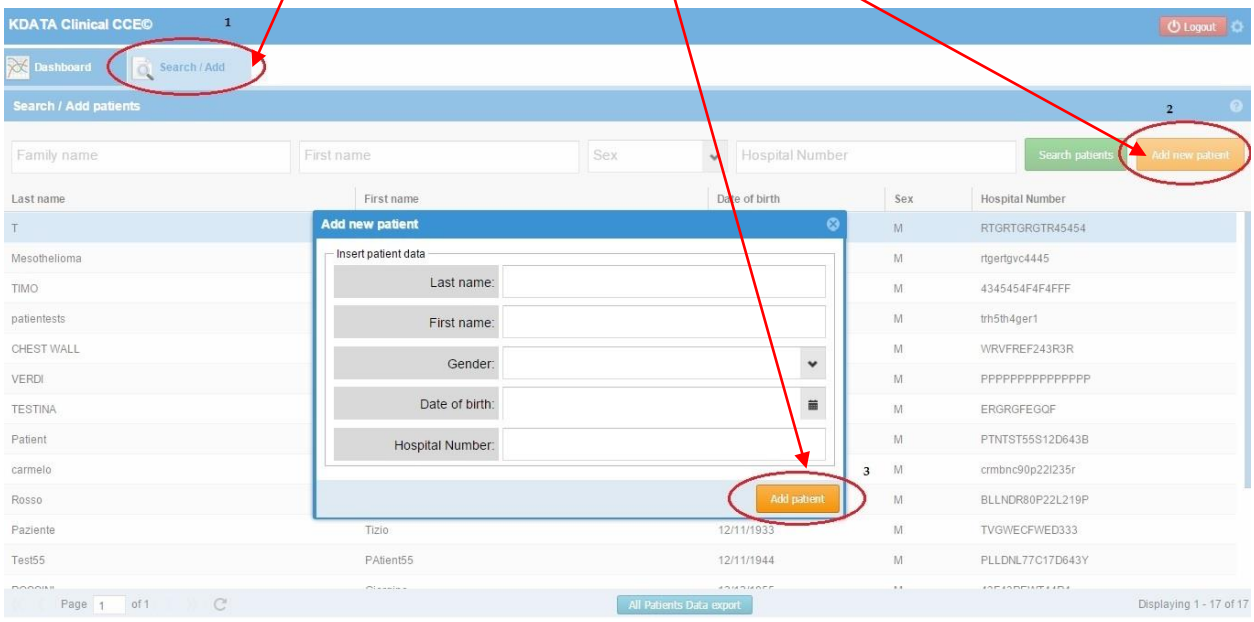


Once you have logged in you are presented with the Database main menu, from which you can add new data, view or edit a procedure, modify your account details, and export your data in Excel for your own purposes.

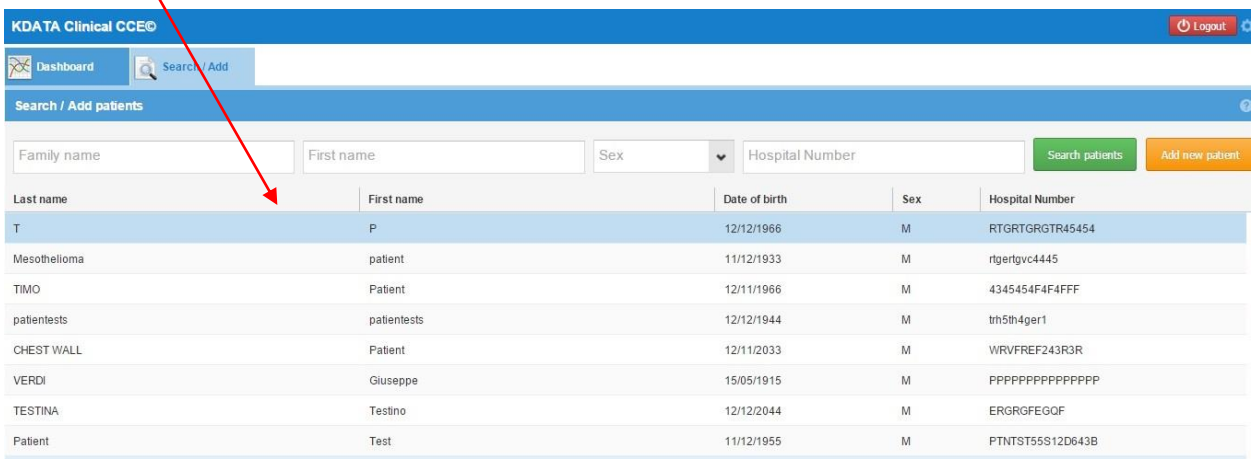


Clicking on the Search/Add tab opens the next screen “Patient Search”, where it is possible to search for patients already in the database or add new patients.

The function Search/Add (1) is for looking for an existing Patient or adding a new one; the function Add New Patients opens a new screen (2) to collect the unique identifying details of a New Patient where a set of mandatory data is required to add a new patient to the registry; you then save your New Patient by clicking the Add Patient (3) button as shown.



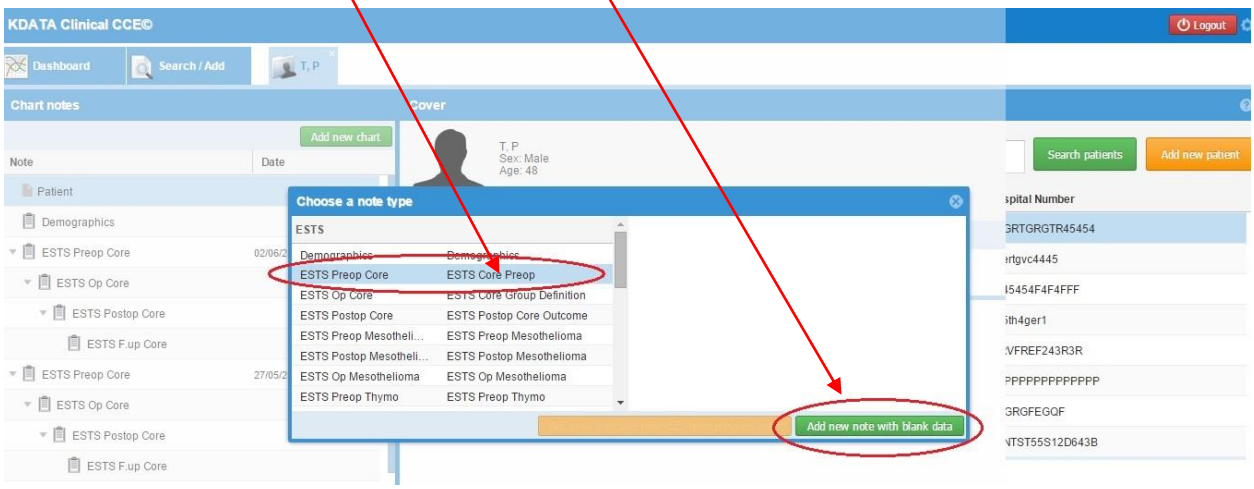
Once you have your New Patient you can select him/her for an appropriate Registry, or access a Patient/Procedure already existing in the Database.



Access to the required Registry (For Example ESTS Core in our case) is obtained by choosing the appropriate “note” from the existing Note List and clicking on the green button “ Add Data to New Note”

Steps: Select the “Note” (1) on Group ESTS

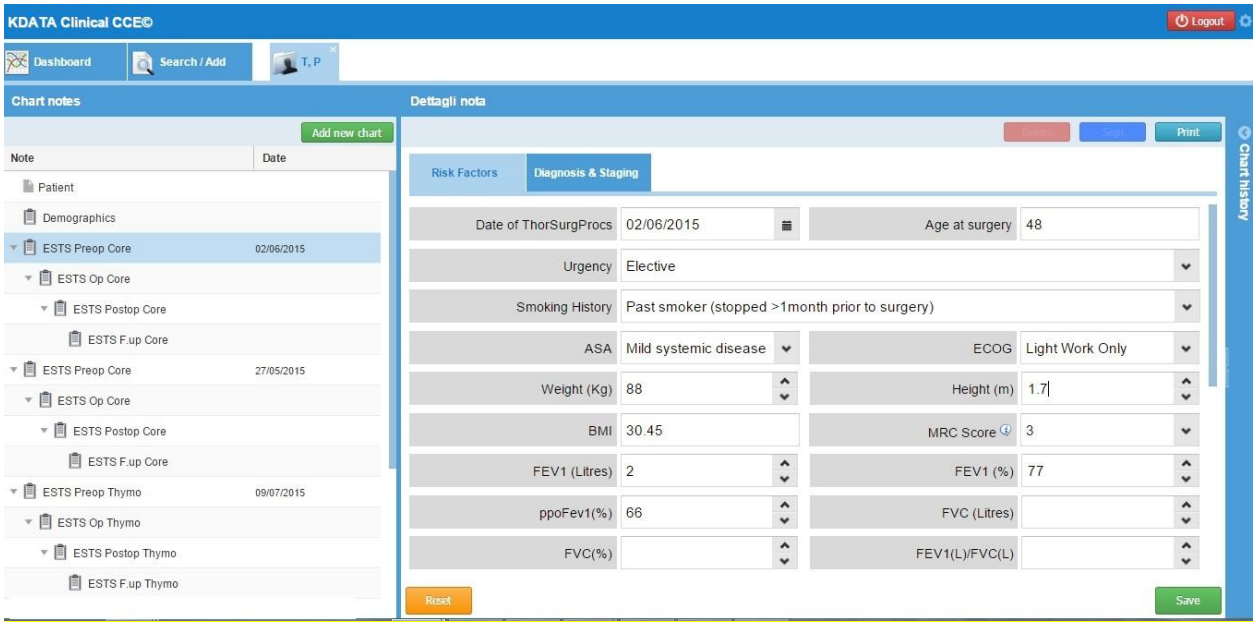
Click on the Add Data to New Note button(2)



These steps will lead you to the Data Collection Section including the routine sections:
Pre-op
Op
Post-Op
Follow-up.

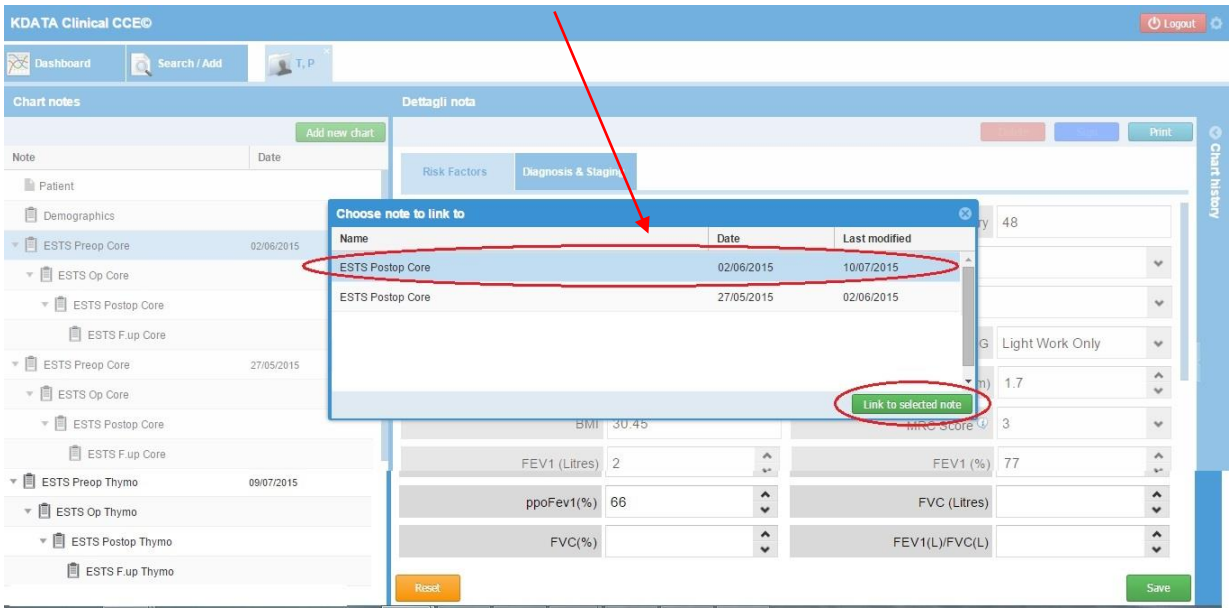
For the following Registries:
Core, Mesothelioma, Thymus, NETTs, Chest Wall Datasets.

PLEASE NOTE that you need to save your data by clicking on the “save” button any time you have completed a section of the registry even if there are some triggers on the application that save the data automatically by default.

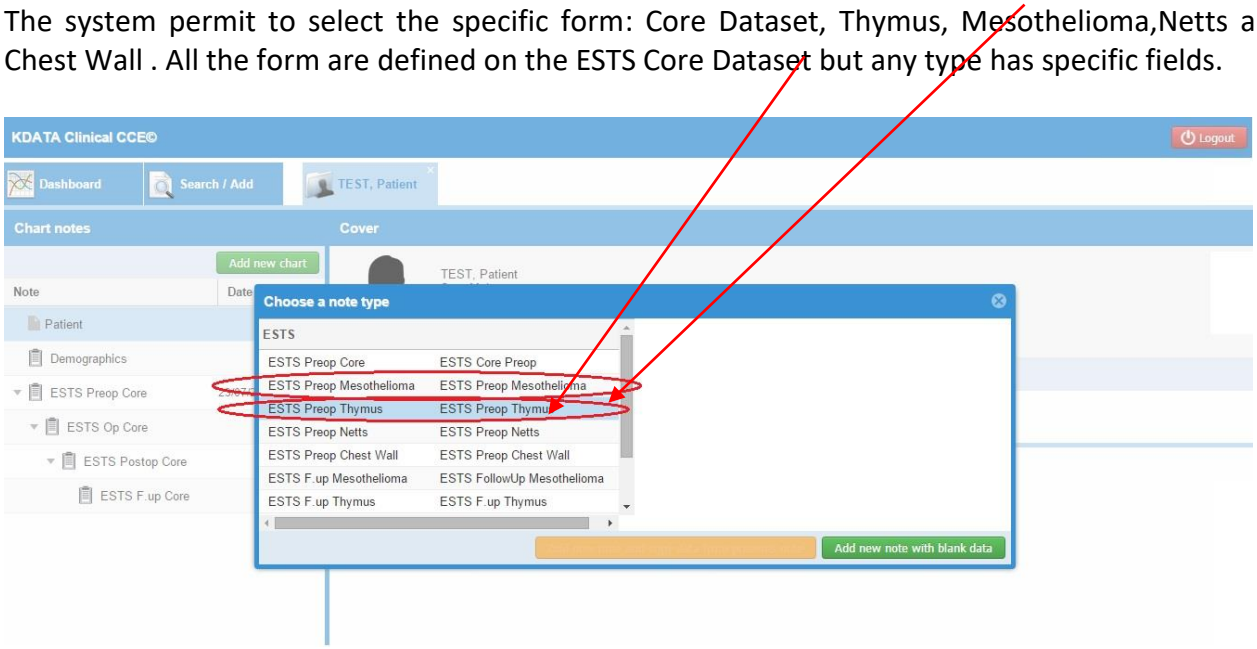


Similar steps are available for the Follow-up section of the Core Dataset section as shown are below:

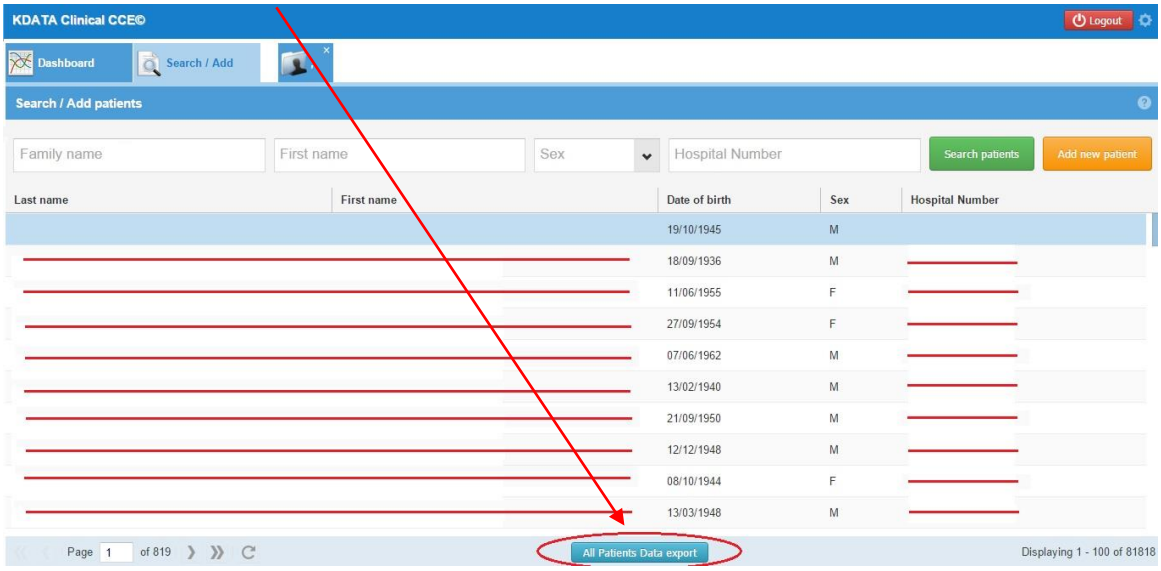
Please note that the User needs to specify to which Procedure the current Follow-up Note is referring to: as shown here below there may be more than one procedure for the same Patient.



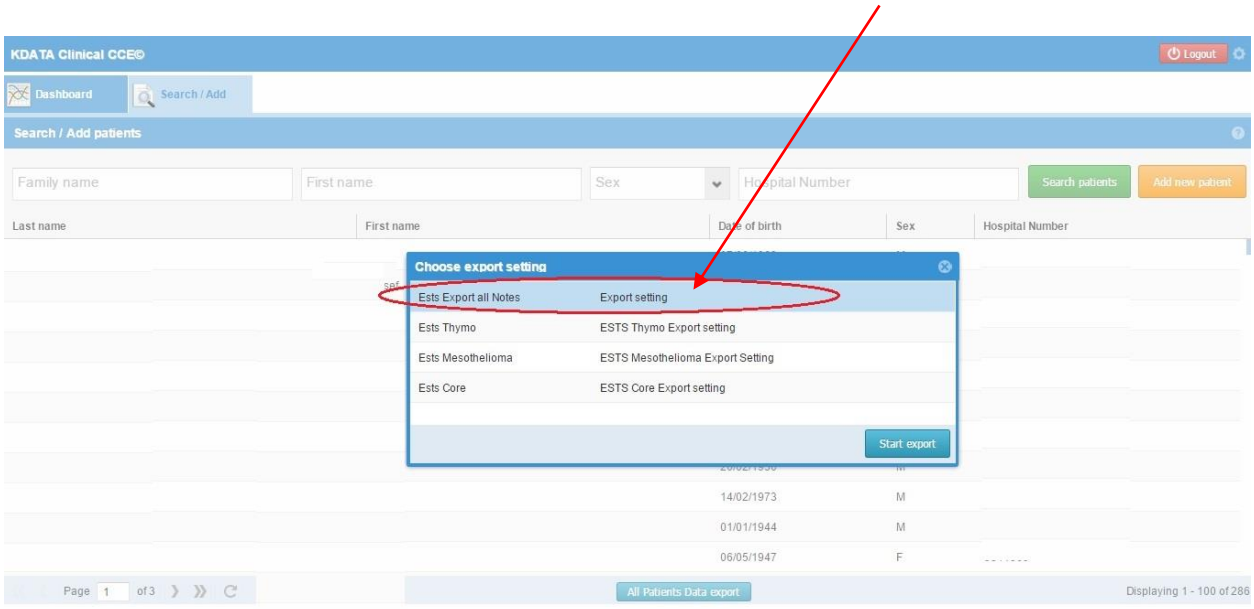
The system permit to select the specific form: Core Dataset, Thymus, Mesothelioma,Netts and Chest Wall . All the form are defined on the ESTS Core Dataset but any type has specific fields.



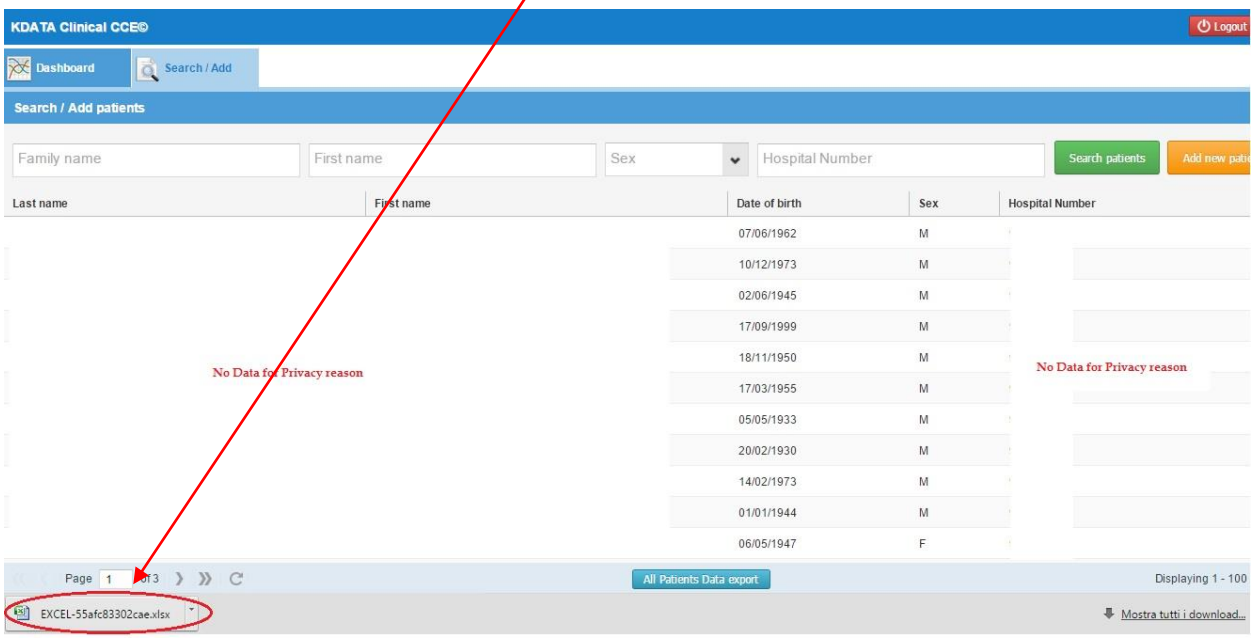
In summary the first step after put in the demographics data or search a patient just saved is to select the specific note and in case of thymo or MEsothelioma or NEtts or chest wall is necessary select the specific note.
In any case the total export permit to have a cumulative file with all type of procedures



After is possible select the type of export : all procedures as in the follow case:

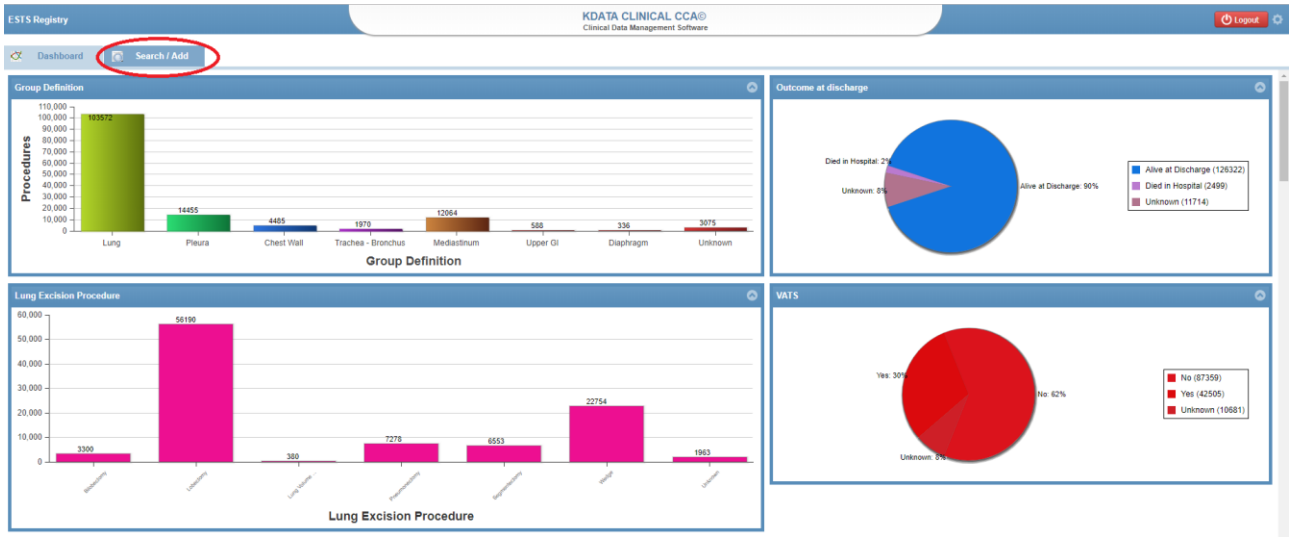


After you can open the file downloaded on the taskbar below



Clinical Care Analysis CCA or System Dashboard.

The first screen after logging in on the system shows a real-time representation of your Centre surgical activities:

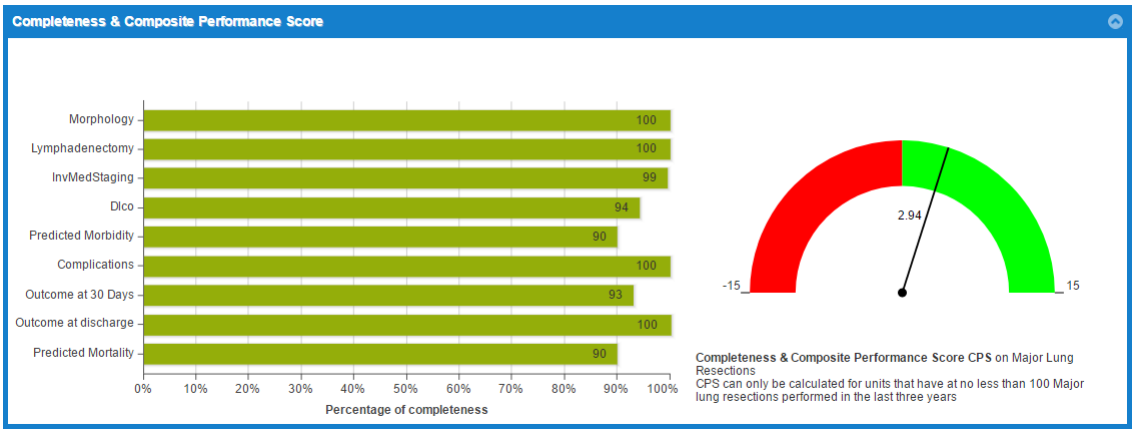


It gets updated each time you add any data into it; it includes an enumeration of the total thoracic surgery recorded activities, with details about lung resections, proportion of VATS and outcome at discharge. Here we have shown the global set visible to the ESTS Database Director only. Each Centre Director can see her/his own Centre data, and nobody else. Specific analysis contents have being developed for the satellite Registries.

Completeness and Composite Performance Score. The system auto-calculates both the Predicted Mortality (%) and Predicted Morbidity (%).

Early outcomes, including in-hospital morbidity, in-hospital and 30-days mortality should be specified in the final section, before submitting the data.

The system calculates the CPS automatically if there are more than 100 major lung excision procedures, and it shows the percentage of Data Completeness, as illustrated here below.



Appendix 2: Definition of major cardiopulmonary complications listed in the database

ARDS: Adult respiratory distress syndrome defined according to the American-European consensus conference. All of the following criteria should be met:

1. Acute onset
2. Arterial hypoxemia with PaO2/FIO2 ratio lower than 200 (regardless PEEP level)
3. Bilateral infiltrates at chest radiograph or CT scan
4. No clinical evidence of left atrial hypertension or pulmonary artery occlusive pressure < 18 mmHg
5. Compatible risk factors

Initial ventilator support >48 hours: Patient initially was ventilated >48 hours in the postoperative period; ventilator support ends with removal of endotracheal tube or, if the patient has a tracheostomy tube, until no longer ventilator dependent.

Reintubation: Patient was reintubated during the initial hospital stay after the initial extubation; this may include patients who have been extubated in the operating room and require intubation in the postoperative period

Atrial Arrhythmia: new onset of atrial fibrillation/flutter (AF) requiring medical treatment or cardioversion. Does not include recurrence of AF which had been present preoperatively.

Ventricular Arrhythmia: sustained ventricular tachycardia or ventricular fibrillation that has been clinically documented and treated by ablation therapy, implantable cardioverter defibrillator, permanent pacemaker, pharmacologic treatment or cardioversion.

Bronchoscopy for atelectasis: postoperative atelectasis documented clinically or radiographically that needed bronchoscopy.

Pneumonia: defined according to the last CDC criteria. Two or more serial chest radiographs with at least **one** of the following:

- New or progressive and persistent infiltrate
- Consolidation
- Cavitation

And at least **one** of the following:

- Fever (>38°C or >100.4°F) with no other recognized cause
- Leukopenia (<4000 WBC/mm^3) or leukocytosis ($\geq$12,000 WBC/mm^3)
- For adults $\geq$70 years old, altered mental status with no other recognized cause

and at least **two** of the following:

- New onset of purulent sputum, or change in character of sputum, or increased respiratory secretions, or increased suctioning requirements
- New onset or worsening cough, or dyspnea, or tachypnea

- Rales or bronchial breath sounds

Worsening gas exchange (e.g. O_2 desaturations (e.g., $PaO_2/FiO_2 \leq 240$), increased oxygen requirements, or increased ventilator demand).

Pulmonary embolism: confirmed by V/Q scan, angiogram or CT scan.

DVT: deep venous thrombosis confirmed by Doppler study, contrast study or other study and that required treatment.

Myocardial infarct: evidenced by one of the following criteria:

1. transmural infarction diagnosed by the appearance of a new Q wave in two or more contiguous leads on ECG.
2. Subendocardial infarction (non Q wave) evidenced by clinical, angiographic electrocardiographic signs.
3. Laboratory isoenzyme evidence of myocardial necrosis.

Renal failure: defined as the onset of new renal failure in the postoperative period according to one of the following criteria:

1. increase of serum creatinine to greater than 2.0, or 2-fold the preoperative creatinine level.
2. a new requirement for dialysis postoperatively.

Cerebrovascular complications: occurrence of one of the following central neurologic postoperative events not present preoperatively:

1. a central neurologic deficit persisting postoperatively for more than 72 hours
2. a transient neurologic deficit (transient ischemic attack or reversible ischemic neurological deficit) with recovery within 72 hours
3. a new postoperative coma persisting at least 24 hours and caused by anoxic/ischemic and/or metabolic encephalopathy, thromboembolic event or cerebral bleed.

Appendix 3: ESTS Institutional Accreditation Program

By Dr Alessandro Brunelli
alexit_2000@yahoo.com

Accreditation program

The ESTS Institutional Accreditation program was initiated in 2011 and is open to all thoracic surgery units participating to the ESTS Database.
The aim of the program is to set standards of good clinical practice across Europe with the intent to improve the quality of care possibly according to published guidelines.

Eligibility Criteria:

- ✓ Participation to the ESTS Database with contribution of at least 150 anatomic lung resections in the last 3 years.This pre-requisite is necessary to calculate a reliable Composite Performance Score, which is the metrics used to evaluate the Institutional performance.
- ✓ The Head of the unit or its Clinical Audit Lead must be an ESTS member.
- ✓ Composite Performance Score greater than 0
- ✓ Completeness of variables used to calculate the Eurolung2 greater than 70%

Based on a similar methodology, ESTS has recently developed and published a Composite Performance Score (CPS) for lung surgery (Brunelli A et al. The European Thoracic Database project: Composite Performance Score to measure quality of care major lung resection. Eur J Cardiothorac Surg 2009; 35: 769-774).
The method consists in developing standardized outcome and process indicators covering all temporal domains of the lung resection care. The indicators were selected based on their evidence-based level. For the preoperative domain, we selected the proportion of patients with DLCO measured before major lung resection, and the proportion of patients with clinically suspicious N2 nodes at CT scan or PET scan submitted to some type of preoperative mediastinal invasive staging. For the intraoperative domain, we selected the proportion of patients with primary neoplastic disease submitted to major anatomic resections and at least lobe-specific (or more extended) nodal dissection. To be defined as at least lobe-specific nodal dissection, station 7 should be always included in the dissection in addition to stations R2-4 for right upper lobectomy, stations 8-9 for lower lobectomies, stations 5 and 6 for left upper lobectomies. For the postoperative domain, we selected the risk-adjusted in-hospital cardiopulmonary and mortality rates.
Each of these indicators has been rescaled according to their standard deviation in the entire population to obtain individual standardized indicators. These were then summed to obtain the composite score for each unit.

The risk adjusted morbidity and mortality rates were calculated using the Eurlung1 and Eurlung 2 risk models. The following model were used:

Eurolung 1 was used to adjust cardiopulmonary morbidity:
Logit= -2.465 + 0.497Xsex male (coded 1 for male and 0 for female) + 0.026Xage + 0.231XCAD (coded 1 for presence of CAD) + 0.371XCVD (coded 1 for presence of CVD) + 0.152XCKD (coded 1 for presence of CKD) – 0.015XppoFEV1 + 0.514X extended resections (coded 1 for presence of extended resection) + 0.497Xthoracotomy (coded 1 for thoracotomy and 0 for VATS).

Eurolung 2 was used to adjust 30 day mortality:
Logit= -5.82 + 0.903Xsex male (coded 1 for male and 0 for female) + 0.044Xage + 0.264XCAD (coded 1 for presence of CAD) + 0.582XCVD (coded 1 for presence of CVD) -0.064XBMI + 0.300Xextended resection (coded 1 for extended resection) + 0.929X pneumonectomy (coded 1 for pneumonectomy and 0 for lesser resection) + 0.894Xthoracotomy (coded 1 for thoracotomy and 0 for VATS) - 0.009XppoFEV1.

Standardized scores are calculated by subtracting the observed risk-adjusted outcome or process incidence minus the average observed outcome or process incidence. The difference is then divided by the standard deviation of the observed outcome or process in the entire population.

A CPS greater than 0 is the threshold selected by the Database Committee as a minimum criteria for accreditation. An automatic function has been implemented in the ESTS Database, which allow the end-users to calculateand review at any time their own CPS.

In addition to their CPS, units must have certain structural, procedural and professional characteristics to be certified. These characteristics needs to be audited along a sample of data submitted to the database. To this purpose, ESTS has subcontracted an external auditing Company, which together with a thoracic surgeon will visit the applicant units and produce a report, which will be evaluated by the Database Committee. If the report will be judged satisfactory, the Accreditation will be granted by the ESTS Council.
The following are the required structural/procedural/professional characteristics (based and modified from Brunelli A, Falcoz PE, D'AmicoT,et al.European guidelines on structure and qualification of generalthoracicsurgery. Eur J CardiothoracSurg. 2014;45:779-86).

Procedures Volume:
A suggested minimum volume of 150 +/- 50 major thoracic procedures per year is recommended.
For esophageal resections a minimum volume of 20 +/- 5 procedures per year is recommended.
For lung transplant a minimum volume of 10 procedures per year is recommended.

Qualification of surgeons:

All surgeons must be qualified to perform thoracic surgery according to individual national or European legislation.
The Head of the unit must have a minimum experience of 5 years of clinical practice as qualified thoracic surgeon.

Costs:
The costs for the inspection and auditing (1500 Euros) are the individual Unit's responsibility.
The accreditation will be valid for a 36 months period. After this period the unit must apply for recertification.

Timeline for the accreditation process

MAY:	Central and automatic calculation of the CPS
	Eligible units announced during ESTS meeting
JUNE:	Invitation letters are sent out to eligible units
JULY:	Deadline acceptance for the accreditation process
AUGUST-MARCH:	Local Audits
APRIL-MAY:	Audit reports reviewed by DB Committee and ESTS Council
MAY:	Accredited units announced during ESTS meeting

ESTS Accreditation Process: a brief review to guide "virtual" Visits
Background and Rationale
As COVID19 has generated various ways to contain it across Europe, it is currently not possible to plan adequately to visit prospective ESTS accreditation Centres in person.
Therefore we propose to amend our current guide as per a "virtual" Visit; here below are the usual criteria revamped to per complied with in a "virtual" mode.

CPS Composite Performance Score Factors
These needs to be read by the Audit Person from each of the selected 10 clinical notes, form the 40 KData have requested in advance. Data must be from either clinical notes (paper) or a local DB that substitute paper notes. The Regent will chose 10 notes on live video, and the audit person will also read the results of each heading on live video.
Preoperative care:
-% of pts having DLCO measured
- % of pts with CT enlarged or PET+ med nodes
undergoing preop invasive mediastinal staging
Operative care:
-% of pts operated on for primary neoplastic
disease submitted to systematic lymph node dissection
Postoperative care:
-risk-adjusted cardiopulmonary morbidity rate
-risk-adjusted mortality rate

Milestones of Process

MAY:	**- Central calculation of CPS-Eligible units announced at ESTS meeting**
JUNE:	**- Invitation letters are sent out to eligible units**
JULY:	**- Deadline acceptance for accreditation process**
AUGUST- MARCH:	**- Local Audits**
APRIL-MAY:	**- Audit reports reviewed by DB Committee and ESTS Council**
MAY:	**- Accredited units announced during ESTS meeting**

Benefits

- Accredited units will be announced during ESTS Annual Meeting and in the ESTS homepage
- Participation to ESTS quality improvement initiatives
- Participation to high-profile scientific projects supported by ESTS
- Accredited units may propose their own clinical research projects based on data in the database
- *Setting up of Personalised dashboard on ESTS Database own log-in page*

Brief Description of Process and Data Checks

All Units who acceptthe ESTS invitation to go through the Accreditation Process will be required to:

a) ESTS PRE-VISIT QUESTIONNAIRE: A copy of the ESTS PRE-VISIT QUESTIONNAIRE will be sent back BEFORE date of visit; it will contain the ESTS PROFESSIONAL, STRUCTURAL & PROCEDURAL replies and it will be sent back fully compiled to the Regent, the ESTS General Secretary & K-Data Clinical BEFORE the PLANNED VIRTUAL VISIT.

b) To make available the from whole 3year's clinical data 40 notes as from the excel fileKData Clinical sent to the Centre; enabling the Regent to choose 10 notes on the day.

A brief PRE-Evaluation Meeting will take place before the proceedings *(Video hosted)*
A Brief POST-Evaluation Meeting All will take place after the proceedings *(Video hosted)*
Data from the notes will be read by the Regent to the KData Clinical person who will record the relevant similarities & discrepancies if any. This method will prevent any untoward breach of Patient Confidentiality. *(Video hosted)*
An Accreditation Visit Report will be circulated to the ESTS General Secretary, to support the final decision to award the actual accreditation to the Unit.

Appendix 4: The Setting of a National Registry in collaboration with ESTS or the “Hungarian Model” Experience

By Dr Attila Enyedi
drenyediattila@gmail.com

The “ Hungarian Model” Experience

Dear Colleagues,

It is with great honor that I introduce to you the Hungarian Chapter of the Silver Book 2023. This chapter serves as a comprehensive summary of the Hungarian Thoracic Surgical activity from 2017 to 2022, based on the records of the ESTS Hungarian Database. As many of you may already know, Hungary, alongside the French Society for Thoracic and Cardiovascular Surgery, contributes cumulative data to the ESTS Database, establishing it as the National Database for thoracic surgery in Hungary.

The establishment of the "ESTS Hungarian Model" has paved the way for a possible Database for nationally or locally connected centers sharing the same language, economic background, or scientific interest. By doing so, we aim to create a National dataset that highlights both the challenges and successes observed in European results, providing precise guidelines to meet and exceed standards while celebrating accomplishments.

Feedback from the analysis of the ESTS Database composite score has provided valuable insights on areas for improvement in perioperative and intraoperative care. It has also emphasized Hungary's strengths, including the significantly higher VATS ratio compared to the European average and the commendable achievements in postoperative morbidity and mortality rates. Several Hungarian Units, including Debrecen, Szeged, and Szolnok, have already obtained accreditation in recent years. Their success serves as motivation for future applicants, inspiring them to strive for elevated treatment quality control using the guidance of the Database.

To enhance the efficacy of patient data recording and contribution to the European Registry, measures are being implemented to create a standardized documentation formula for thoracic surgical patients across the nation. This standardized approach will incorporate all aspects of the

ESTS Dataset, ranging from tumor board records to comprehensive follow-up documentation of patients.

The Hungarian Chapter of the Silver Book 2023 is a testament to the dedication and collaboration of our thoracic surgical community in Hungary. I extend my gratitude to all those involved in contributing to the ESTS Hungarian Database and shaping the future of thoracic surgery in our country. Let us continue our efforts to improve patient care, drive research advancements, and uphold the highest standards of treatment quality.

Best regards

Dr Attila Enyedi,

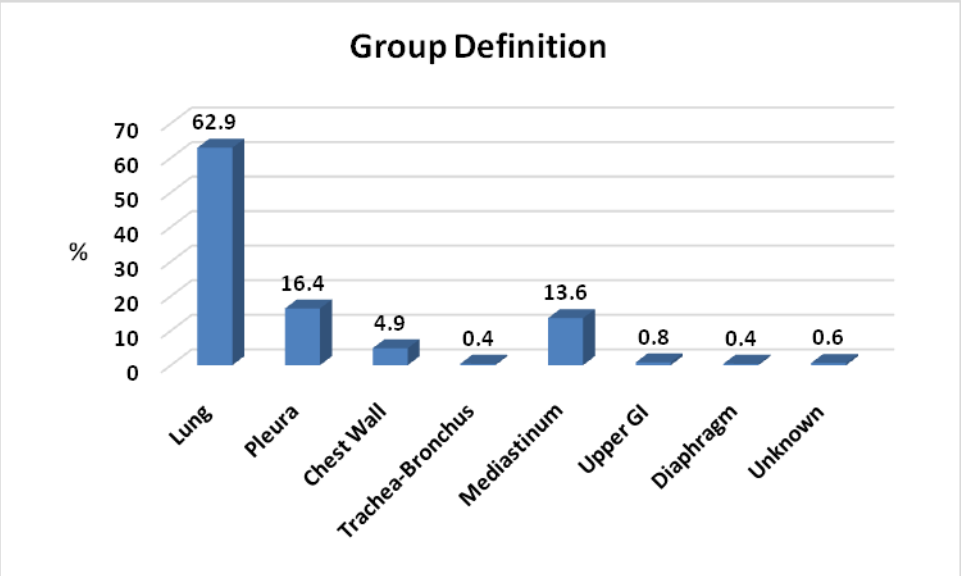
ESTS Regent for Hungary

drenyediattila@gmail.com

Hungarian Cumulative Data

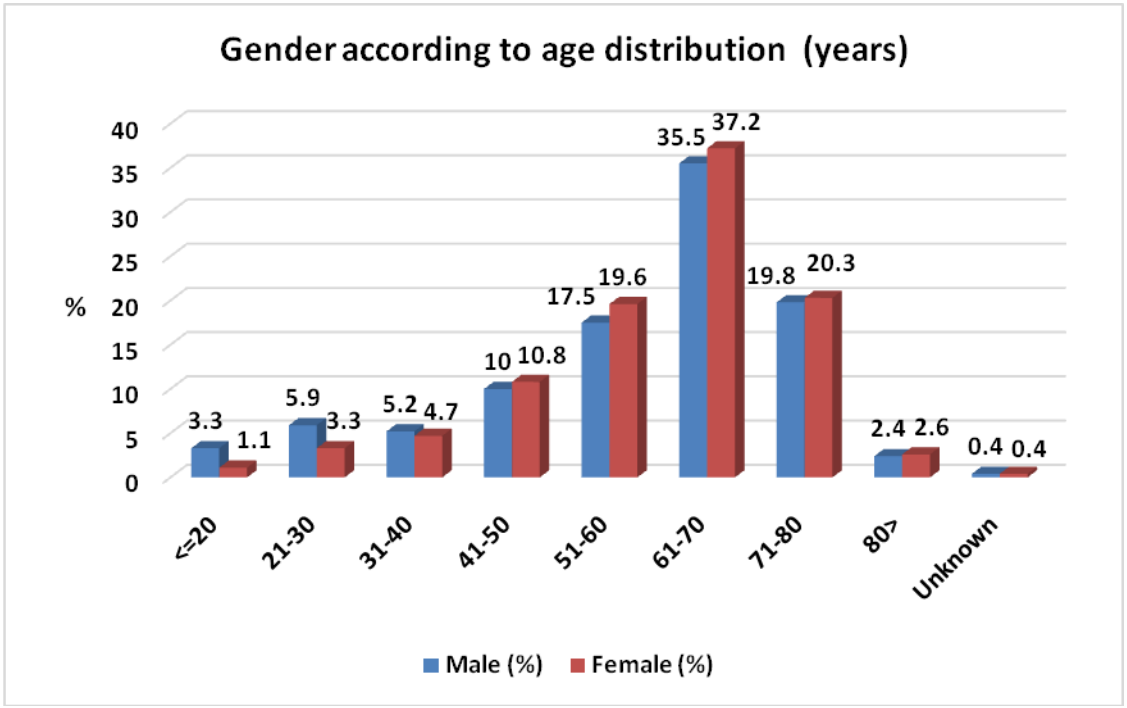
Group Definitions

Group Definition	Occurrences	Percent
Lung	17790	62.9
Pleura	4642	16.4
Chest Wall	1395	4.9
Trachea-Bronchus	116	0.4
Mediastinum	3858	13.6
Upper GI	217	0.8
Diaphragm	103	0.4
Unknown	179	0.6
Total	**28300**	100



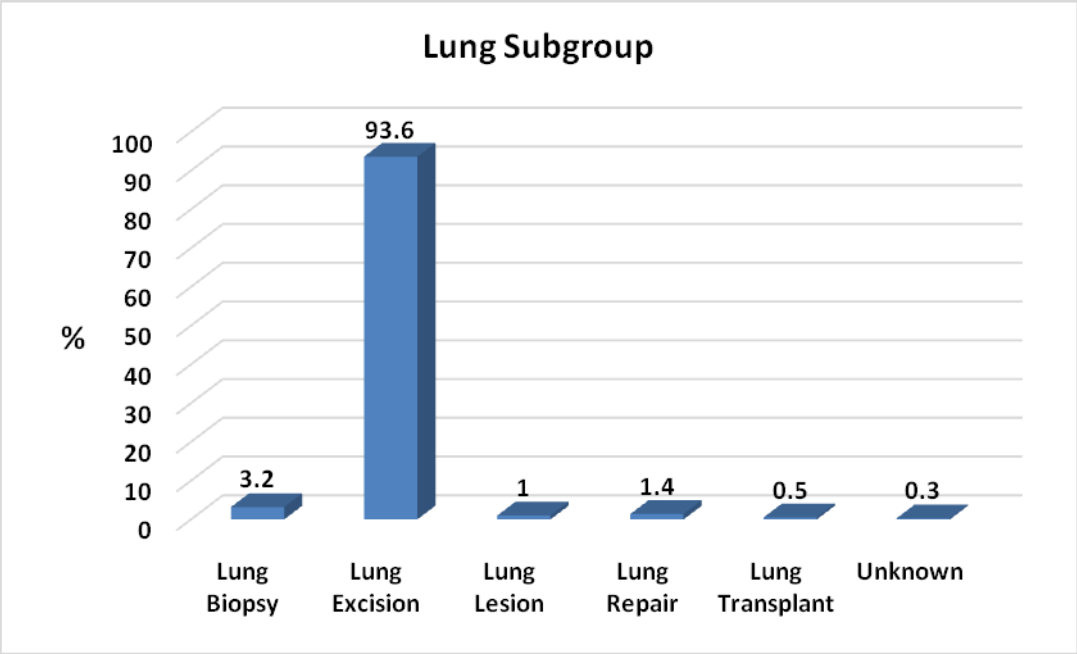
Gender according to age distribution (years)

Age (years)	Male (%)	Female (%)
<=20	3.3	1.1
21-30	5.9	3.3
31-40	5.2	4.7
41-50	10	10.8
51-60	17.5	19.6
61-70	35.5	37.2
71-80	19.8	20.3
80>	2.4	2.6



Lung Subgroup

	Occurrences	Percent
Lung Biopsy	567	3.2
Lung Excision	16652	93.6
Lung Lesion	175	1
Lung Repair	244	1.4
Lung Transplant	90	0.5
Unk	62	0.3
Total	**17790**	100

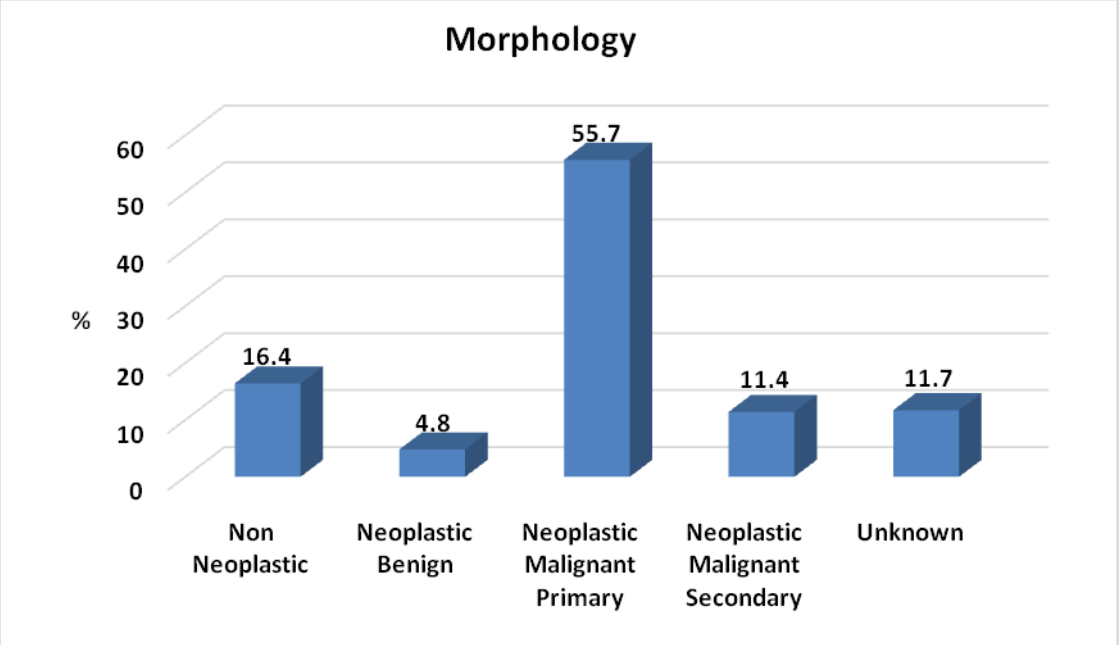


Lung Excision Procedure

	Occurrences	Percent
Bilobectomy	256	1.5
Lobectomy	8056	48.4
Lung Volume Reduction	34	0.2
Pneumonectomy	689	4.1
Segmentectomy	1029	6.2
Wedge	6503	39.1
Unk	85	0.5
Total	**16652**	100

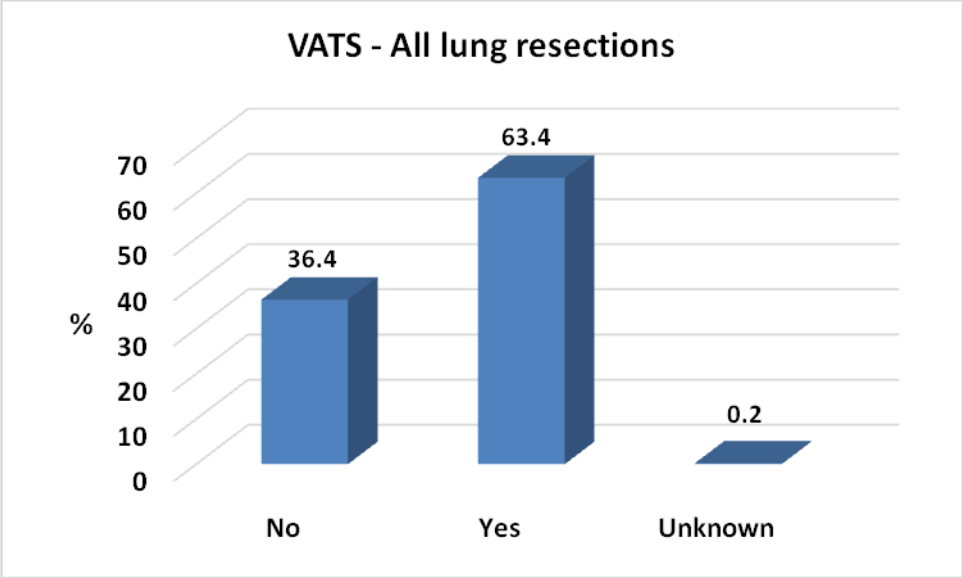
Lung resections pathology

Morphology	Occurrences	Percent (%)
Non Neoplastic	2733	16.4
Neoplastic Benign	802	4.8
Neoplastic Malignant Primary	9266	55.7
Neoplastic Malignant Secondary	1904	11.4
Unknown	1947	11.7
Total	**16652**	**100**



Lung resections pathology (All lung resections)

VATS	Occurrences	Percent (%)
No	6057	36.4
Yes	10555	63.4
Unknown	40	0.2
Total	16652	100

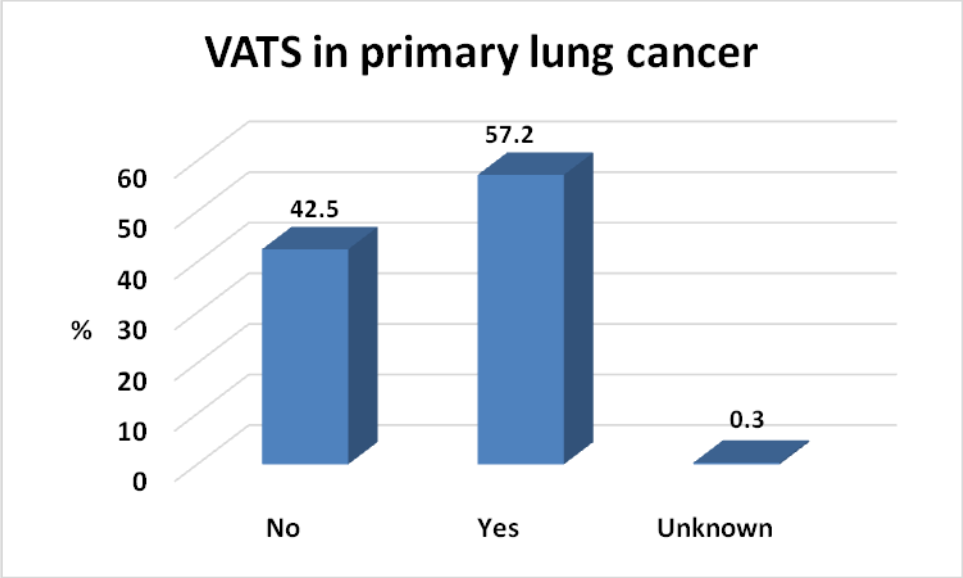


Lung resections pathology (Only Lobectomy)

VATS	Occurrences	Percent (%)
No	3392	42.1
Yes	4650	57.7
Unknown	14	0.2
Total	**8056**	**100**

Lung resections pathology (Primary malignant)

VATS	Occurrences	Percent (%)
No	3941	42.5
Yes	5297	57.2
Unknown	28	0.3
Total	**9266**	**100**

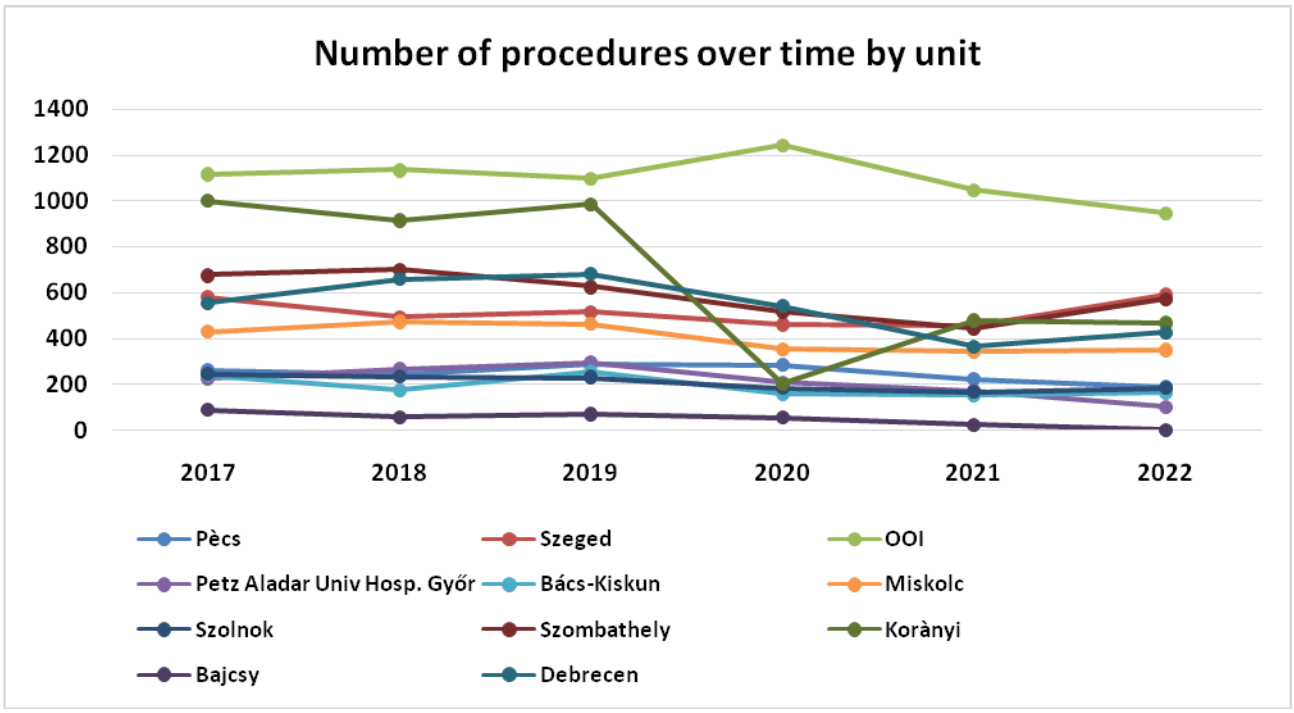


Unadjusted in-hospital mortality rates in lung excision procedures (Primary Lung Cancer)

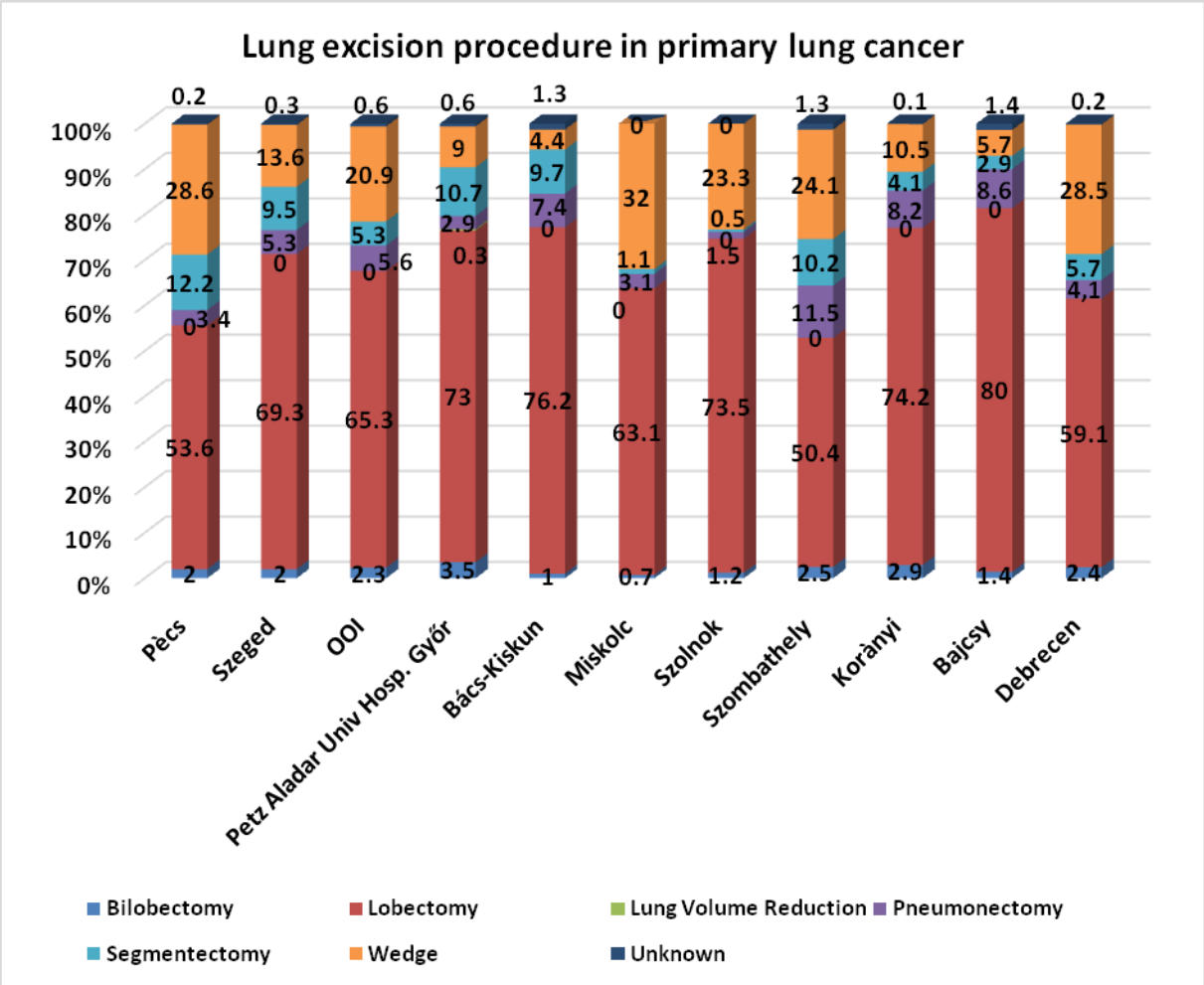
Outcome at Discharge - Died in Hospital	N	Died in Hospital	Percent(%)
Bilobectomy	189	5	2.6
Lobectomy	5722	34	0.6
Lung Volume Reduction	1	0	0
Pneumonectomy	503	18	3.6
Segmentectomy	615	3	0.5
Wedge	1849	3	0.2
Total	**8879**	**63**	**0.7**

Units specific activity & Comparative Analysis between contributing units

Country	2017	2018	2019	2020	2021	2022	Total
Pècs	261	240	287	284	223	187	1482
Szeged	579	493	515	461	456	589	3093
OOI	1116	1134	1098	1242	1045	946	6581
Petz Aladar Univ Hosp. Győr	226	266	293	206	169	101	1261
Bács-Kiskun	240	174	254	159	154	165	1146
Miskolc	430	472	463	353	344	352	2414
Szolnok	243	233	229	182	166	183	1236
Szombathely	676	700	626	519	445	574	3540
Korànyi	998	913	984	202	478	465	4040
Bajcsy	88	56	70	54	22	0	290
Debrecen	553	658	680	540	363	423	3217
Total	5410	5339	5499	4202	3865	3985	28300

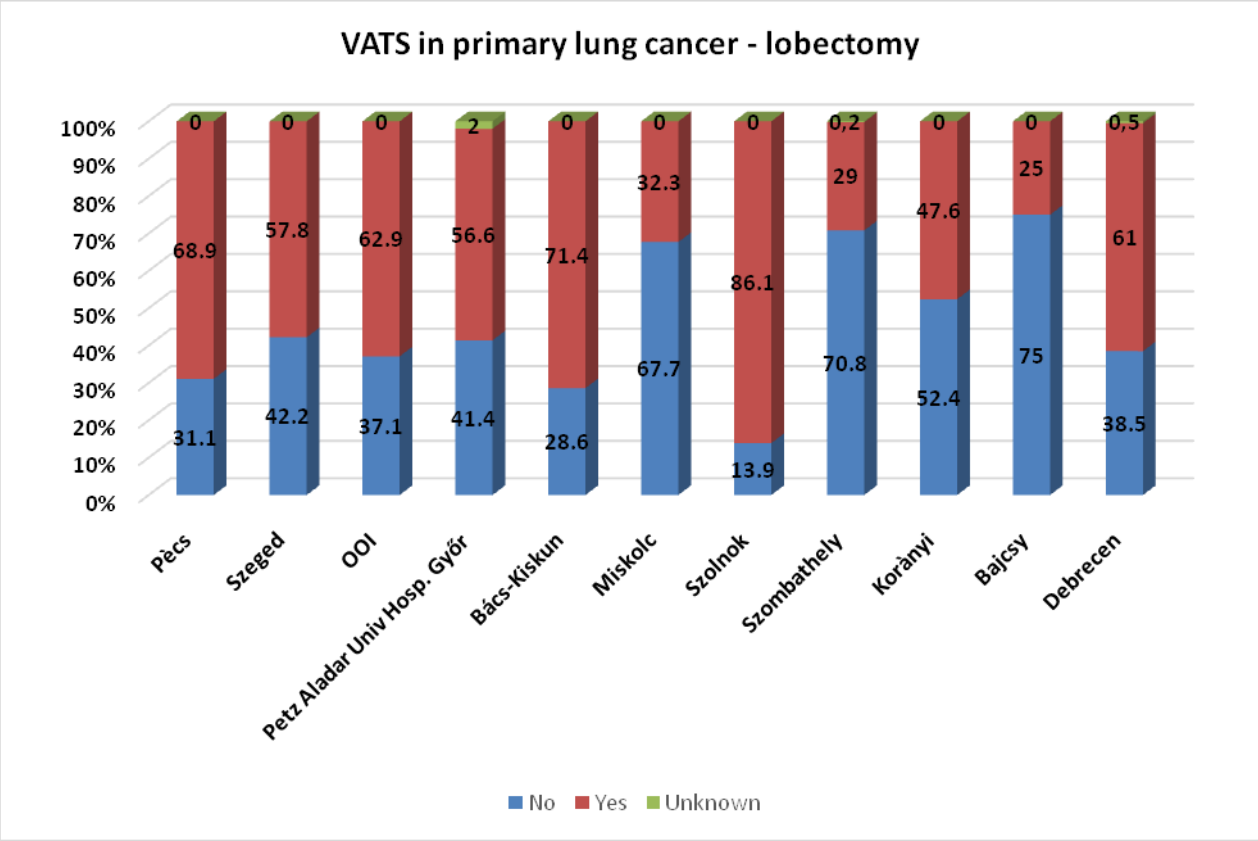


Unit	Total	Bilobectomy	Lobectomy	Lung Volume Reduction	Pneumonectomy	Segmentectomy	Wedge	Unknown
Pècs	737	2	53.6	0	3.4	12.2	28.6	0.2
Szeged	1285	2	69.3	0	5.3	9.5	13.6	0.3
OOI	2742	2.3	65.3	0	5.6	5.3	20.9	0.6
Petz Aladar Univ Hosp. Győr	344	3.5	73	0.3	2.9	10.7	9	0.6
Bács-Kiskun	390	1	76.2	0	7.4	9.7	4.4	1.3
Miskolc	456	0.7	63.1	0	3.1	1.1	32	0
Szolnok	403	1.2	73.5	0	1.5	0.5	23.3	0
Szombathely	964	2.5	50.4	0	11.5	10.2	24.1	1.3
Korànyi	733	2.9	74.2	0	8.2	4.1	10.5	0.1
Bajcsy	70	1.4	80	0	8.6	2.9	5.7	1.4
Debrecen	1142	2.4	59.1	0	4.1	5.7	28.5	0.2
Total	9266	2.2	64.4	0	5.7	6.8	20.4	0.5



Lung resections pathology (Only Lobectomy – Primary Lung Cancer)

Unit	VATS NO(%)	VATS YES(%)
Pècs	31.1	68.9
Szeged	42.2	57.8
OOI	37.1	62.9
Petz Aladar Univ Hosp. Győr	41.4	56.6
Bács-Kiskun	28.6	71.4
Miskolc	67.7	32.3
Szolnok	13.9	86.1
Szombathely	70.8	29
Korànyi	52.4	47.6
Bajcsy	75	25
Debrecen	38.5	61



Appendix 5 : General Data Protection Regulation - UE 2016/679

STUDIO LEGALE MAGLIO & PARTNERS
LUCERNA IURIS – INTERNATIONAL LEGAL NETWORK

***

In collaborazione con

Siegert & Kollegen – Frieburg
Alan Bensoussan Avocats – Paris
Pinsent Masons Law Firm – London
PLMJ Sociedade de Advogados – Lisboa
Landwell Global Abogados – Barcelona
Singewald Consultants Group – Amsterdam
Guilmot – Bassine Avocats – Bruxelles
Engstorm Advokats – Stockolm
Procopé & Hornborg Law Offices Ltd – Helsinki
Traple Konarski Podrecki Kancelaria Prawna – Kraków
Spohn Richter & Partners Rechtsanwälte OEG – Wien
VJT & Partners – Budapest
A. & K. Metaxopoulos & Partners Law Firm -Athens

CMS von Erlach Henrici AG Rechtsanwalt - Zürich
Randa Havel Legal advocátní kancelár s.r.o.- Praha
A&L Goodbody - Dublin
Alrud Law Firm -Moscow
Angela Wang & Co. Sollicitors – Honk Kong – Shanghai
Holding Redlich Law Firm – Sydney
Russell McVeagh Law Firm – Auckland
Avish Kalicharan & Associates - Pretoria
Veirano Advogados – São Paulo
Marval O'Farrell Mairal – Buenos Aires
Portilla Ruy-Diaz y Aguilar, S.C. -México D.F.
Stikeman Elliott LLP - Montréal
Prescott Law Firm – New York

Avvocato Marco Maglio
Presidente del Giurì di Autodisciplina
per direct marketing, telemarketing, vendite a distanza e dirette

K Data Clinical S.r.l.
Via Orazio, 31
00193 Roma

Milan, 23th May 2018

RE: assessment of the legal compliance of the personal data processing management procedures pursuant to the current legislation on the protection of personal data and certification of the correct implementation of EU Regulation 2016/679 (General Data Protection regulation - GDPR).

To K Data Klinical

with reference to the requirements established by the current legislation on personal data, as of today I have been able to carry out the necessary checks on the procedures and documentation used by you for the management of the charges imposed on the data controller to allow the adjustment of the processing of personal data to the EU Regulation 2016/679 (General regulation for the protection of personal data - the so-called GDPR).

This verification involved all the activities of data processing of your company.

The plan allowed to develop the following activities:

1) mapping of personal data processed
2) definition of the first version of the treatment register

1

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e.mail: avvocato@maglio.eu – www.lucernairis.eu

3) evaluation of the review of the roles of data processing, including the decision to proceed with the appointment of a data protection officer (Data Protection Officer) and definition of the document appointing the parties authorized to process data
4) review of the information to be provided to data subjects for data processing
5) review of data processing activities against suppliers and definition of treatment processes
6) preliminary assessment of the treatments and risk analysis in relation to the need to carry out the impact assessment in the processing of personal data
7) analysis of the evaluation processes of the adequacy of the technical and organizational security measures adopted for data processing
8) definition of the processes necessary to guarantee the adoption of data protection processes through design (privacy by design) and protection by default (privacy by default)
9) definition of processes for handling the notification obligation for data breaches (data breach notification)
10) definition of the criteria for the conservation of personal data

By carrying out these checks, I have been able to review the treatment procedures already adopted by you and verify the minimum IT security measures with the subjects you use for the provision of IT services. This verification required the implementation of an adjustment plan that is described in the document attached to this declaration (Annex 1).

As a result of this verification I can acknowledge that the Holder, in order to prepare the documentation useful to certify the adoption of security measures suitable to prevent the illegal processing of personal data to be placed, has correctly carried out the adjustment activity to the EU Regulation 2016/679 and to proceed with updating the formalities required by the aforementioned legislation.

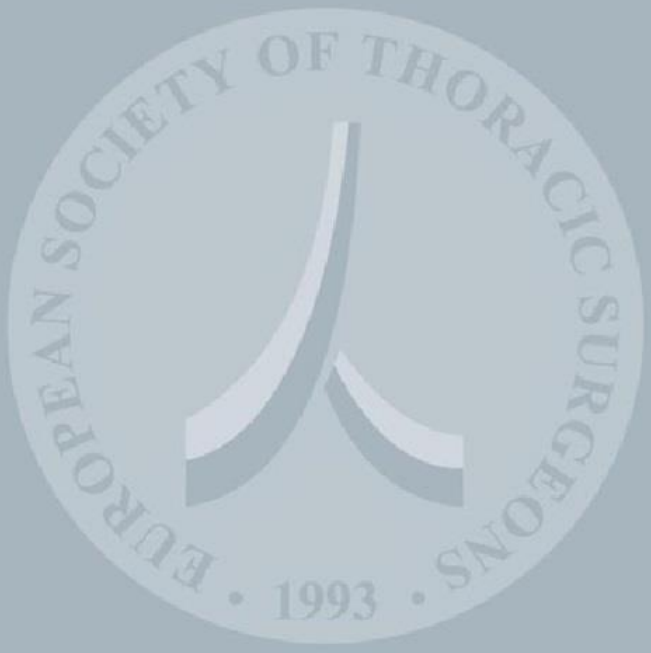
At the end of this review I can issue an opinion of full compliance of the processing processes with respect to the rules of the current legislation on the processing of personal data in the framework of EU Regulation 2016/679 for all companies in your Group.

Feel free to contact me to ensure the continuation of the adaptation and updating process and of your organizational procedures with respect to the frequent innovations that characterize this delicate subject, taking into account in particular the new rules introduced by the General Regulations for the protection of personal data (2016 / 679) will require a further implementation process after the date of full application of the same Regulation with effect from 25 May 2018.

Best regards.

Avv. Marco Maglio

Attachment– GDPR How to approach the change


EUROPEAN SOCIETY OF THORACIC SURGEONS
1993