



DATABASE ANNUAL REPORT

2025

PRODUCED BY THE ESTS DATABASE COMMITTEE



*Powered by **KData Clinical***



EUROPEAN SOCIETY OF THORACIC SURGEONS DATABASE COMMITTEE

Dr Zalan Szanto (Hungary)

ESTS Director of Audit and Database

szantozalan@gmail.com

Dr. Alessandro Brunelli (UK) <i>Alexit_2000@yahoo.it</i>	Dr. Dirk Van Raemdonck (Belgium) <i>dirk.vanraemdonck@uzleuven.be</i>
Dr. Pierre Emmanuel Falcoz (France) <i>herbert.decaluwe@uzleuven.be</i>	Dr. Bernhard Moser (Austria) <i>Bernhard.moser@meduniwien.ac.at</i>
Dr. Michele Salati (Italy) <i>michelesalati@hotmail.com</i>	Dr. Enrico Ruffini (Italy) <i>enrico.ruffini@unito.it</i>
Isabella Schmitt-Opitz (Switzerland) <i>isabelle.schmitt-opitz@usz.ch</i>	Nuria Novoa (Spain) <i>nuria.novoa@usal.es</i>
Dr. Pierluigi Filosso (Italy) <i>pierluigi.filosso@unito.it</i>	Dr. Alessandro Mariani (Italy) <i>awmariani@gmail.com</i>
Dr. Andrea Billè (Italy) <i>andrea_bille@hotmail.it</i>	Dr. Xavier Benoit D'journo (France) <i>Xavier.djourno@gmail.com</i>
Dr. Hans Van Veer(Belgium) <i>hans.vanveer@uzleuven.be</i>	Dr. Raul Embun (Spain) <i>raulembun@gmail.com</i>
Dr. Yaron Shargall (Canada) <i>shargal@mcmaster.ca</i>	Dr. Luca Bertolaccini (Italy) <i>luca.bertolaccini@gmail.com</i>
Dr. Hasan Batirel (Turkey) <i>hbatirel@marmara.edu.tr</i>	Dr. Gonzalo Varela (Spain) <i>gvs1@outlook.com</i>
Dr. Jean-Marc Baste(France) <i>jean-marc.baste@chu-rouen.fr</i>	

INDEX

Message from the President of ESTS	6
Message from Director of ESTS Database	7
The European Society of Thoracic Surgeons Database	8
List of Contributing Centres	11
PART 1 - European Database Cumulative Activity (2007-2024) –Only European units	16
Overall age and gender distributions	19
Total surgical activity within the entire dataset	20
Lung resections	25
Primary lung cancer	36
Comparisons of outcomes between 2007-2015 vs 2016-2024 in the total dataset	42
Hospital mortality trending presented as CUSUM plots	44
PART 2 - Units-specific Activity & Comparative Analysis between Contributing Units (2007 – 2024) - Only European units	47
Number of units enrolled in the ESTS database as of December 2024, by country	48
Epidemiologic data	49
Primary lung cancer per contributing units	55
Observed versus predicted in-hospital mortality rates of major lung resections in different European units	63
PART 3 – Thymoma Section	65
Thymoma Section fields	68
PART 4 – Mesothelioma Section	93
Mesothelioma Section fields	94
PART 5 – NETTS Section	107

NETTS Section fields	108
PART 6 – CHEST WALL Section	124
Chest Wall Section fields	125
PART 7 – LID Section	148
LID Section fields	150
Appendices	
Appendix 1: Database format and submission of data	168
Appendix 2: Definition of major cardiopulmonary complications	176
Appendix 3: ESTS institutional accreditation program	178
Appendix 4: The Setting of a National Registry “Hungarian Model”	182
Appendix 5: General Data Protection Regulation (GDPR)	193

Message from the President of ESTS

The European Society of Thoracic Surgeons (ESTS) Database represents a cornerstone of our collective effort to improve thoracic surgical practice through the systematic collection and analysis of real-world clinical data. Since its inception, the ESTS Database has served not only as a benchmarking tool for participating units but also as a foundation for quality improvement, research, and education across Europe and beyond.



This annual report presents the analysis of new cases entered by ESTS members over the past year. To me the value of this report is not only the information it provides but also the effort behind every single data included in it. It reflects the Society's ongoing commitment to transparency, data-driven decision-making, and the pursuit of excellence in thoracic surgery. All these values are at the core of our society that pursues the excellence in our field based on the international collaboration from all its members. This effort has allowed us to reach almost 275,000 cases. A huge collection of information waiting to be explored. I invite you to think about the almost infinite possible studies that can be developed using it. Remember, if you contribute to the database, you can propose studies and get advantage from it. Annually the program committee of the congress selects the best abstract developed using the database for presentation at the Vogt-Moykopf session.

The strength of this database lies in its scope, consistency, and the voluntary contributions of its members, who recognize the value of shared data in advancing the specialty. It is, without doubt, one of the Society's most valuable assets—an evolving repository of knowledge that supports clinical excellence, informs guidelines, and fosters international collaboration.

I extend my gratitude to all contributors, especially to units from France, Spain and Hungary great contributors this year and I invite everyone continued engagement to ensure the quality and impact of this essential resource.

Nuria M. Novoa
President of ESTS

Message from the Director of ESTS Database

Dear Colleagues and Friends,

I am delighted to present the 14th edition of the ESTS Silver Book, which comprehensively covers thoracic surgical activities from 2007 to 2024. Building on the success of previous editions, this version continues to capture critical insights and experiences in thoracic surgery, reinforcing the Society's commitment to advancing quality, research, and patient safety.

In 2024, 140 European units each contributed at least 100 cases to the ESTS Database, culminating in 18,597 new patient records. This expanded the Database to nearly 280,000 procedures since its inception in 2007, showcasing the extraordinary commitment and collaborative spirit of participating institutions over the past 15 years, all underpinned by our valued partnership with KdataClinical srl.

Engagement with the ESTS Database markedly enhances the quality and safety of patient care. Its comparative outcome measures have fostered significant improvements, particularly in reducing operative mortality, as highlighted in this report. Furthermore, participation in the ESTS Database is a prerequisite for eligibility for the esteemed ESTS institutional accreditation.

This report provides an epidemiological overview of thoracic surgery activity across Europe, with a special focus on lung resections, a key component of our specialty and essential for the European Accreditation program. All Registry sections have noted an increase in cases, with the lung section dominating at 80% of registered cases. The thymic section boasts the world's largest prospective database, and the mesothelioma and NET sections have also collected substantial case volumes, considering the rarity of these malignancies.

Rather than analyzing by country, we have chosen to offer a comparison among contributing units. For a coherent European accreditation perspective, only European units that have reported more than 150 major lung resections in the last three years are included. This platform uniquely identifies centers of excellence, supports the accreditation process for Thoracic Surgery Departments, and serves as a resource for collaborative research and auditing of specific thoracic pathologies.

As my tenure as Database Director concludes, I am honored to pass the responsibilities to my successor, Raul Embun, a distinguished Thoracic Surgeon at University Hospital Miguel Servet & Lozano Blesa in Zaragoza, Spain. Raul's exemplary leadership of the Spanish ReSect Database and his innovative analytical approaches make him well-equipped to guide the ESTS Database into its next chapter. On behalf of the ESTS Database Committee, I express our deepest gratitude to all past, present, and future data contributors for their invaluable efforts and collaboration. We eagerly anticipate your feedback and are looking forward to discussing new initiatives in person. Please remember to download the concise version of the Silver Book via the Congress App!

Dr. Zalan Szanto

Director of ESTS Audit and Database



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 led 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 about the 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 2024) in the registry are shown

Country	City	Institution
ALBANIA	TIRANA	University Hospital of Lung Diseases "Shefqet Ndroqi"
AUSTRIA	VIENNA	Otto Wagner Hospital
AUSTRIA	VIENNA	Medical University of Vienna
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
GERMANY	HEMER	Chest Hospital Hemer
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 Körház 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	Pamok Győr Hungars
HUNGARY	KECSKEMÉT	Bács Kiskun County Hospital
HUNGARY	GYŐR	Petz Aladar Teaching Hospital (PAMOK)
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 Bbari
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

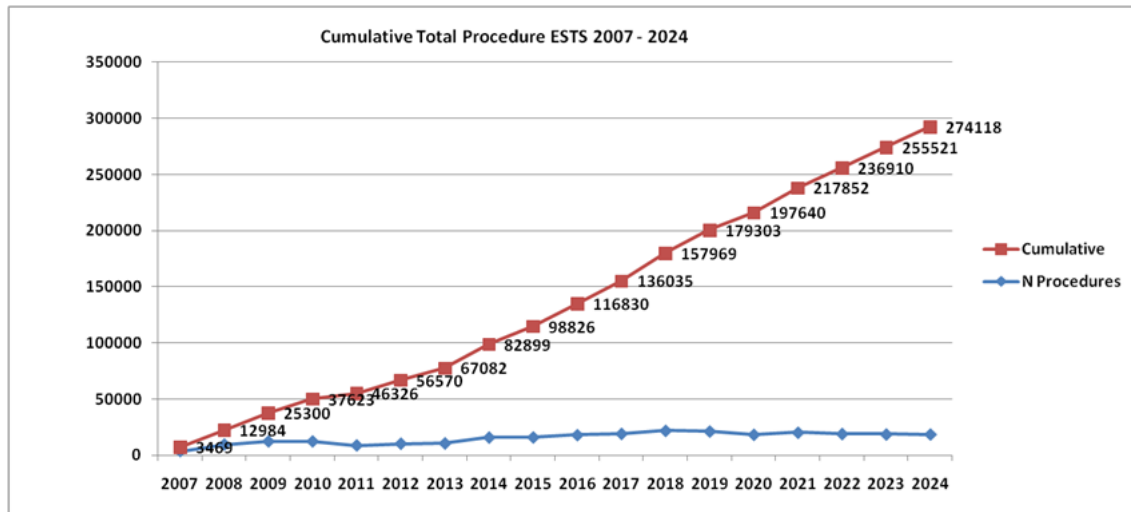
PORTUGAL	VILA NOVA DE GAIA	centro Hospitalar de Vila Nova de Gaia Espinho
ROMANIA	BUCHAREST	Institute of Oncology Bucharest
ROMANIA	BUCHAREST	Marius Nasta Institute of Pneumology
ROMANIA	DROBETA-TURNU SEVERIN	County Emergency Hospital
ROMANIA	TIMISOARA	Clinical Municipal Emergency Hospital
SLOVAKIA	BRATISLAVA	University Hospital Bratislava , Slovakia
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 für 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
UK	EXETER	Royal Devon & Exeter NHS Foundation Trust
UK	LEEDS	St. James's University Hospital

PART 1

EUROPEAN DATABASE

CUMULATIVE ACTIVITY (2007-2024) (European units Only)

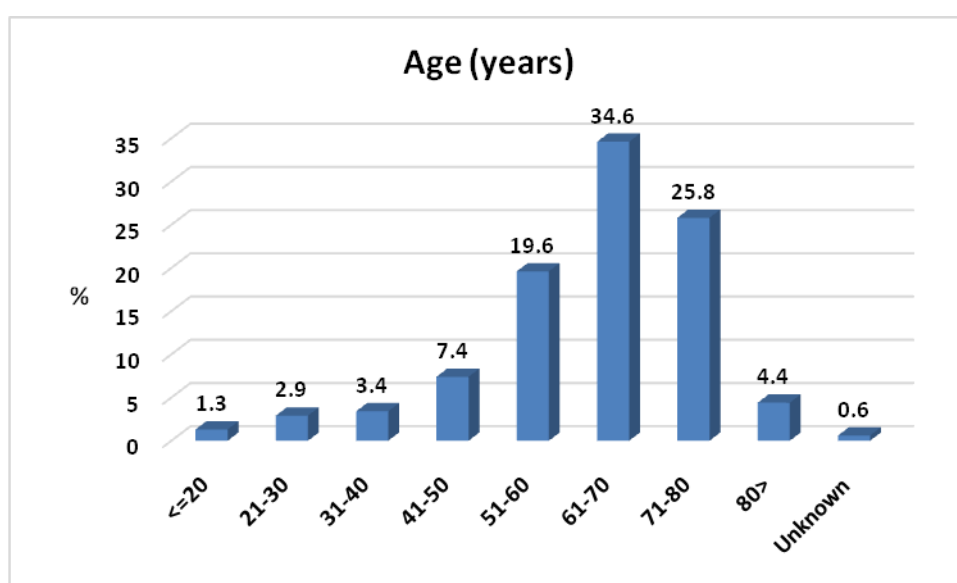
Growth of the ESTS Database 2007-24



Overall age and gender distributions

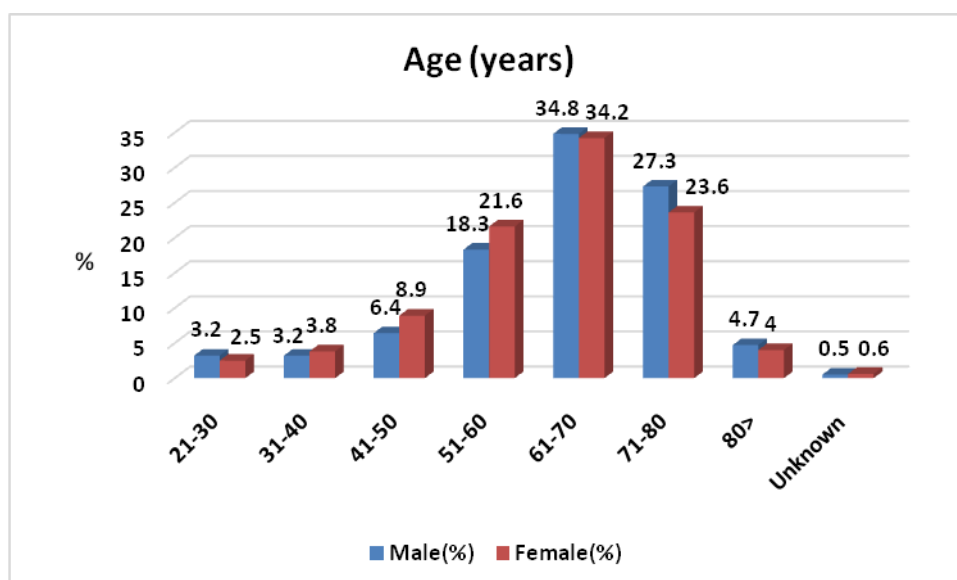
Age (years)

Age (years)	Occurrences	Percentages
<=20	3628	1.3
21-30	7955	2.9
31-40	9442	3.4
41-50	20287	7.4
51-60	53745	19.6
61-70	94736	34.6
71-80	70737	25.8
>80	12059	4.4
Unknown	1529	0.6
Total	274118	100



Gender according to age distribution (years)

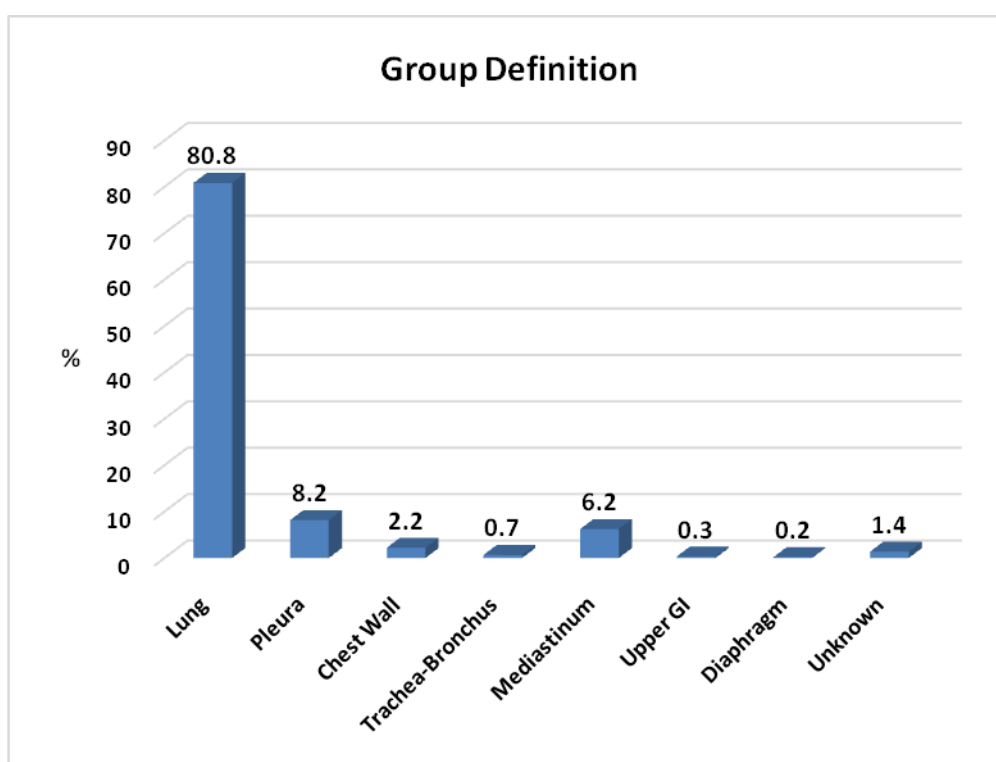
Age (years)	Male (%)	Female (%)
<=20	1.6	0.8
21-30	3.2	2.5
31-40	3.2	3.8
41-50	6.4	8.9
51-60	18.3	21.6
61-70	34.8	34.2
71-80	27.3	23.6
>80	4.7	4
Unknown	0.5	0.6



Total surgical activity within the entire dataset

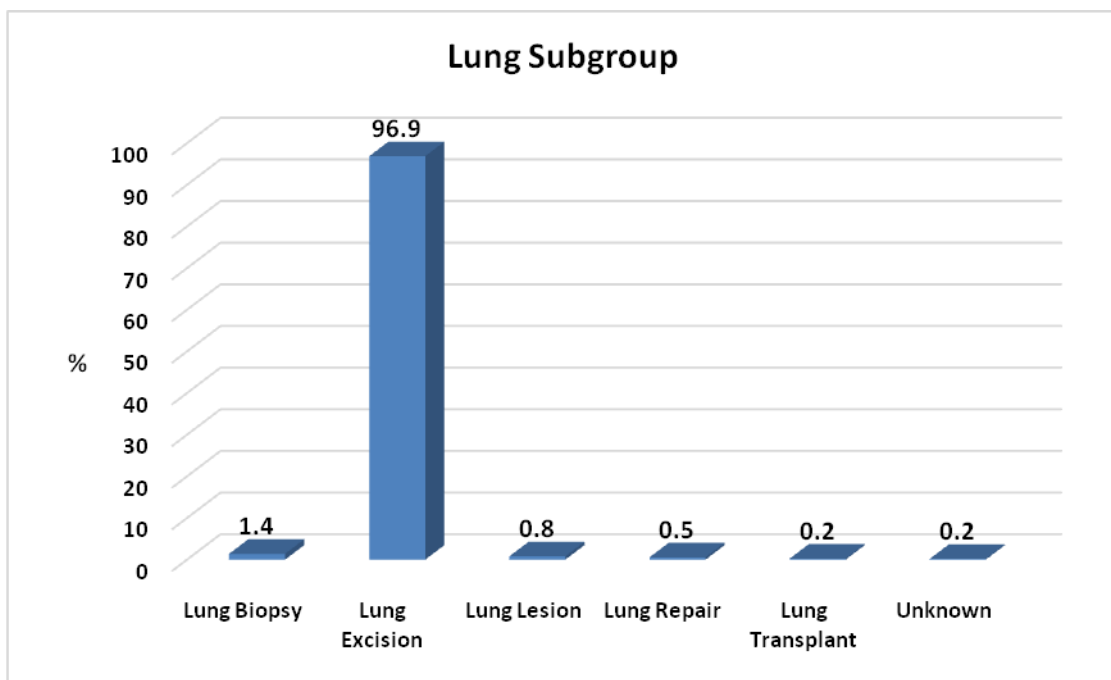
Group Definitions

Group Definition	Occurrences	Percent
Lung	221593	80.8
Pleura	22391	8.2
Chest Wall	6102	2.2
Trachea-Bronchus	1786	0.7
Mediastinum	17063	6.2
Upper GI	911	0.3
Diaphragm	508	0.2
Unknown	3764	1.4
Total	274118	100



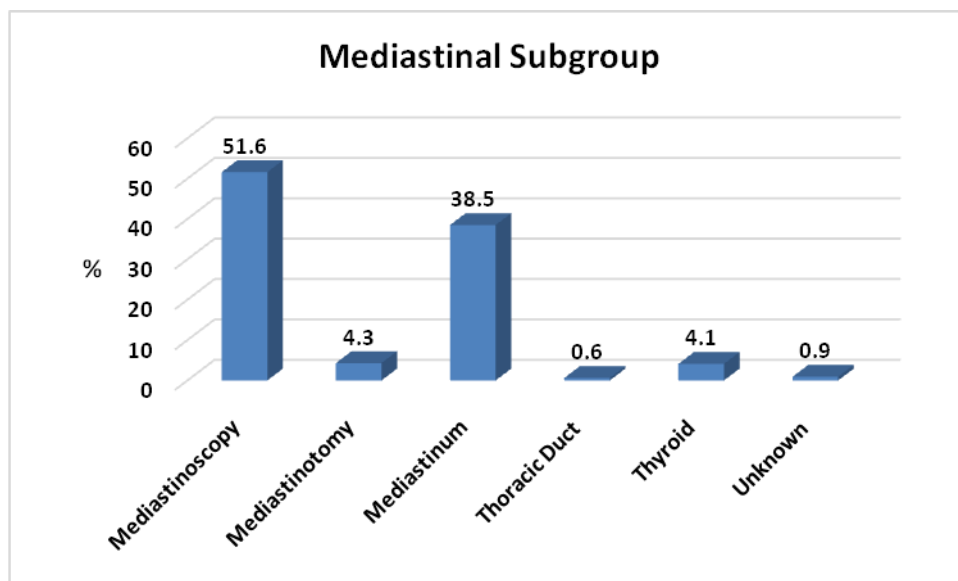
Lung Subgroup

	Occurrences	Percent
Lung Biopsy	3077	1.4
Lung Excision	214662	96.9
Lung Lesion	1748	0.8
Lung Repair	1203	0.5
Lung Transplant	487	0.2
Unknown	416	0.2
Total	221593	100



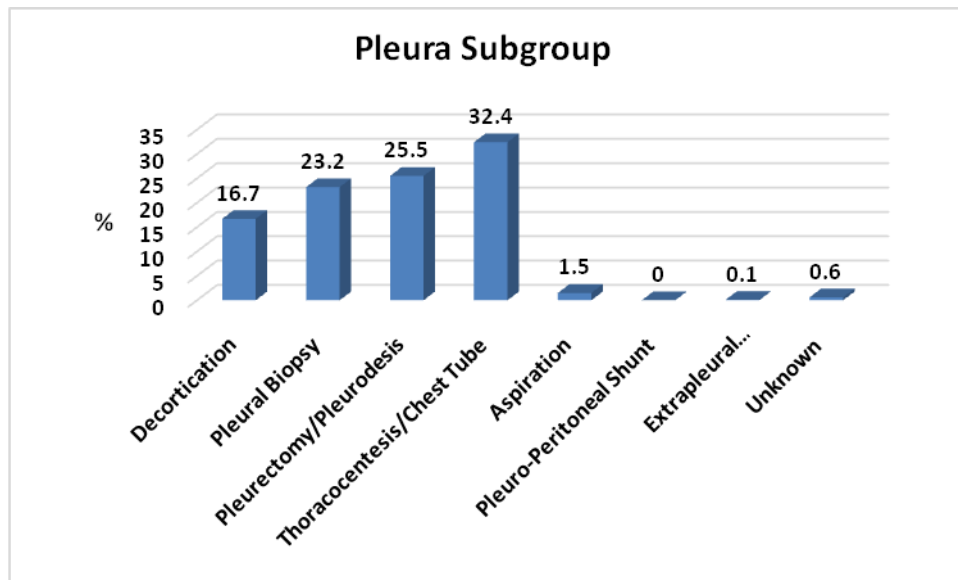
Mediastinum Subgroup

	Occurrences	Percent
Mediastinoscopy	8809	51.6
Mediastinotomy	739	4.3
Mediastinum	6572	38.5
Thoracic Duct	96	0.6
Thyroid	697	4.1
Unknown	150	0.9
Total	17063	100



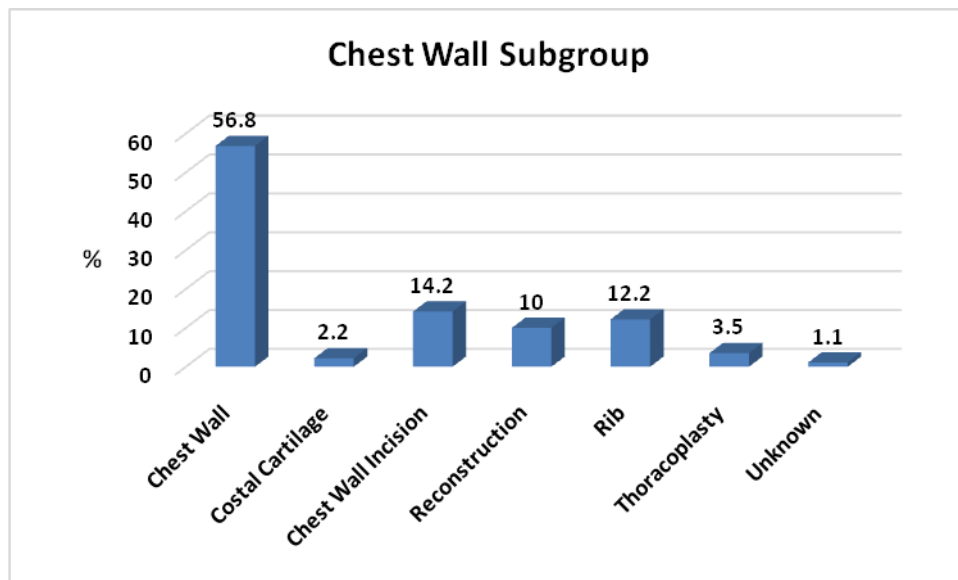
Pleura Subgroup

	Occurrences	Percent
Decortication	3734	16.7
Pleural Biopsy	5202	23.2
Pleurectomy/Pleurodesis	5701	25.5
Thoracocentesis/Chest Tube	7257	32.4
Aspiration	342	1.5
Pleuro-Peritoneal Shunt	9	0
Extrapleural Pneumonectomy	11	0.1
Unknown	135	0.6
Total	22391	100



Chest Wall Subgroup

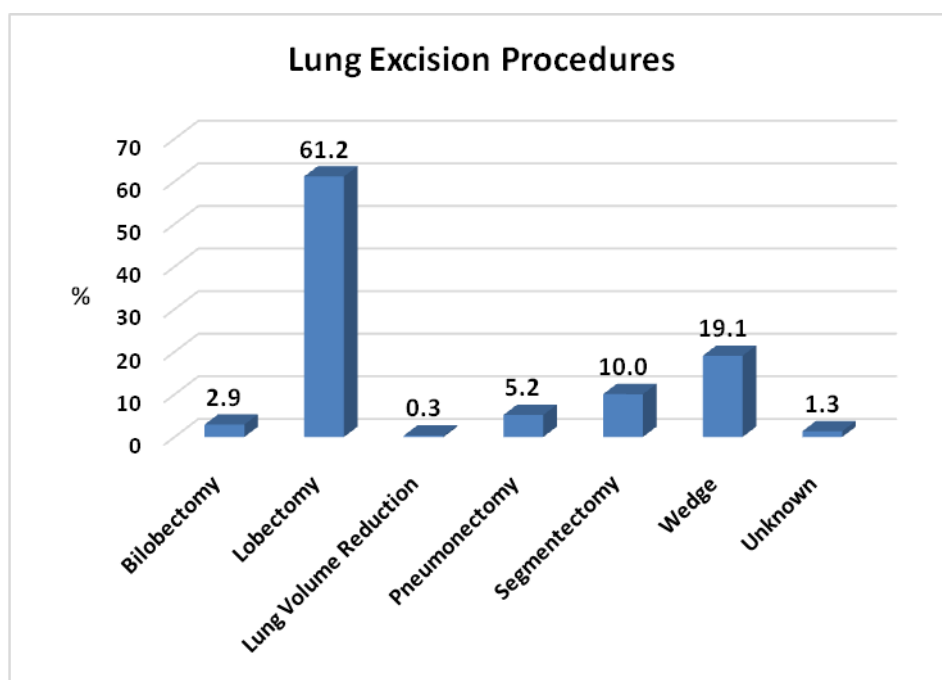
	Occurrences	Percent
Chest Wall	3469	56.8
Costal Cartilage	132	2.2
Chest Wall Incision	865	14.2
Reconstruction	608	10
Rib	743	12.2
Thoracoplasty	217	3.5
Unknown	68	1.1
Total	6102	100



Lung resections

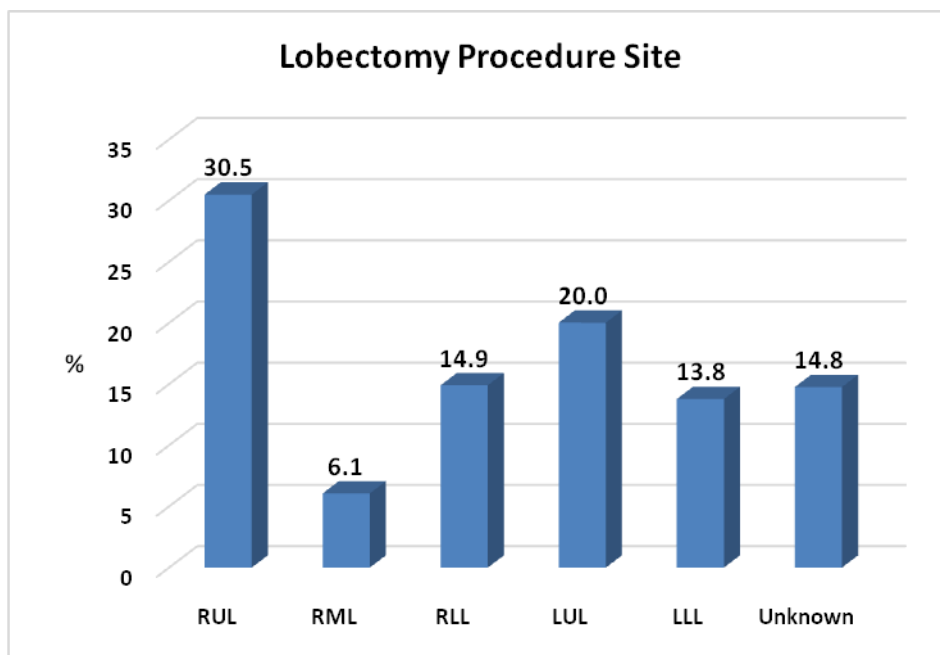
Types of lung resections performed, including all diagnoses

	Occurrences	Percent
Bilobectomy	6218	2.9
Lobectomy	131298	61.2
Lung Volume Reduction	697	0.3
Pneumonectomy	11099	5.2
Segmentectomy	21552	10.0
Wedge	40928	19.1
Unknown	2870	1.3
Total	214662	100



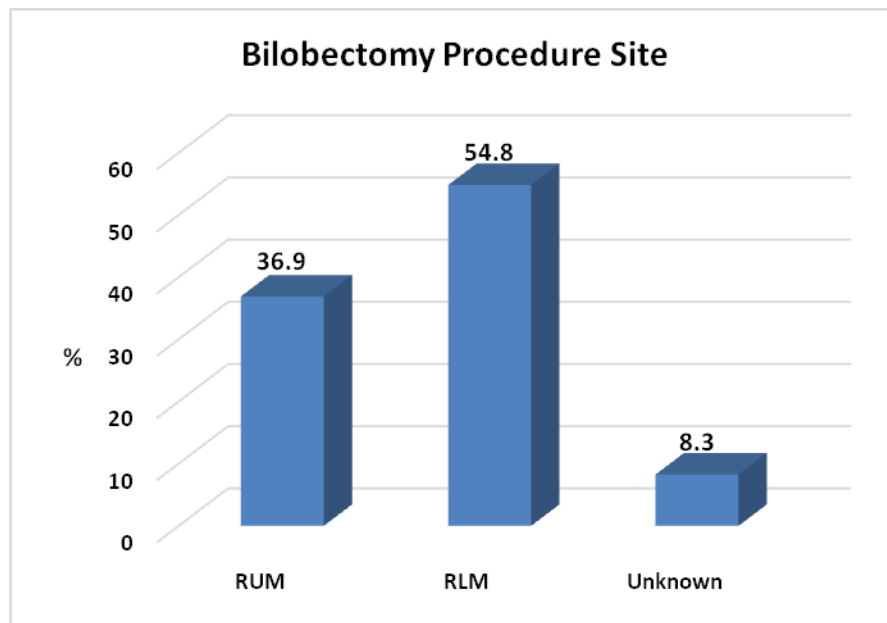
Distribution of lobectomy by site of resection

Lobectomy Procedure Site	Occurrences	Percent
RUL	40036	30.5
RML	7954	6.1
RLL	19567	14.9
LUL	26284	20.0
LLL	18084	13.8
Unknown	19373	14.8
Total	131298	100



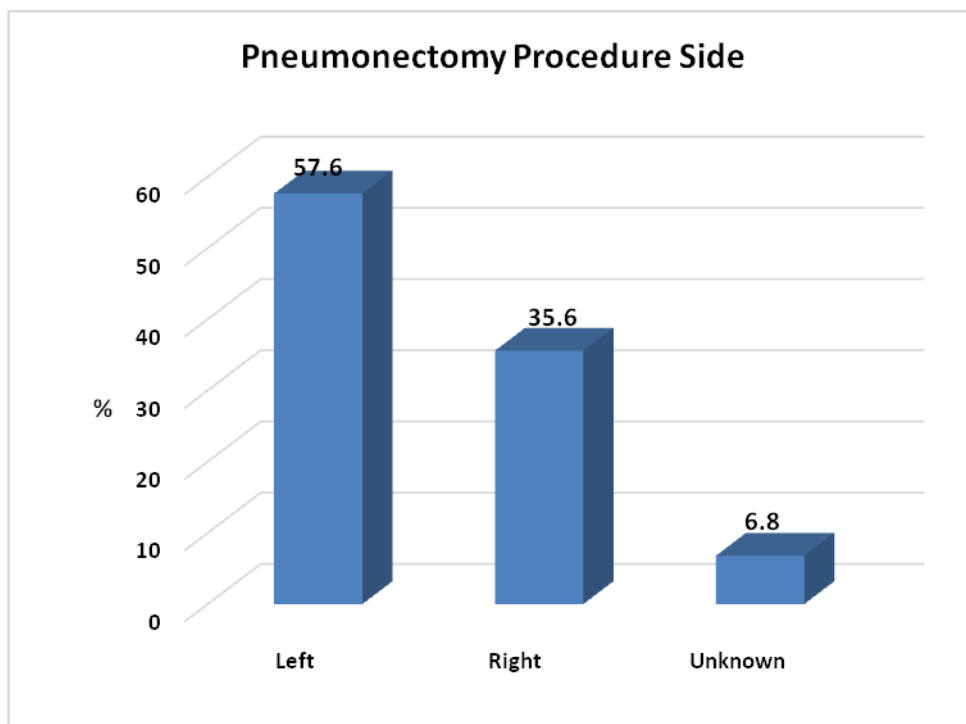
Distribution of bilobectomy by site of resection

Bilobectomy Procedure Site	Occurrences	Percent
RUM	2295	36.9
RLM	3409	54.8
Unknown	514	8.3
Total	6218	100



Distribution of pneumonectomy by side

Pneumonectomy Side	Occurrences	Percent
Left	6397	57.6
Right	3949	35.6
Unknown	753	6.8
Total	11099	100

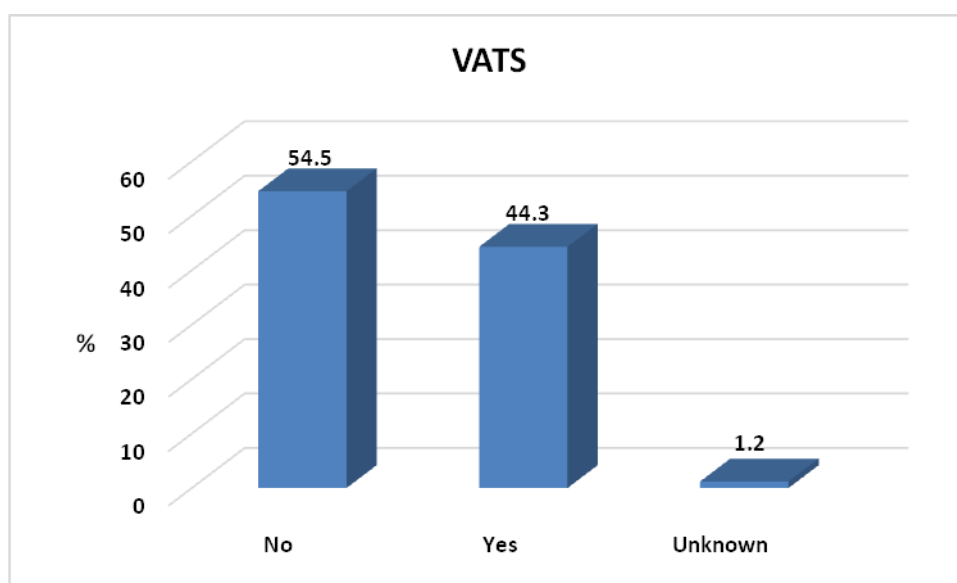


Pneumonectomy Qualifier	Occurrences	Percent
Alone	6700	60.4
Completion	531	4.8
Intrapericardial	954	8.6
Pleuropneumonectomy	247	2.2
Sleeve Resection	124	1.1
Diaphragm Resection	30	0.3
Atrial Resection	122	1.1
SVC Resection/Reconstruction	97	0.9
Vertebral Resection	165	1.5
Unknown	2129	19.2
Total	11099	100

VATS as a proportion of all lung resections

VATS	Occurrences	Percent (%)
No	116493	54.5
Yes	95742	44.3
Unknown	2427	1.2
Total	214662	100

Note the increase from 43.5 to 44.3!!!! Also a similar % of data completeness



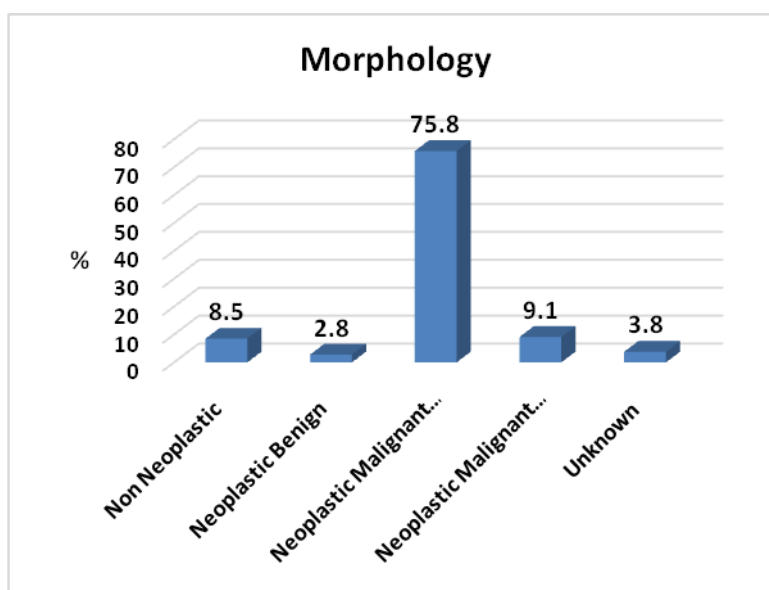
	No	Yes	Yes (%)
2007-2015	56256	19161	34.1
2016-2024	60237	76581	56.0
Total	116493	95742	45.1

VATS as a proportion of lobectomy

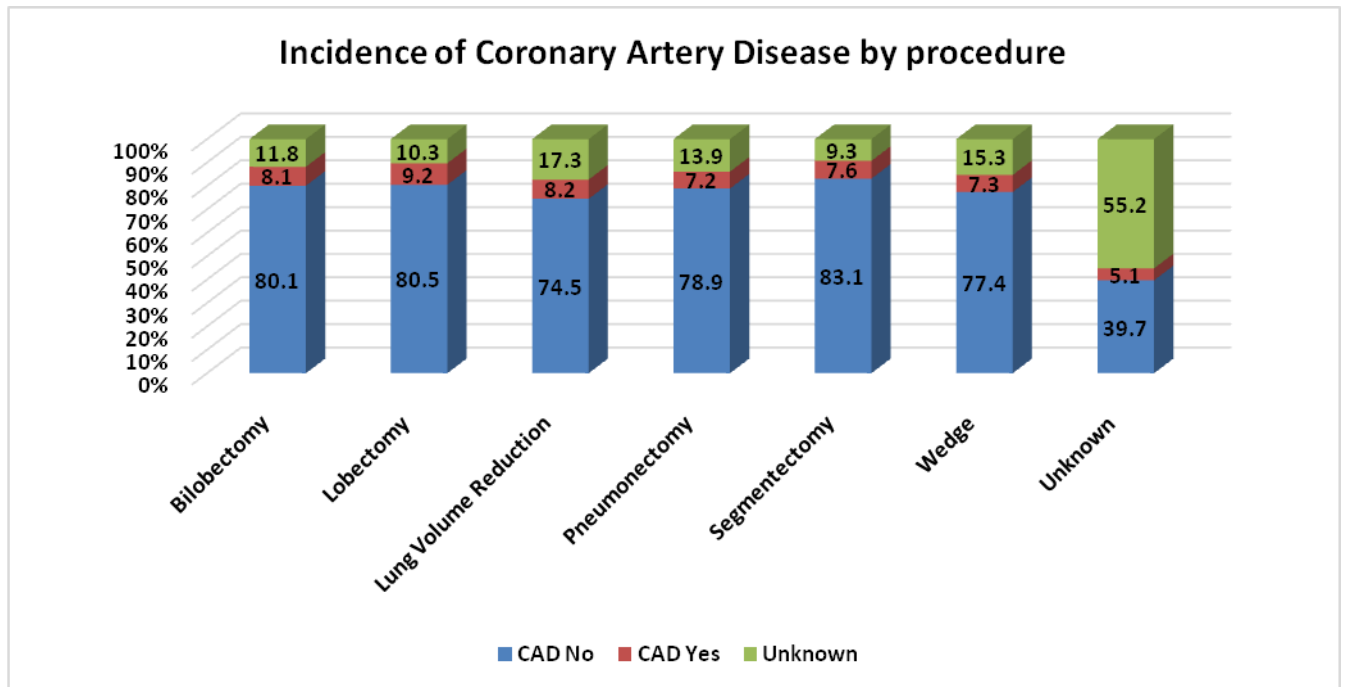
	No	Yes	Yes (%)
2007-2015	35203	7495	17.6
2016-2024	39966	44906	52.9
Total	75169	52401	41.1

Lung resections pathology

Morphology	Occurrences	Percent (%)
Non Neoplastic	17618	8.5
Neoplastic Benign	5781	2.8
Neoplastic Malignant Primary	164493	75.8
Neoplastic Malignant Secondary	18843	9.1
Unknown	7927	3.8
Total	214662	100

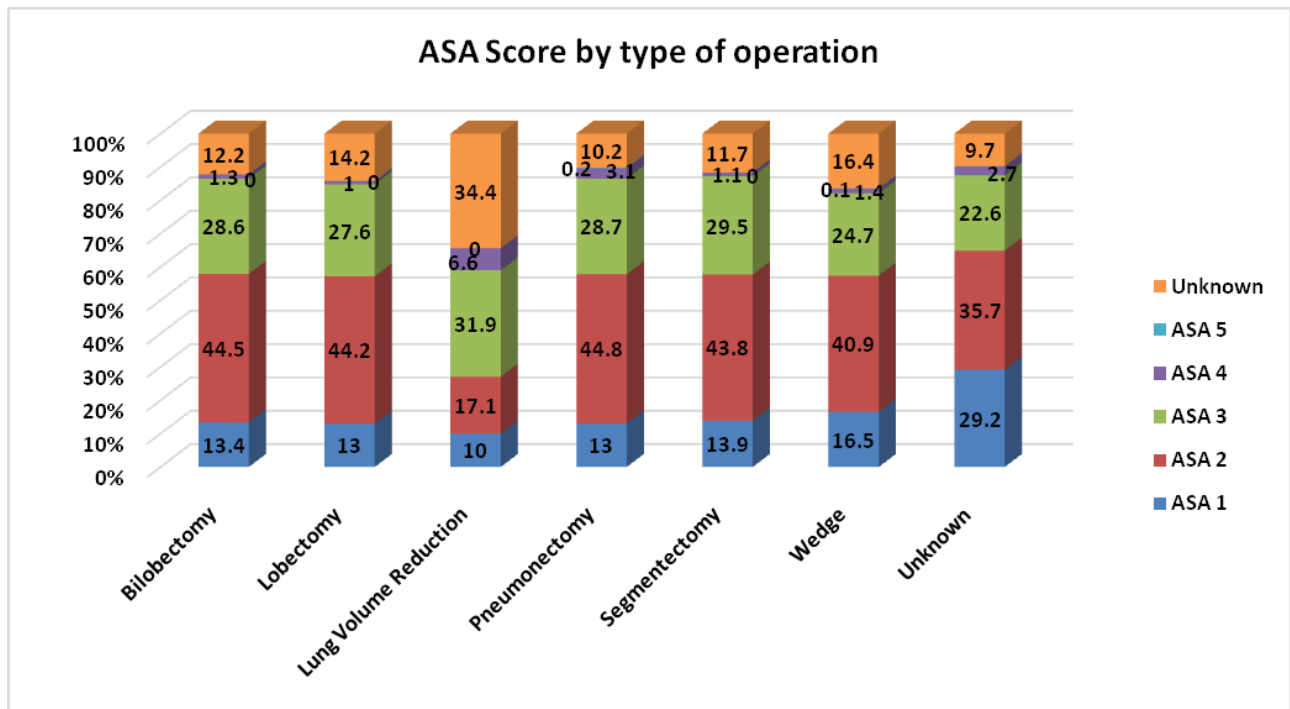


Incidence of coronary artery disease by procedure



Lung Excision Procedure	CAD NO	CAD YES	Unknown
Bilobectomy	4829	490	713
Lobectomy	101404	11618	12958
Lung Volume Reduction	519	57	121
Pneumonectomy	8642	789	1518
Segmentectomy	16506	1510	1840
Wedge	31349	2969	6205
Unknown	1126	144	1565
Total	164375	17577	24920

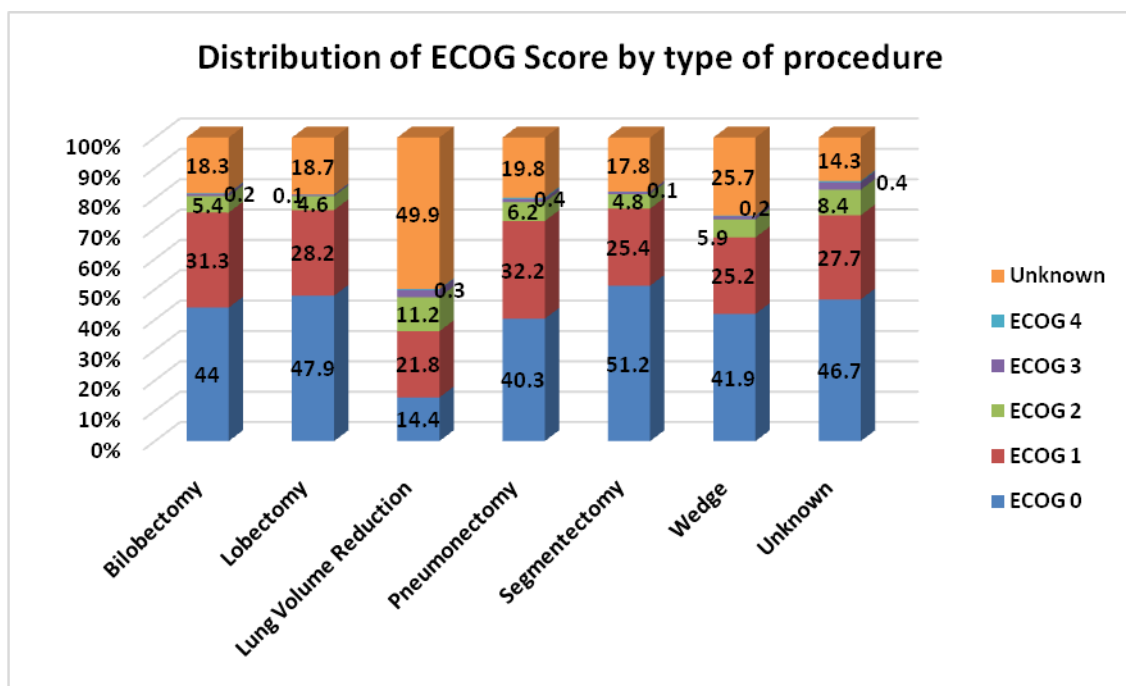
Distribution of ASA score by type of operation



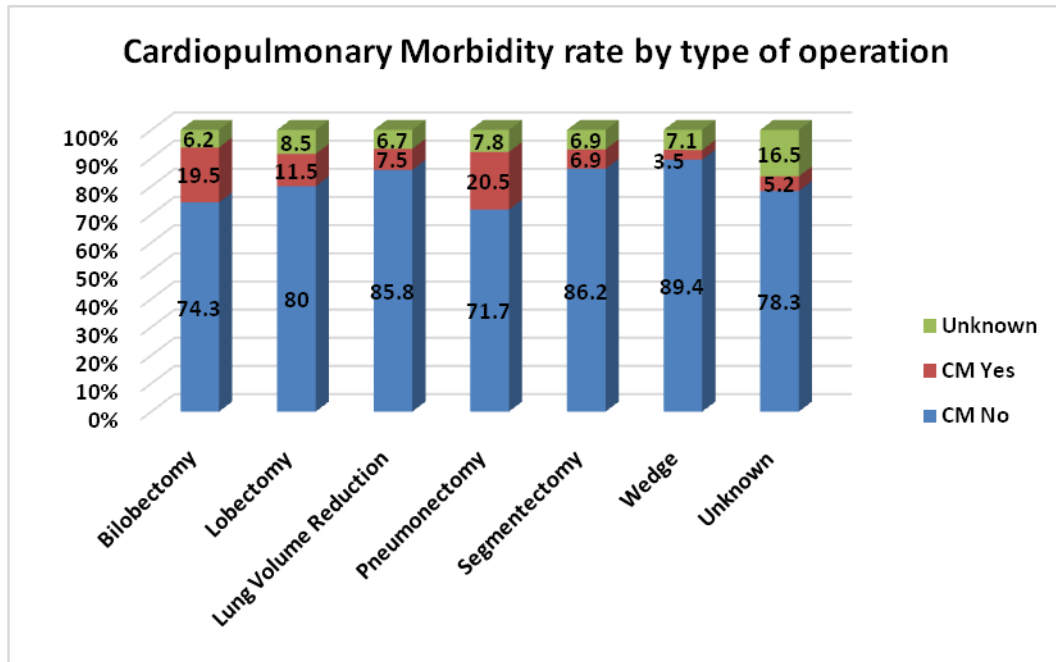
Lung Excision Procedure	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Unknown
Bilobectomy	806	2682	1725	77	3	739
Lobectomy	16388	55697	34724	1215	55	17901
Lung Volume Reduction	70	119	222	46	0	240
Pneumonectomy	1423	4900	3145	335	25	1121
Segmentectomy	2749	8700	5863	219	1	2324
Wedge	6672	16588	10018	573	25	6647
Unknown	829	1011	641	76	3	275
Total	28937	89697	56338	2541	112	29247

Distribution of ECOG score by type of operation

Lung Excision Procedure	ECOG 0	ECOG 1	ECOG 2	ECOG 3	ECOG 4	Unknown
Bilobectomy	2654	1888	328	48	10	1104
Lobectomy	60317	35512	5738	682	119	23612
Lung Volume Reduction	100	152	78	17	2	348
Pneumonectomy	4408	3530	677	124	46	2164
Segmentectomy	10166	5052	945	130	19	3544
Wedge	16962	10200	2394	467	83	10417
Unknown	1324	786	239	71	11	404
Total	95931	57120	10399	1539	290	41593



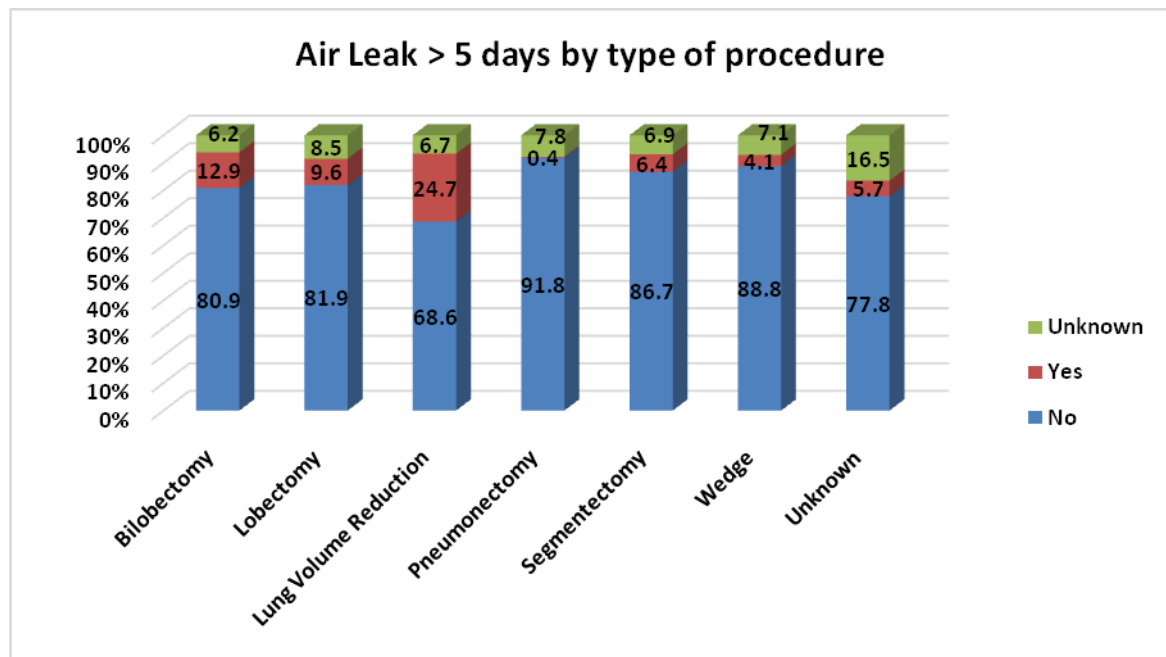
Cardiopulmonary morbidity rate in different types of lung resections



	CM No	CM No (%)	CM Yes	CM Yes(%)	Unknown	Unknown (%)	Total
Bilobectomy	4484	74.3	1177	19.5	371	6.2	5794
Lobectomy	100788	80	14484	11.5	10708	8.5	119543
Lung Volume Reduction	598	85.8	52	7.5	47	6.7	647
Pneumonectomy	7855	71.7	2241	20.5	853	7.8	10666
Segmentectomy	17119	86.2	1368	6.9	1369	6.9	17997
Wedge	36206	89.4	1435	3.5	2882	7.1	38222
Unknown	2219	78.3	148	5.2	468	16.5	2833
Total	169269		20905		16698		195702

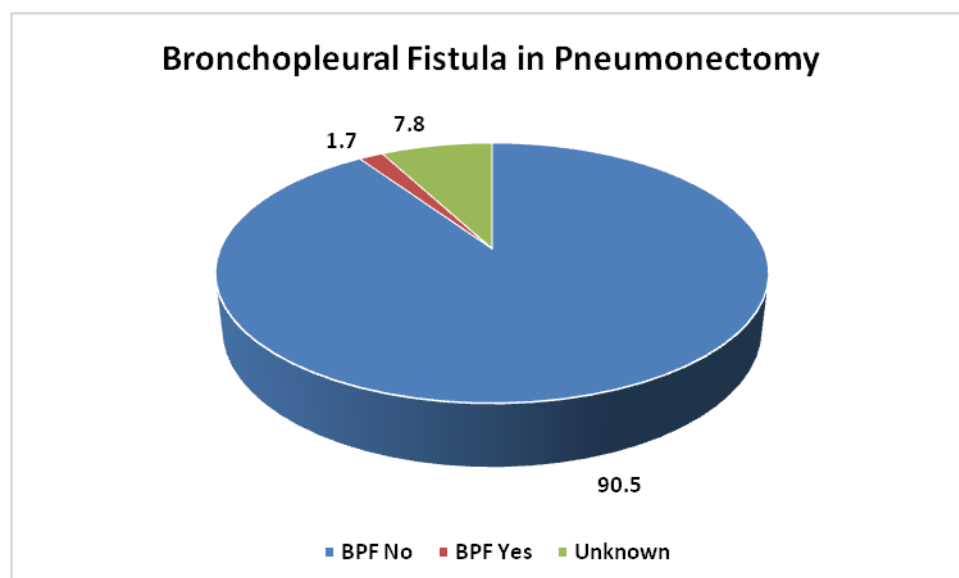
Incidence of prolonged air leak (> 5days) in different types of lung resections

Lung Excision - PROCEDURE	Air Leak > 5 days		
	No (%)	Yes (%)	Unknown (%)
Bilobectomy	80.9	12.9	6.2
Lobectomy	81.9	9.6	8.5
Lung Volume Reduction	68.6	24.7	6.7
Pneumonectomy	91.8	0.4	7.8
Segmentectomy	86.7	6.4	6.9
Wedge	88.8	4.1	7.1



Incidence of bronchopleural fistula (BPF) in pneumonectomy

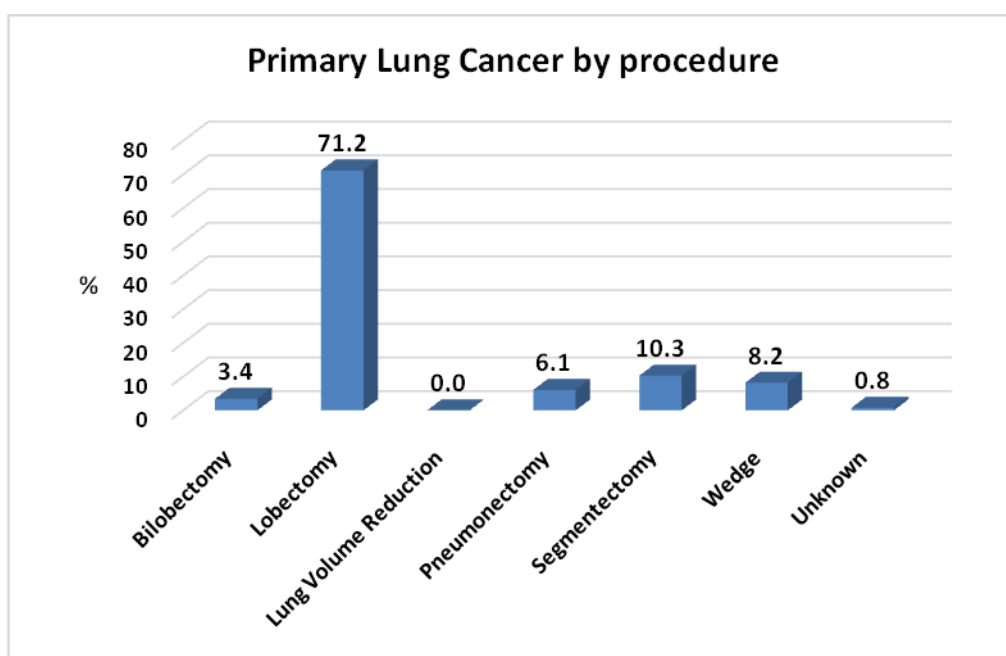
Bronchopleural fistula	BPF No	BPF Yes	Unknown	Total
Pneumonectomy (N)	9914	182	853	10949
Pneumonectomy (%)	90.5	1.7	7.8	100



Primary lung cancer

Lung resection for primary lung cancer: Types of procedures

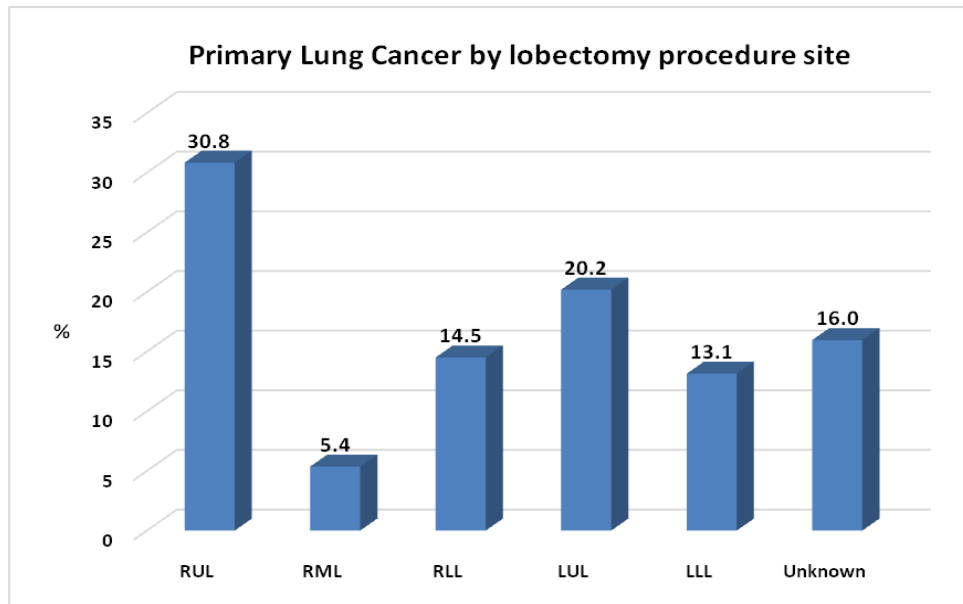
	Occurrences	Percent
Bilobectomy	5649	3.4
Lobectomy	117121	71.2
Lung Volume Reduction	24	0.0
Pneumonectomy	9985	6.1
Segmentectomy	16920	10.3
Wedge	13520	8.2
Unknown	1274	0.8
Total	164493	100



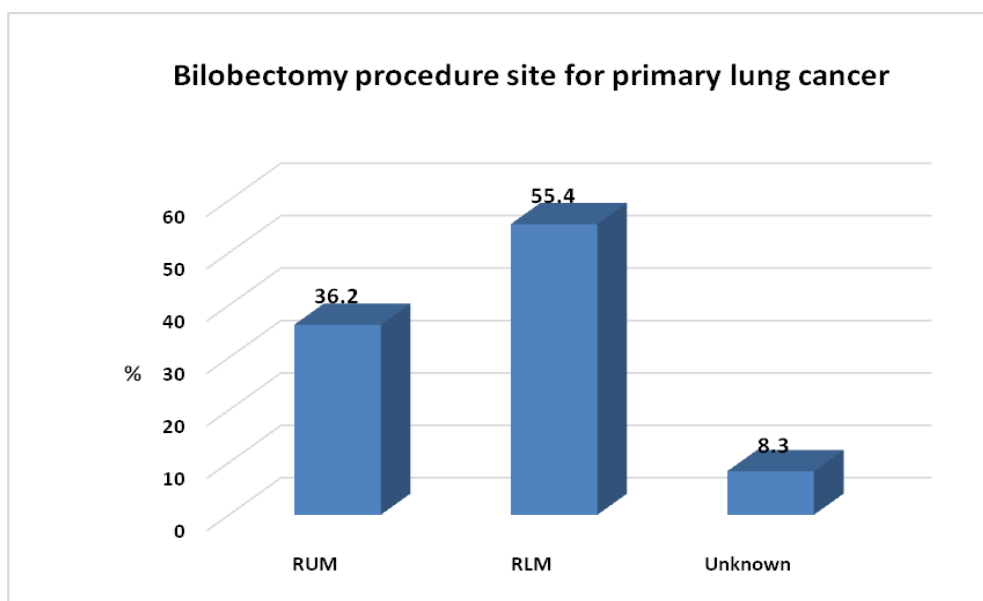
Bilobectomy – Lobectomy qualifier	Occurrences	Percent
Alone	107747	87.2
Chest Wall	3689	3.1
Superior Sulcus Tumor	531	0.4
Sleeve	3351	2.9
Diaphragm Resection	121	0.1
Atrial Resection	87	0.1
SVC Resection/Reconstruction	89	0.1
Vertebral Resection	378	0.3
Unknown	6777	5.8
Total	122770	100

Distribution of lobectomy/bilobectomy by site of resection

Lobectomy procedure site	Occurrences	Percent
RUL	36114	30.8
RML	6278	5.4
RLL	16990	14.5
LUL	23647	20.2
LLL	15394	13.1
Unknown	18698	16.0
Total	117121	100



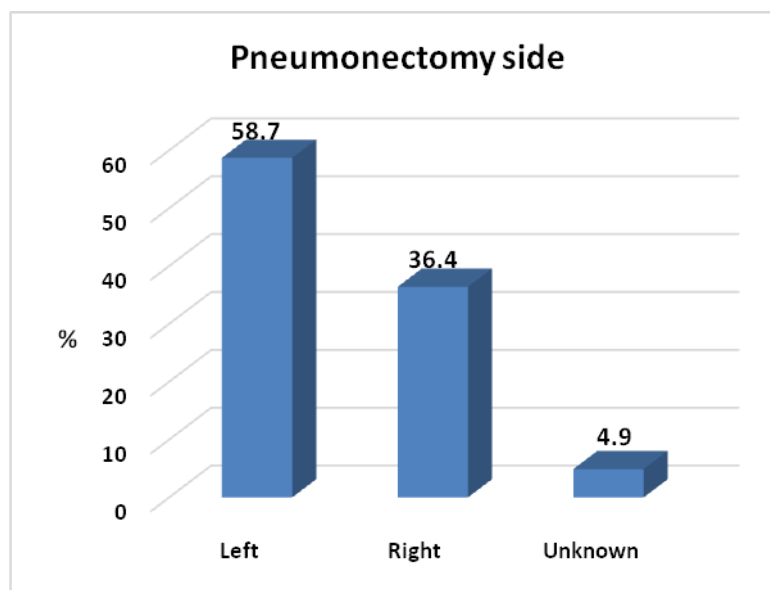
Bilobectomy procedure site	Occurrences	Percent
RUM	2047	36.2
RLM	3132	55.4
Unknown	470	8.3
Total	5649	100



Distributions of pneumonectomy

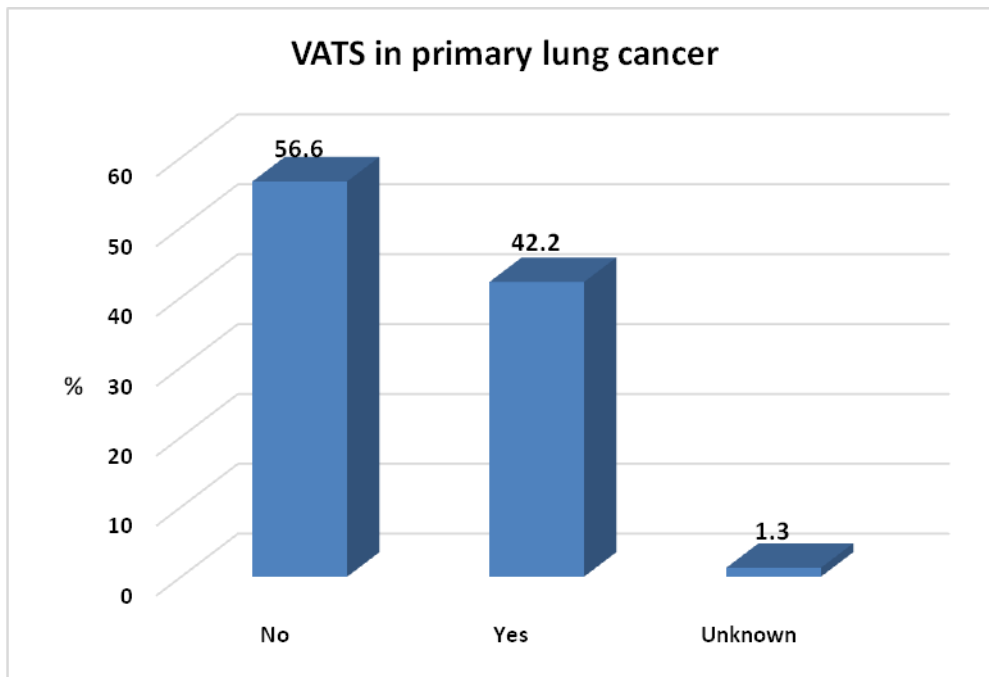
Pneumonectomy Qualifier	Occurrences	Percent
Alone	6103	61.1
Completion	427	4.3
Intrapericardial	848	8.5
Pleuropneumonectomy	194	1.9
Sleeve Resection	120	1.2
Diaphragm Resection	17	0.2
Atrial Resection	119	1.2
SVC Resection/Reconstruction	96	1.0
Vertebral Resection	161	1.6
Unknown	1900	19.0
Total	9985	100

Pneumonectomy side	Occurrences	Percent
Left	5875	58.8
Right	3628	36.3
Unknown	482	4.8
Total	9985	100



Distribution of VATS procedures in total lung resections

VATS	Occurrences	Percent
No	93038	56.6
Yes	69360	42.2
Unknown	2095	1.3
Total	164493	100



Distributions of VATS procedures in lobectomy/bilobectomy

VATS	Occurrences	Percent
No	70776	58.2
Yes	50789	40.8
Unknown	1205	1
Total	122770	100

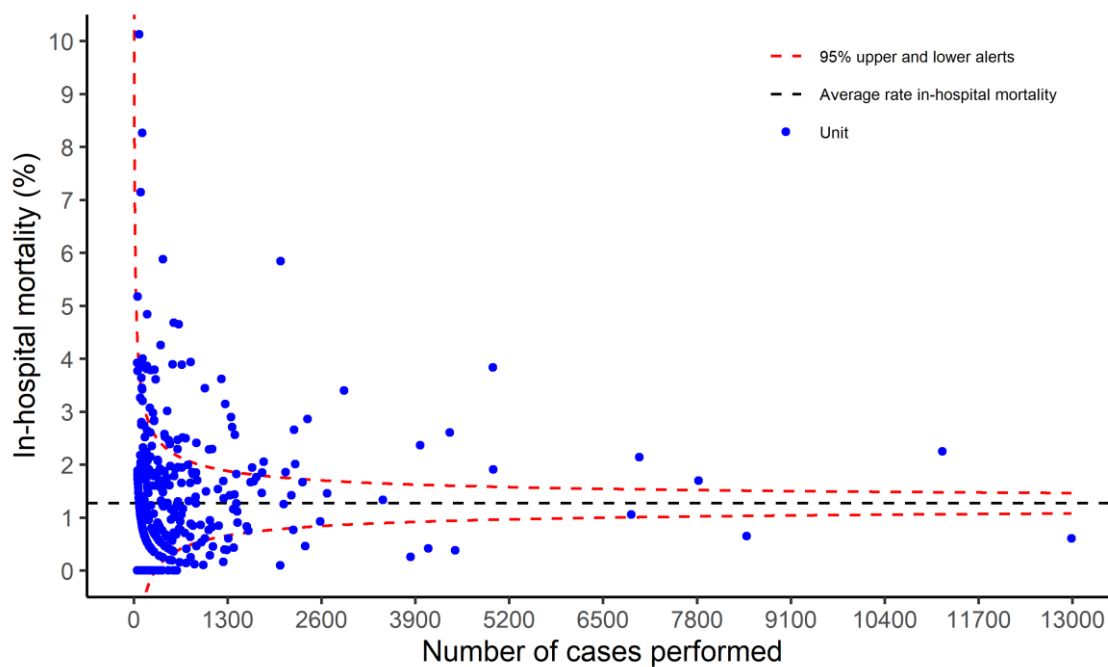
Unadjusted in-hospital mortality rates in primary lung cancer resections

Outcome at Discharge - Died in Hospital	N	Died in Hospital	Percent(%)
Bilobectomy	5305	173	3.3
Lobectomy	109413	1254	1.1
Lung Volume Reduction	18	0	0.0
Pneumonectomy	9422	493	5.2
Segmentectomy	15286	91	0.6
Wedge	12798	101	0.8
Total	152242	2068	1.4

Overall unadjusted in-hospital mortality calculated in the total dataset

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

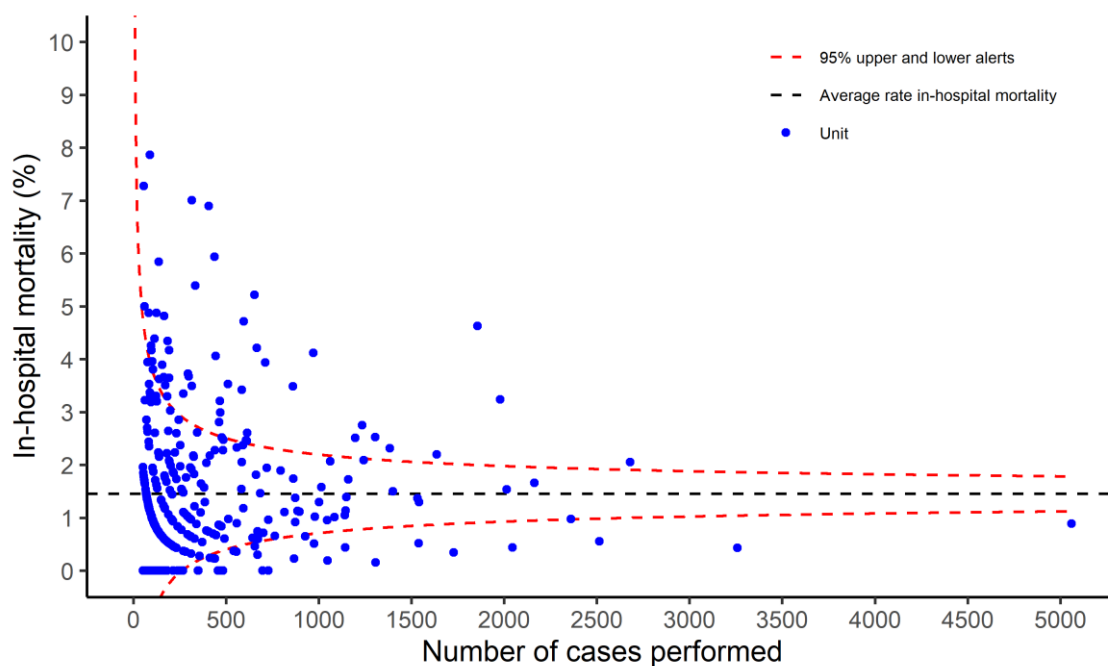
Please note that the majority of the units are within the limits. Around 15% of the Units are above the 95% upper limit whereas the 7% are below the 95% lower limit.



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 13% of the Units are above the 95% upper limit whereas the 7% are below the 95% lower limit.

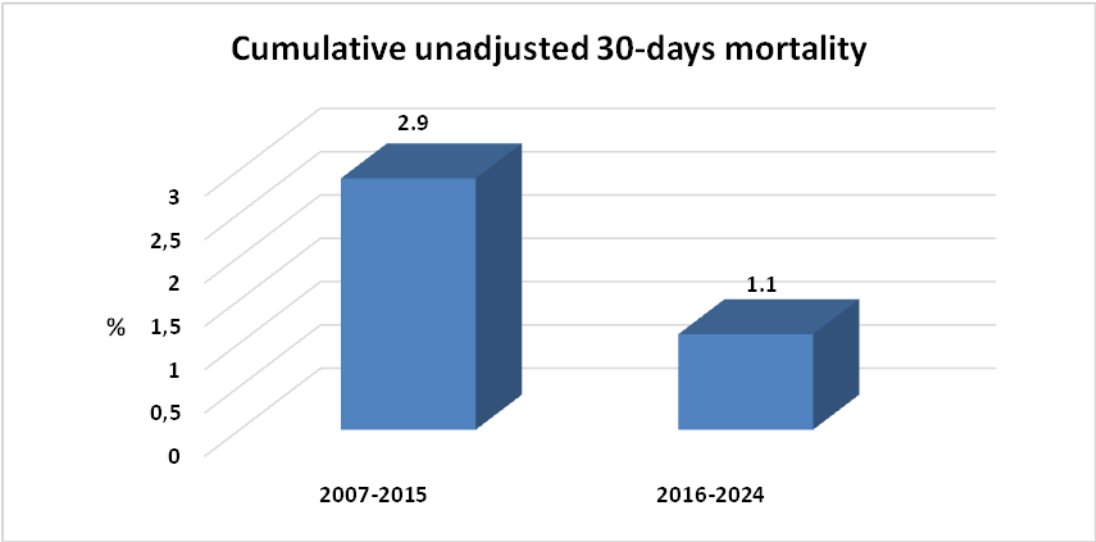


Comparisons of outcomes between 2007-2015 vs 2016-2024 in the total dataset

** Due to missing data, the 30-day mortality was only evaluated in 140560 patients, leaving 115225 patients out*

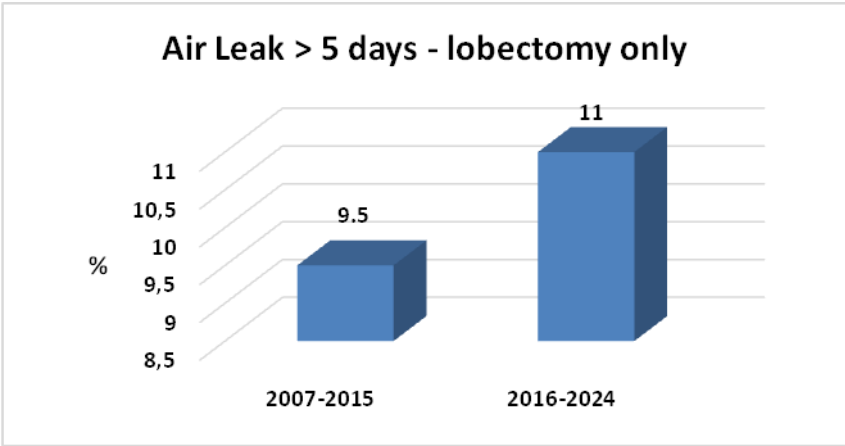
Cumulative non-adjusted 30-day mortality

Cumulative non-adjusted 30-day mortality	Alive	Died	Died Percent
2007-2015	44685	1358	2.9
2016-2024	101420	1177	1.1
Total	146105	2535	1.7



Prolonged air leak (LOBECTOMY ONLY)

Air leak > 5 Days	No	Yes	Yes(%)
2007-2015	36031	3781	9.5
2016-2024	72162	8869	11
Total	108193	12650	10.5



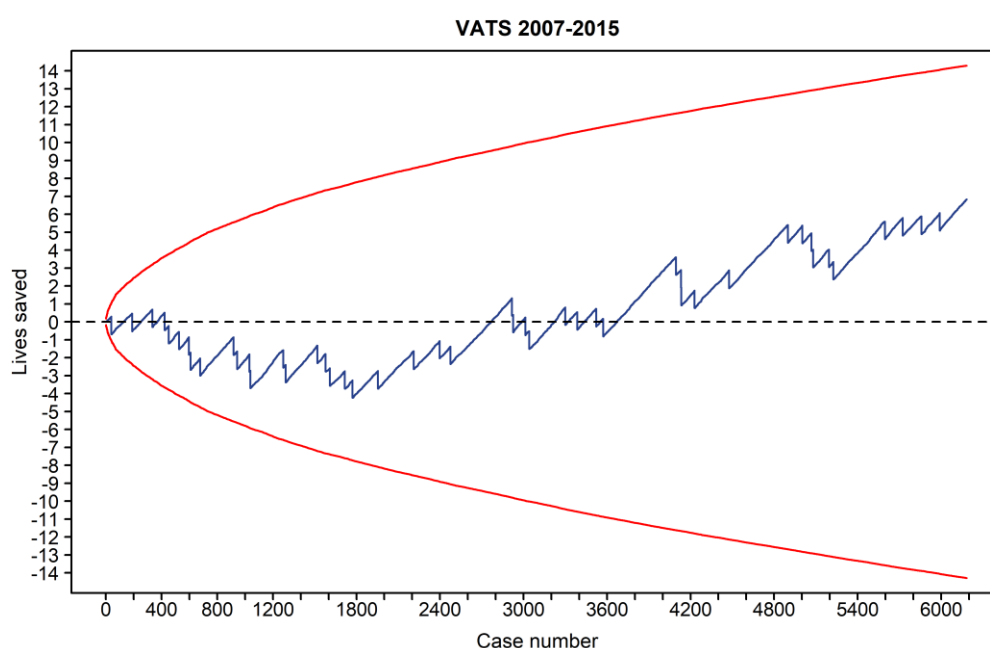
Hospital Mortality trending presented as CUSUM plots

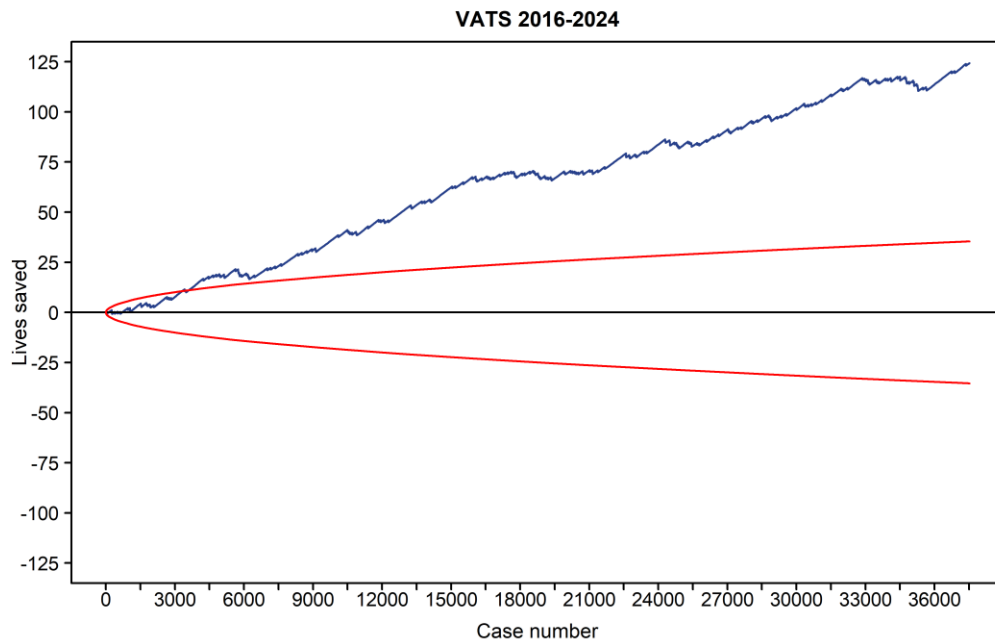
VATS CUSUM PLOTS

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, where 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.

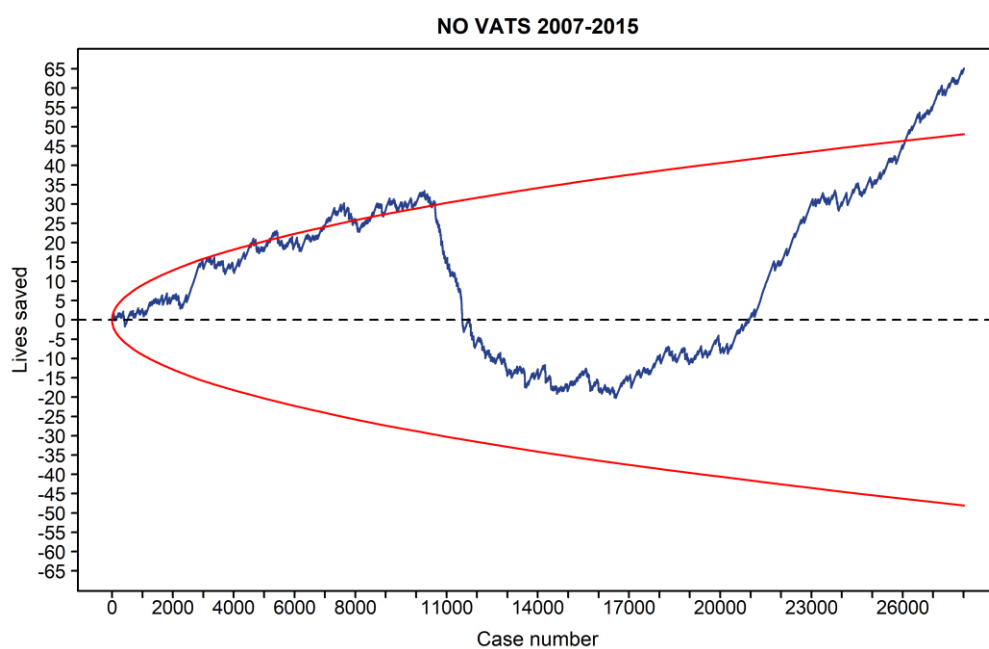
In the next figures, risk-adjusted CUSUM graphs for hospital mortality are presented for non-extended lobectomy performed through VATS or open approach in two different periods of time: 2007-2015 and 2016-2024.

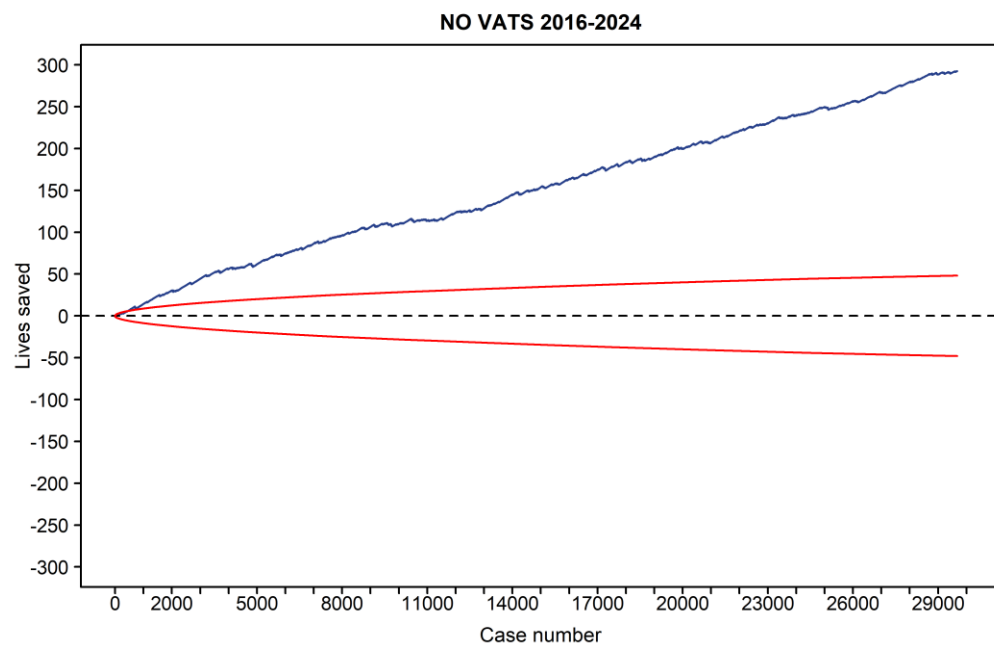
In the case of VATS, the first timeframe shows some variation around the zero for the first 400 cases followed by more than 2500 cases characterized by a slight mortality increase. After case 3000 the number of lives saved stabilized again around zero until it starts increasing after case 3600. In the period 2015-2023, 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 until approximately case 35000, where is stabilized on 110 lives saved. The last few thousands observations are characterized by an increase in lives saved up to nearly 125.





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. After the curve stabilized around 5-10 lives loss, a subsequent continuous increase in lives saved is shown from case 17000 onwards. From 2016, no VATS procedures resulted in a continuous and sharp improve of hospital mortality.





PART 2

UNITS-SPECIFIC ACTIVITY

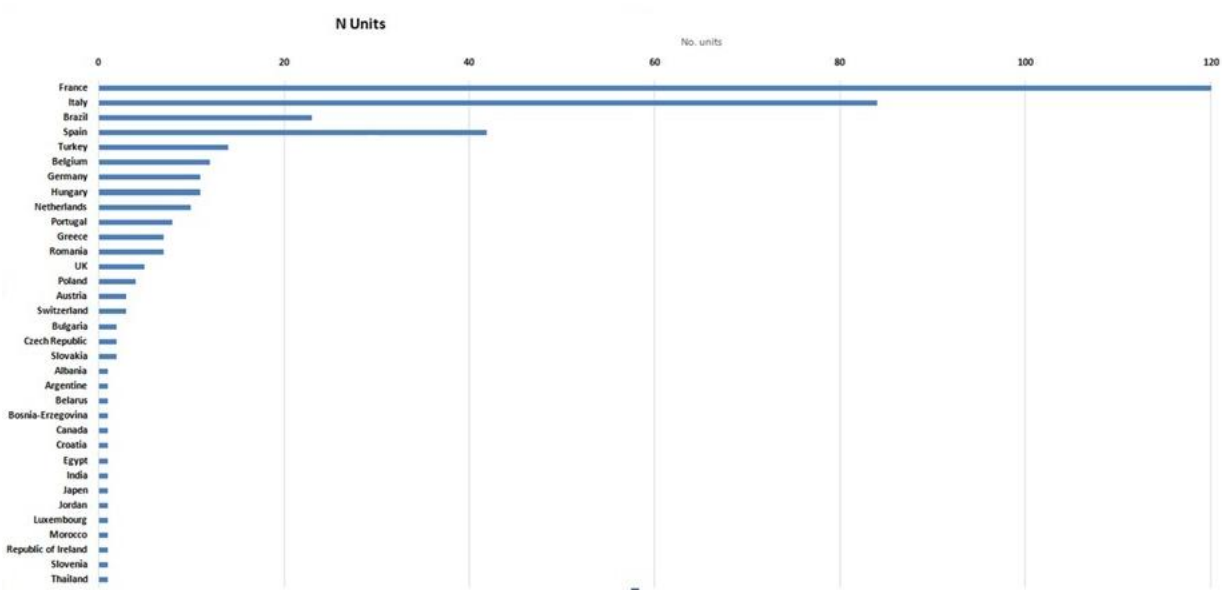
&

COMPARATIVE ANALYSIS

BETWEEN CONTRIBUTING UNITS (2007-2024) (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 2024, by Country



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

Unit	Percent
Bm02dl	29.42
Bm05dl	34.26
Ch10dl	31.12
Fr060785003_01°	45.5
Fr130780521_01	40.29
Fr130785652_01°	44.92
Fr140000209_01°	38.01
Fr210987558_01	42.81
Fr300782117_01°	45.81
Fr310019351_01	39.21
Fr330783648_01°	36.88
Fr340796663_01°	41.03
Fr350000741_01°	42.34
Fr370004467_01°	44.12
Fr380000067_01°	41.95
Fr440017598_01°	37.21
Fr540000486_01°	40.59
Fr540001138_01°	41.07
Fr590784864_01°	24.42
Fr630000479_01°	41.12
Fr670000025_01°	36.14
Fr690784186_01°	38.98
Fr750100232_01°	39.74
Fr750100273_01°	38.27
Fr750150104_01	41.39
Fr750712184_01°	40.69
Fr750803447_01°	40.2
Fr760000158_01	34.54
Fr800006124_01°	35.56
Fr830100574_01°	52.58
Fr840001861_01°	46.35
Fr860000223_01°	40.59
Fr870000064_01°	41.87
Fr920000650_01	44.69
Fr920000684_01°	38.82
Fr930100037_01°	34.3
Gr02d0	44.36
Gy18dl	38.84
Gy23dl	29.44
Gy25dl°	33.89

Hu01dl	23.67
Hu02dl	26.87
Hu03dl	24.8
Hu04dl	23.87
Hu06dl	21.61
Hu07dl	27.63
Hu08dl	25.2
Hu09dl	23.82
Hu12dl	19.02
Ie01dl	41.51
It03d0	38.61
It32dl	37.19
It38dl	49.08
NI19dl	40.95
PI06dl	43.63
PI08dl	26.89
Pt05dl°	34.27
Sk01dl	23.76
SI03dl°	40.25
SP00007°	49.78
SP00009°	41.82
SP00015°	44.59
SP00047°	39.45
SP00049°	39.4
SP00067°	37.1
SP00082°	37.74
SP00106°	36.75
Sp01dl	38.89
Sp07d0	39.28
Sp17dl	37.38
Sp28dl	31.08
Sp31dl	41.08
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	90.3
Bm05dl	92.24
Ch10dl	84.47
Fr060785003_01°	52.81
Fr130780521_01°	96.44
Fr130785652_01°	78.57
Fr140000209_01°	91.47
Fr210987558_01°	74.74
Fr300782117_01°	36
Fr310019351_01°	61.38
Fr330783648_01°	59.15
Fr340796663_01°	59.51
Fr350000741_01°	70.69
Fr370004467_01°	86.23
Fr380000067_01°	36.07
Fr440017598_01°	68.86
Fr540000486_01°	25.11
Fr540001138_01°	56.67
Fr590784864_01°	64.57
Fr630000479_01°	75
Fr670000025_01°	96.45
Fr690784186_01°	79.87
Fr750100232_01°	51.38
Fr750100273_01°	61.83
Fr750150104_01°	87.29
Fr750712184_01°	53.14
Fr750803447_01°	60.92
Fr760000158_01	63.84
Fr800006124_01°	63.46
Fr830100574_01°	86.38
Fr840001861_01°	60.93
Fr860000223_01°	82.23
Fr870000064_01°	24.67
Fr920000650_01°	78.6
Fr920000684_01°	71.9
Fr930100037_01°	54.17
Gr02d0	6.09
Gy18dl°	67.73
Gy23dl	90.3
Gy25dl°	93.97
Hu01dl	22.54
Hu02dl	38.98
Hu03dl	8.38

Hu04dl	3.09
Hu06dl	10.99
Hu07dl	18.73
Hu08dl	6.42
Hu09dl	9.76
Hu12dl	62.29
Ie01dl	98.77
It03d0	75.49
It32dl	95.56
It38dl	31.74
NI19dl	95.91
PI06dl	82
PI08dl	18.53
Pt05dl°	88.15
Sk01dl	90.43
SI03dl°	89.36
SP00007°	78.43
SP00009°	94.55
SP00015°	90.7
SP00047°	86.98
SP00049°	96.23
SP00067°	84.86
SP00082°	93.53
SP00106°	96.1
Sp01dl	91.55
Sp07d0	73.85
Sp17dl	82.79
Sp28dl	88.65
Sp31dl	89.77
Uk05dl	93.88

(°): 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, TEMPLA etc.)

Unit	Percent
Bm02dl°	85.17
Bm05dl°	89.73
Ch10dl°	75.36
Fr060785003_01°	70
Fr130780521_01°	76.19
Fr130785652_01°	88.89
Fr140000209_01°	62.07
Fr210987558_01°	20
Fr300782117_01°	100
Fr310019351_01°	59.09
Fr330783648_01°	17.39
Fr340796663_01°	20.59
Fr350000741_01°	40
Fr370004467_01°	50
Fr380000067_01°	76.92
Fr440017598_01°	20
Fr540000486_01°	8.33
Fr540001138_01°	0
Fr590784864_01°	54.55
Fr630000479_01°	68.18
Fr670000025_01°	24.39
Fr690784186_01°	28.21
Fr750100232_01°	100
Fr750100273_01°	56
Fr750150104_01°	71.43
Fr750712184_01°	46.67
Fr750803447_01°	38.89
Fr760000158_01°	40.82
Fr800006124_01°	73.33
Fr830100574_01°	78.95
Fr840001861_01°	72
Fr860000223_01°	54.17
Fr870000064_01°	57.14
Fr920000650_01°	47.06
Fr920000684_01°	31.71
Fr930100037_01°	63.64
Gr02d0°	2.33

Gy18dl°	53.76
Gy23dl°	69.07
Gy25dl°	95.24
Hu01dl°	9.42
Hu02dl°	6.31
Hu03dl°	8.33
Hu04dl°	6.38
Hu06dl°	6.94
Hu07dl°	14.63
Hu08dl°	28.07
Hu09dl°	60.1
Hu12dl°	75.66
Ie01dl°	64.6
It03d0°	31.43
It32dl°	10.36
It38dl°	14.29
NI19dl°	75.79
PI06dl°	81.68
PI08dl°	54.55
Pt05dl°	50
Sk01dl°	29.01
SI03dl°	28.57
SP00007°	82.93
SP00009°	100
SP00015°	90.91
SP00047°	86.67
SP00049°	76.19
SP00067°	84.62
SP00082°	83.33
SP00106°	86.36
Sp01dl°	76.83
Sp07d0°	42.46
Sp17dl°	46.3
Sp28dl°	72
Sp31dl°	69.35
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	91.84
Bm05dl	95.44
Ch10dl	96.35
Fr060785003_01°	98.81
Fr130780521_01°	97.96
Fr130785652_01°	91.67
Fr140000209_01°	91.99
Fr210987558_01°	99.58
Fr300782117_01°	100
Fr310019351_01°	99.39
Fr330783648_01°	97.55
Fr340796663_01°	97.93
Fr350000741_01°	82.56
Fr370004467_01°	92.06
Fr380000067_01°	77.78
Fr440017598_01°	97.2
Fr540000486_01°	97.83
Fr540001138_01°	98.08
Fr590784864_01°	96.41
Fr630000479_01°	98.07
Fr670000025_01°	98.39
Fr690784186_01°	98.19
Fr750100232_01°	73
Fr750100273_01°	97.78
Fr750150104_01°	93.03
Fr750712184_01°	83.4
Fr750803447_01°	98.69
Fr760000158_01°	86.67
Fr800006124_01°	98.71
Fr830100574_01°	93.75
Fr840001861_01°	99.34
Fr860000223_01°	97.97
Fr870000064_01°	97.33
Fr920000650_01°	84.17
Fr920000684_01°	96.52
Fr930100037_01°	100
Gr02d0°	85.04
Gy18dl°	100
Gy23dl	97.29
Gy25dl°	99.09
Hu01dl	95.55

Hu02dl	85.76
Hu03dl	67.79
Hu04dl°	96.95
Hu06dl	95.1
Hu07dl	99.11
Hu08dl	65.64
Hu09dl	94.81
Hu12dl	97.51
Ie01dl	94.8
It03d0	88.72
It32dl	87.69
It38dl	98.49
NI19dl	95.51
PI06dl	99.6
PI08dl	100
Pt05dl°	96.12
Sk01dl	67.73
SI03dl°	99.46
SP00007°	17.89
SP00009°	96.19
SP00015°	98.98
SP00047°	99.35
SP00049°	75.18
SP00067°	92.9
SP00082°	5.92
SP00106°	34.43
Sp01dl	93.46
Sp07d0	93.07
Sp17dl	96.99
Sp28dl	14.45
Sp31dl	91.29
Uk05dl	84.02

Primary lung cancer per contributing Units

Percentage of lung excision procedures

Unit	Bilobectomy	Lobectomy	Lung Volume Reducti on	Pneumonectomy	Segmentectomy	Wedge	Unk
Bm02dl	3.7	62.9	0	11.3	6.1	15.7	0.3
Bm05dl	6.5	70.8	0	10.3	6.7	5.7	0
Ch10dl	2.9	71.9	0.1	8.2	8.6	7.1	1.2
Fr060785003_01°	1	39.8	0	1.4	41.7	15.6	0.5
Fr130780521_01	3.3	66.2	0	1.8	20.5	7.3	0.9
Fr130785652_01°	1.5	63.3	0	0	32.1	3.1	0
Fr140000209_01°	5.3	75.3	0	1.7	11.9	5.6	0.2
Fr210987558_01	3.1	72.3	0	3.5	19.9	0.5	0.7
Fr300782117_01°	1.9	78.7	0	0	17.4	2	0
Fr310019351_01	2.7	83.8	0	1.8	9.7	1.6	0.4
Fr330783648_01°	3.4	78.7	0	2.8	12.7	2.1	0.3
Fr340796663_01°	3	69.7	0	1.5	21.3	4.2	0.3
Fr350000741_01°	2.6	60.2	0.4	0.7	20.1	15.3	0.7
Fr370004467_01°	2.5	54.8	0.4	0.4	34.7	6.3	0.9
Fr380000067_01°	0	67.8	0	2.3	17.8	11.5	0.6
Fr440017598_01°	4.2	69.8	0	3.7	15.8	5.6	0.9
Fr540000486_01°	1.8	79.4	0	3.7	7	7	1.1
Fr540001138_01°	2.1	47.5	0	3.8	27	18.7	0.9
Fr590784864_01°	1.6	69.1	0	2.6	21.1	5.6	0
Fr630000479_01°	4.3	73.2	0	4	14.3	4	0.2
Fr670000025_01°	2.7	66.3	0	5.8	21.4	2.6	1.2
Fr690784186_01°	3.3	65.9	0.2	2.3	22.8	5.3	0.2
Fr750100232_01°	3.3	66.9	0	2	24.5	2	1.3
Fr750100273_01°	2.4	60.1	0	2.1	31.1	4	0.3
Fr750150104_01	2.5	53.2	0	0.6	41.8	1.9	0
Fr750712184_01°	2.7	52	0	3.9	33.6	6.6	1.2
Fr750803447_01°	2.7	74.1	0.3	3.4	12.1	7.4	0
Fr760000158_01	1	56	0.1	2.1	35.3	5.5	0
Fr800006124_01°	1.8	65	0	2.2	19.5	11.1	0.4
Fr830100574_01°	3.1	68.2	0	1.7	14.7	12	0.3
Fr840001861_01°	0.5	75	0	3.1	17.2	4.2	0
Fr860000223_01°	2.2	68.3	0	2.2	17.7	8.1	1.5
Fr870000064_01°	4.4	65.5	0	4	18.7	6.9	0.5
Fr920000650_01	3.7	69.7	0	2.2	19.6	4.2	0.6
Fr920000684_01°	2.6	77	0	0	10.5	9.9	0
Fr930100037_01°	2.5	75.6	0	1.2	16.1	4.6	0
Gr02d0	4.3	62.7	0	13.8	4.1	6.5	8.6
Gy18dl°	4.8	60.4	0	7.4	21.8	4.1	1.5
Gy23dl	3.4	66.5	0	4.4	8.1	16.9	0.7
Gy25dl°	4.6	64.2	0	0.7	23.9	6.6	0

Unit	Lung Volume Reducti						
	Bilobectomy	Lobectomy	on	Pneumonectomy	Segmentectomy	Wedge	Unk
Hu01dl	2.5	58.5	0	3.9	12.2	22.8	0.1
Hu02dl	3	68.9	0	4.5	10	12.6	1
Hu03dl	2.4	65.4	0	7.2	6.2	18	0.8
Hu04dl	3	69.7	0.8	3.6	12.9	8.3	1.7
Hu06dl	1.1	66.7	0	4.5	2.8	24.2	0.7
Hu07dl	1.5	70.4	0	1.8	1.3	23.9	1.1
Hu08dl	2.4	53.4	0	12.4	10.1	20.5	1.2
Hu09dl	2.6	70.3	0	7.5	5.7	13.3	0.6
Hu12dl	2.2	66	0.1	5.4	7.5	18.6	0.2
Ie01dl	5	82.9	0	5.4	0.5	5.8	0.4
It03d0	3.4	74.4	0	4.4	8.5	9.2	0.1
It32dl	3.2	75.9	0	6	5.3	9.5	0.1
It38dl°	5.2	86.1	0	1.7	1.5	5.5	0
NI19dl	3.6	70.2	0	3.5	11.8	10.9	0
PI06dl	3.2	81	0	3.2	10.9	1.7	0
PI08dl	5.3	77.6	0	9.3	4.2	3.6	0
Pt05dl°	3.3	62.8	0	1.1	14.2	18.6	0
Sk01dl	4.5	87	0	6.2	2.3	0	0
SI03dl°	2	85.8	0	2	5.1	5.1	0
SP00007°	2.9	84.2	0	3.8	8.6	0	0.5
SP00009°	3.6	62.6	0	1.4	32.4	0	0
SP00015°	3.2	69.4	0	9.7	16.9	0	0.8
SP00047°	1.1	65.4	0	1.6	30.3	0	1.6
SP00049°	2.5	82.1	0	6.1	8.9	0	0.4
SP00067°	2.6	77.6	0	1.6	18.2	0	0
SP00082°	6.2	85.4	0	4.5	3.9	0	0
SP00106°	2.1	55.9	0	3.9	38.1	0	0
Sp01dl	3.8	73.2	0.1	4.7	12.2	5.8	0.2
Sp07d0	3	56.9	0	3.4	11.4	24.7	0.6
Sp17dl	3.5	71.5	0	5.8	11.1	7.4	0.7
Sp28dl	3.5	72.5	0	6.6	16.1	1.3	0
Sp31dl	2.2	66.1	0	3.4	18	8.9	1.4
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 Resecti on	SVC Resectio n/Recon struction	Vertebral Resection	Unk
Bm02dl	91.2	1.4	1.2	5	0.2	0.3	0	0	0.7
Bm05dl	79.4	4.1	1.7	14.2	0.2	0.2	0.1	0	0.1
Ch10dl	56.3	6.4	0.2	11.8	0.5	1.4	0.1	0	23.3
Fr060785003_01°	89.5	4.7	0	5.8	0	0	0	0	0
Fr130780521_01°	97.4	1.3	0	1.3	0	0	0	0	0
Fr130785652_01°	97.6	1.8	0	0.6	0	0	0	0	0
Fr140000209_01°	99.4	0.6	0	0	0	0	0	0	0
Fr210987558_01°	98	0.5	0.2	1.3	0	0	0	0	0
Fr300782117_01°	96	1.6	0.8	1.6	0	0	0	0	0
Fr310019351_01°	97.7	0.4	0.2	1.7	0	0	0	0	0
Fr330783648_01°	97.8	1.3	0	0.9	0	0	0	0	0
Fr340796663_01°	98.8	0.8	0	0.4	0	0	0	0	0
Fr350000741_01°	94.2	4.1	0	1.7	0	0	0	0	0
Fr370004467_01°	98.6	0.7	0	0.7	0	0	0	0	0
Fr380000067_01°	96.6	1.7	0	1.7	0	0	0	0	0
Fr440017598_01°	98.1	0.6	0	1.3	0	0	0	0	0
Fr540000486_01°	98.6	1.4	0	0	0	0	0	0	0
Fr540001138_01°	100	0	0	0	0	0	0	0	0
Fr590784864_01°	95.3	0.5	1.4	2.8	0	0	0	0	0
Fr630000479_01°	97.4	0.9	0.3	1.4	0	0	0	0	0
Fr670000025_01°	96.2	1	0	2.4	0.4	0	0	0	0
Fr690784186_01°	95.3	1.7	0	2.7	0	0	0.3	0	0
Fr750100232_01°	100	0	0	0	0	0	0	0	0
Fr750100273_01°	97.9	1.3	0.4	0.4	0	0	0	0	0
Fr750150104_01°	98.3	0	0	1.7	0	0	0	0	0
Fr750712184_01°	96.9	1.3	0.5	1.3	0	0	0	0	0
Fr750803447_01°	98.7	0.4	0	0.9	0	0	0	0	0
Fr760000158_01	99.5	0.3	0	0.2	0	0	0	0	0
Fr800006124_01°	99.3	0	0.7	0	0	0	0	0	0
Fr830100574_01°	97.1	0	0	2.9	0	0	0	0	0
Fr840001861_01°	100	0	0	0	0	0	0	0	0
Fr860000223_01°	99.5	0	0	0.5	0	0	0	0	0
Fr870000064_01°	100	0	0	0	0	0	0	0	0
Fr920000650_01°	95.9	1.1	0.4	2.4	0	0.2	0	0	0
Fr920000684_01°	97.5	0.8	0	1.7	0	0	0	0	0
Fr930100037_01°	98.4	0.6	0.5	0.5	0	0	0	0	0
Gr02d0°	92.9	3.3	1.2	1.9	0	0.5	0	0	0.2
Gy18dl°	78.7	6.6	1.1	12.1	0	1.1	0.4	0	0
Gy23dl	84.3	3.2	1.3	9.9	0.4	0.2	0.4	0.1	0.2
Gy25dl°	80.8	1	0	13.4	1	0	0	0	3.8
Hu01dl	84.8	1.9	0	1.9	0	0.1	0	0	11.3

Hu02dl	14.8	1.4	0.2	7.4	0.3	0	0.2	0.2	75.5
Hu03dl	50.8	6.4	0	4.7	0.4	0.1	0.1	0	37.5
Hu04dl°	23.6	4.8	0.4	1.1	0.4	0	0.4	0.2	69.1
Hu06dl	96.6	0	0.2	0.3	0.1	0	0	0	2.8
Hu07dl	89.7	0	0	2.7	0	0.2	0	0	7.4
Hu08dl	40	1.5	0.1	0.1	0.3	0.2	0	0.1	57.7
Hu09dl	71.7	1	0.1	1.3	0.1	0.1	0.1	0	25.6
Hu12dl	89.7	1.3	0	0.8	0.1	0	0	0	8.1
Ie01dl	90.6	1.9	0.1	5.1	0.3	0.2	0	0	1.8
It03d0	88.6	1.2	0.1	3.4	0.1	0.2	0	0	6.4
It32dl	86.3	2.1	0.2	0.8	0.1	0.1	0.1	0.1	10.2
It38dl°	98.4	1.3	0	0.3	0	0	0	0	0
NI19dl	93.1	2.4	0.9	2.3	0.7	0.2	0.2	0	0.2
PI06dl	99	0.1	0	0.7	0.1	0	0	0	0.1
PI08dl	93.1	1.1	0	5.3	0.2	0.1	0.2	0	0
Pt05dl°	93.4	1.6	0	3.3	0	0	0	0	1.7
Sk01dl	93.9	1.3	0.3	4.3	0.1	0	0	0	0.1
SI03dl°	59.5	1.2	0	0	0	0	0	0	39.3
SP00007°	96.2	1.6	0	0	0.6	1.1	0	0	0.5
SP00009°	89.1	1.1	0	0	1.1	0	1.1	0	7.6
SP00015°	92.2	1.1	0	0	0	0	0	0	6.7
SP00047°	92.8	1.6	0	1.6	0	0	0	0	4
SP00049°	97.1	0	0	0	0.4	0.4	0	0	2.1
SP00067°	51.3	0.6	0	0	0	0	0	0	48.1
SP00082°	94.5	1.2	0	0.6	0	0	0	0	3.7
SP00106°	95.8	0.6	0	0	0.6	0	0	0.6	2.4
Sp01dl	82	4.4	0.7	3.1	0.1	0.1	0	0	9.6
Sp07d0	92.3	2.6	0.4	0.3	0.3	0	0	0.2	3.9
Sp17dl	84.4	2.8	1.4	5.8	0.2	0.5	0.1	0.4	4.4
Sp28dl	95.6	1.9	0.5	1.4	0.3	0	0	0	0.3
Sp31dl	90.4	2.9	0.4	2.7	0	0.2	0	0.2	3.2
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 extended and type of resection amongsts pneumonectomies

Unit	Alone	Completion	Intraper icardial	Pleuropn eumonect omy	Sleeve Resection	Diaph ragm Resec tion	Atrial Resect ion	SVC Resecti on/Rec onstruct ion	Verte bral Resec tion	Unk
Bm02dl°	32.9	17.5	34.2	1.4	2.1	0	0	0	0.7	11.2
Bm05dl°	61	5.7	27.6	0.4	0.4	0	0	0.4	0.8	3.7
Ch10dl°	24.1	5.4	23.2	18.7	4.5	7.1	3.6	0.9	0	12.5
Fr060785003_01°	100	0	0	0	0	0	0	0	0	0
Fr130780521_01°	100	0	0	0	0	0	0	0	0	0
Fr140000209_01°	100	0	0	0	0	0	0	0	0	0
Fr210987558_01°	95.2	0	0	0	4.8	0	0	0	0	0
Fr310019351_01°	100	0	0	0	0	0	0	0	0	0
Fr330783648_01°	100	0	0	0	0	0	0	0	0	0
Fr340796663_01°	100	0	0	0	0	0	0	0	0	0
Fr350000741_01°	100	0	0	0	0	0	0	0	0	0
Fr370004467_01°	100	0	0	0	0	0	0	0	0	0
Fr380000067_01°	100	0	0	0	0	0	0	0	0	0
Fr440017598_01°	100	0	0	0	0	0	0	0	0	0
Fr540000486_01°	100	0	0	0	0	0	0	0	0	0
Fr540001138_01°	100	0	0	0	0	0	0	0	0	0
Fr590784864_01°	100	0	0	0	0	0	0	0	0	0
Fr630000479_01°	94.4	0	0	0	5.6	0	0	0	0	0
Fr670000025_01°	100	0	0	0	0	0	0	0	0	0
Fr690784186_01°	100	0	0	0	0	0	0	0	0	0
Fr750100232_01°	100	0	0	0	0	0	0	0	0	0
Fr750100273_01°	100	0	0	0	0	0	0	0	0	0
Fr750150104_01°	100	0	0	0	0	0	0	0	0	0
Fr750712184_01°	100	0	0	0	0	0	0	0	0	0
Fr750803447_01°	100	0	0	0	0	0	0	0	0	0
Fr760000158_01°	60.5	0	0	0	0	0	0	0	0	39.5
Fr800006124_01°	100	0	0	0	0	0	0	0	0	0
Fr830100574_01°	100	0	0	0	0	0	0	0	0	0
Fr840001861_01°	83.3	0	0	0	16.7	0	0	0	0	0
Fr860000223_01°	100	0	0	0	0	0	0	0	0	0
Fr870000064_01°	100	0	0	0	0	0	0	0	0	0
Fr920000650_01°	92.9	0	0	0	7.1	0	0	0	0	0
Fr930100037_01°	100	0	0	0	0	0	0	0	0	0
Gr02d0°	25.3	13.8	33.3	2.3	1.2	0	1.1	1.2	1.1	20.7
Gy18dl°	22.6	0	58.1	16.1	0	0	3.2	0	0	0
Gy23dl°	38.4	1.5	35.3	7.5	9	0.8	6	1.5	0	0
Gy25dl°	100	0	0	0	0	0	0	0	0	0
Hu01dl°	75	4.2	12.5	2.1	0	0	0	0	0	6.2
Hu02dl°	10.7	24.6	4.1	0	0	0	0	0.8	0	59.8
Hu03dl°	41.6	23.7	8.7	2	1.8	0.3	0	0	0	21.9

Hu04dl°	29.2	37.5	4.2	0	0	4.1	0	0	0	25
Hu06dl°	38.7	0	13.6	0	0	0	0	0	0	47.7
Hu07dl°	61.5	0	38.5	0	0	0	0	0	0	0
Hu08dl°	39	11	11	0	0	0	0	0	0	39
Hu09dl°	60.3	8.7	13	0.6	0	0	1.2	0	0	16.2
Hu12dl°	83.7	4.6	7.8	0	0	0	0	0	0	3.9
Ie01dl°	58	8.7	24.6	1.5	1.5	4.3	0	0	1.4	0
It03d0°	48	8.2	21.9	0	4.1	0	1.4	0	0	16.4
It32dl°	66.7	4.9	23.5	0	1.2	0	1.2	0	0	2.5
It38dl°	0	0	16.7	0	0	0	0	0	0	83.3
NI19dl°	84	0	16	0	0	0	0	0	0	0
PI06dl°	73.1	0	23.9	0	1.5	0	0	0	1.5	0
PI08dl°	67.3	0	16.8	0	0.5	0.5	5	1.5	0	8.4
Pt05dl°	50	50	0	0	0	0	0	0	0	0
Sk01dl°	72.5	0	27.5	0	0	0	0	0	0	0
SI03dl°	100	0	0	0	0	0	0	0	0	0
SP00007°	50	0	50	0	0	0	0	0	0	0
SP00009°	50	0	0	0	0	0	0	0	0	50
SP00015°	66.6	16.7	16.7	0	0	0	0	0	0	0
SP00047°	66.7	0	0	0	0	0	0	0	0	33.3
SP00049°	64.7	11.7	11.8	0	0	0	5.9	0	0	5.9
SP00067°	33.4	33.3	0	0	0	0	0	0	0	33.3
SP00082°	75	12.5	12.5	0	0	0	0	0	0	0
SP00106°	81.8	9.1	9.1	0	0	0	0	0	0	0
Sp01dl°	51.9	8.6	12.3	6.2	2.5	1.2	1.2	0	0	16.1
Sp07d0°	48.7	10.2	17.9	2.6	2.6	0	2.6	2.6	0	12.8
Sp17dl°	79	8.1	8.1	1.6	1.6	0	0	1.6	0	0
Sp28dl°	76.8	8.9	7.2	0	0	0	0	0	0	7.1
Sp31dl°	42.3	11.5	34.6	3.9	0	0	0	0	0	7.7
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	87.6	12.4	0
Bm05dl	47.4	52.6	0
Ch10dl	48	39.4	12.6
Fr060785003_01°	38.1	60.7	1.2
Fr130780521	45.7	53.5	0.8
Fr130780521_01°	32.6	66.6	0.8
Fr130785652_01°	28	72	0
Fr140000209	74.3	25.7	0
Fr140000209_01°	64.6	35.4	0
Fr210987558	67.8	16.2	16
Fr210987558_01°	77.2	2.8	20
Fr300782117_01°	24.6	75.4	0
Fr310019351	58.6	41.1	0.3
Fr310019351_01°	22.1	77.5	0.4
Fr330783648	46.1	53.4	0.5
Fr330783648_01°	44.1	55.9	0
Fr340796663_01°	9.5	90.5	0
Fr350000741°	18.4	80.2	1.4
Fr350000741_01°	24.2	75.2	0.6
Fr370004467_01°	31.3	67.9	0.8
Fr380000067_01°	47.5	52.5	0
Fr440017598_01°	30.7	69.3	0
Fr540000486	82.8	17.2	0
Fr540000486_01°	73.6	26.4	0
Fr540001138_01°	31.9	68.1	0
Fr590784864°	60.9	33.3	5.8
Fr590784864_01°	40.5	55.7	3.8
Fr630000479	42.6	56.7	0.7
Fr630000479_01°	25.1	74.6	0.3
Fr670000025	45	54.3	0.7
Fr670000025_01°	36.4	63.6	0
Fr690784186_01°	43	56.7	0.3
Fr750100232_01°	48.5	50.5	1
Fr750100273	58	38.1	3.9
Fr750100273_01°	61.2	33.9	4.9
Fr750150104	25.6	73.3	1.1
Fr750150104_01°	38.9	60.4	0.7
Fr750712184	78.9	19.3	1.8
Fr750712184_01°	66	32.1	1.9
Fr750803447_01°	57.3	41.8	0.9
Fr760000158	22.3	76.5	1.2
Fr760000158_01°	34.5	64.9	0.6
Fr800006124_01°	9.5	89.8	0.7
Fr830100574°	42.2	57	0.8

Fr830100574_01°	26.1	73.9	0
Fr840001861_01°	66.7	33.3	0
Fr860000223	70.6	29.2	0.2
Fr860000223_01°	76.8	17.8	5.4
Fr870000064_01°	48.1	51.9	0
Fr920000650	37.3	56.8	5.9
Fr920000650_01°	35.9	60.2	3.9
Fr920000684_01°	21.4	77.8	0.8
Fr930100037_01°	51.9	46.5	1.6
Gr02d0°	99.5	0.5	0
Gy18dl°	97	3	0
Gy23dl	59.3	40.7	0
Hu01dl°	41.9	58.1	0
Hu02dl	46.2	53.7	0.1
Hu03dl	41.2	58.7	0.1
Hu04dl°	40.5	57	2.5
Hu05dl°	36.4	63.6	0
Hu06dl	73	27	0
Hu07dl°	20	80	0
Hu08dl	70.8	29.1	0.1
Hu09dl	56.1	43.9	0
Hu12dl	54.2	45.4	0.4
Ie01dl	33.2	66.8	0
It03d0	56.1	43.3	0.6
It19d0°	58.3	19.9	21.8
It32dl	64.6	35.4	0
NI19dl	10	90	0
PI06dl	55.5	44.5	0
PI08dl	52.4	47.6	0
Pt05dl°	28.3	71.7	0
Sk01dl	49	51	0
SI03dl°	7.8	92.2	0
Sp01dl	59	41	0
Sp06dl°	32.9	67.1	0
Sp17dl	56.7	43	0.3
Sp28dl	21.9	78.1	0
Sp31dl°	11.6	88.4	0
Uk05dl	23.5	76.4	0.1

(°): 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 (%)	N	Observed	Predicted
Bm02dl	877	1.82	2.81
Bm05dl	1859	1.56	2.13
Ch10dl	695	1.15	1.96
Fr060785003_01°	57	0	1.43
Fr130780521	1114	2.06	1.71
Fr130780521_01°	378	1.85	1.38
Fr130785652_01°	152	0	0.87
Fr140000209	872	1.15	2.07
Fr140000209_01°	320	0.94	1.86
Fr210987558	676	1.33	2.5
Fr210987558_01°	355	0.85	2.25
Fr300782117_01°	110	3.64	1.32
Fr310019351	941	0.43	1.78
Fr310019351_01°	444	0.68	1.1
Fr330783648	829	2.17	1.59
Fr330783648_01°	304	1.97	1.33
Fr340796663_01°	131	0	1.24
Fr350000741°	274	0.73	1.25
Fr350000741_01°	151	0	1.2
Fr370004467_01°	84	0	1.44
Fr380000067_01°	107	0	2.03
Fr440017598_01°	140	0.71	1.35
Fr540000486	642	1.09	2.66
Fr540000486_01°	176	3.41	2.49
Fr540001138_01°	168	2.38	1.7
Fr590784864°	236	0	1.78
Fr590784864_01°	190	0.53	1.34
Fr630000479	503	0.8	1.78
Fr630000479_01°	322	1.24	1.56
Fr670000025	941	1.17	1.96
Fr670000025_01°	295	1.02	1.87
Fr690784186_01°	220	0.91	1.49
Fr750100232_01°	88	0	1.29
Fr750100273°	191	0	1.79
Fr750100273_01°	147	0	1.74
Fr750150104°	569	1.05	1.49
Fr750150104_01°	276	0.72	1.39
Fr750712184°	576	0.52	2.46

Predicted and Observed In-Hospital Mortality Rate (%)	N	Observed	Predicted
Fr750712184_01°	206	0	2.11
Fr750803447_01°	209	0.96	1.5
Fr760000158	671	0.15	1.48
Fr760000158_01°	368	0.54	1.1
Fr800006124_01°	106	0	1.09
Fr830100574°	315	2.86	2.08
Fr830100574_01°	186	1.08	1.6
Fr840001861_01°	117	1.71	2.19
Fr860000223	630	1.9	2.3
Fr860000223_01°	182	1.65	1.9
Fr870000064_01°	131	0.76	1.44
Fr920000650°	486	0.82	1.52
Fr920000650_01°	245	0	1.4
Fr920000684_01°	71	0	0.94
Fr930100037_01°	169	0.59	1.9
Gr02d0°	405	1.73	3.39
Gy18dl°	271	6.27	2.9
Gy23dl	1998	1.6	2.1
Hu01dl	558	1.43	1.36
Hu02dl	1180	0.51	1.48
Hu03dl	3517	0.8	1.61
Hu04dl°	247	2.43	1.38
Hu05dl°	276	0.36	1.56
Hu06dl	561	0.36	1.64
Hu07dl°	456	2.41	1.16
Hu08dl°	307	1.95	2.6
Hu09dl	801	0.87	1.77
Hu12dl	1876	1.07	1.72
Ie01dl	927	2.8	1.76
It03d0	1059	0.47	1.98
It19d0°	318	0.94	2.43
It32dl	990	0.1	2.36
NI19dl°	465	2.8	1.4
PI06dl	1508	0.4	1.81
PI08dl	1435	1.46	1.91
Pt05dl°	88	0	1.3
Sk01dl	755	0.93	1.62
SI03dl°	131	1.53	1.2
Sp01dl	763	0.52	2.26
Sp06dl°	145	1.38	1.39
Sp17dl	798	1.63	2.3
Sp28dl	663	1.66	1.76
Sp31dl°	476	1.47	1.49
Uk05dl	1614	2.79	1.53

(°): 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 Registry Thymoma section



Dr. Bernhard Moser

Chair ESTS Thymic Working Group

bernhard.moser@meduniwien.ac.at

Dear ESTS members,

We are proud of the unwavering support of ESTS members to participate to the ESTS Thymic Working Group and ESTS Thymic Database, whose number of patients continues to increase every year. This years` Silver book summarizes the data of already 4212 patients! In order to meet the continuing demands of cutting edge research on this rare disease, ESTS has rolled out the new ESTS Thymic Database! The newly developed ESTS Thymic Database takes Surgical Research on patients with thymomas and thymic carcinomas to the next level.

A New Era of Data Quality and Clinical Insight

We are excited to have launched the new version of the ESTS Thymic Registry, which has evolved through our Plan-Do-Check-Act (PDCA) cycle as a project, to combat significant challenges in the management of thymic epithelial tumors (TETs). It incorporates the full complexity of these tumors, while expanding the depth of data collection without overburdening contributors.

A primary goal of this update was to enhance and simplify the overall experience clinicians have when it comes to data submission. To provide comprehensive scientific accuracy, the registry integrates automatic TNM staging and color-coded fields as well as the recently published WHO 2021 histopathological definitions. Neoadjuvant and adjuvant treatment variables are now extended to include chemotherapy, immunotherapy, and radiotherapy. Conditional logic ensures

only relevant fields are displayed in forms, speeding up data entry, while protecting the quality of core records. The use of pre-filled defaults (like “none” for paraneoplastic autoimmune syndromes) minimizes the risk of missing or incomplete data.

It adds increased surgical specificity through more detailed fields for organ- or structure-specific resections, including robotic-assisted and combined approaches. It forces the registry to go beyond a single “Resected Structures” field to a granular summary of real-world surgical complexity. Such variables in conjunction with newly emphasized variables for final pathologic diagnosis and outcome measures provide a solid foundation for collaborative research and the global comparison of data.

The new registry contains 23 mandatory variables, a notable increase from the 17 in the previous system, to capture the realities of TET treatment in a more comprehensive way. These adjustments reflect contemporary perspectives in thoracic oncology and were driven by user input. The result is a design that is balanced, reflects real clinical workflows, and promotes the highest standards for evidence-based care.

The results of the pilot study and workflow for continuing improvement of the database were presented at this years “Mediastinum session” at the annual ESTS Meeting in Budapest “The new European Society of Thoracic Surgeons (ESTS) Thymic Registry: Improving data completeness, granularity and integrating novel data-entry features”.

Your contributions are vital. By entering cases into the newly upgraded ESTS Thymic Registry, you join an international effort to advance TET research, promote best practices, and ultimately improve patient outcomes. We encourage the entire thoracic surgical community to engage in this enhanced platform and help shape the future of TET care. Thank you for your engagement, and we look forward to advancing the management of patients with TETs together!

Please contact me or Dr. Stefano Passani <s.passani@kdataclinical.it> for your new log in data or the possibility of 3rd party imports (=upload of your .xls, spss or other databases to the ESTS Thymic database)!

We already thank you now for your continuous support of the New ESTS Thymic database! If you are not a member of the ESTS Thymic database – PLEASE JOIN US NOW and be part of this joint effort improving patient care for those with thymic epithelial tumors!

Dr. Bernhard Moser

Chair of the ESTS Thymic Working Group

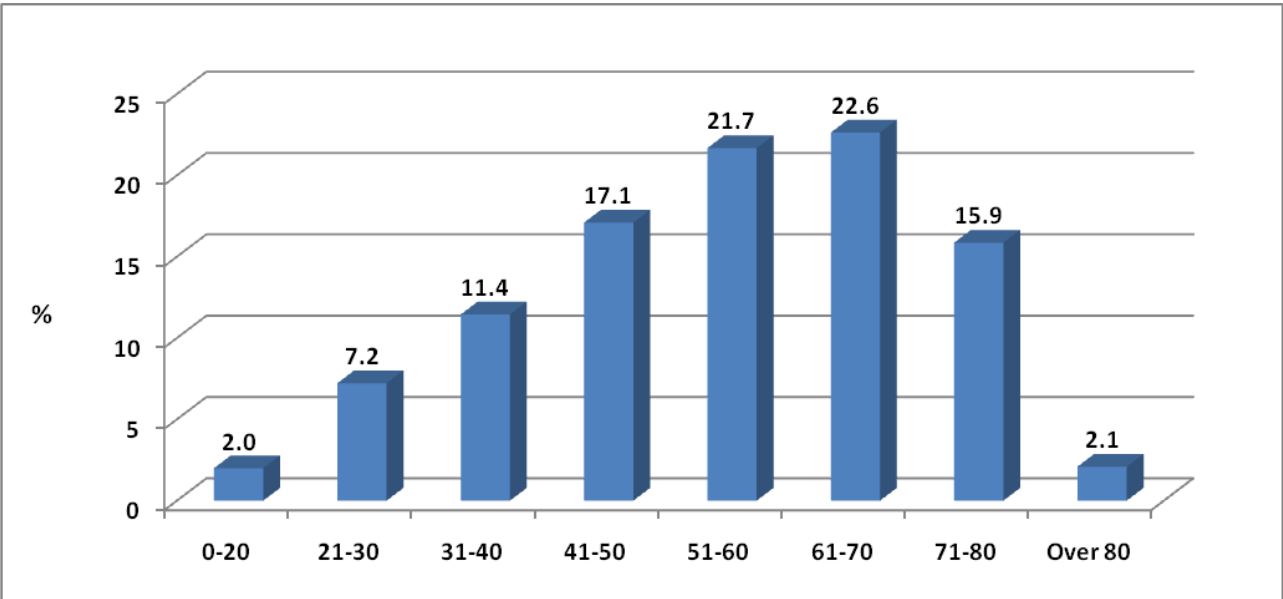
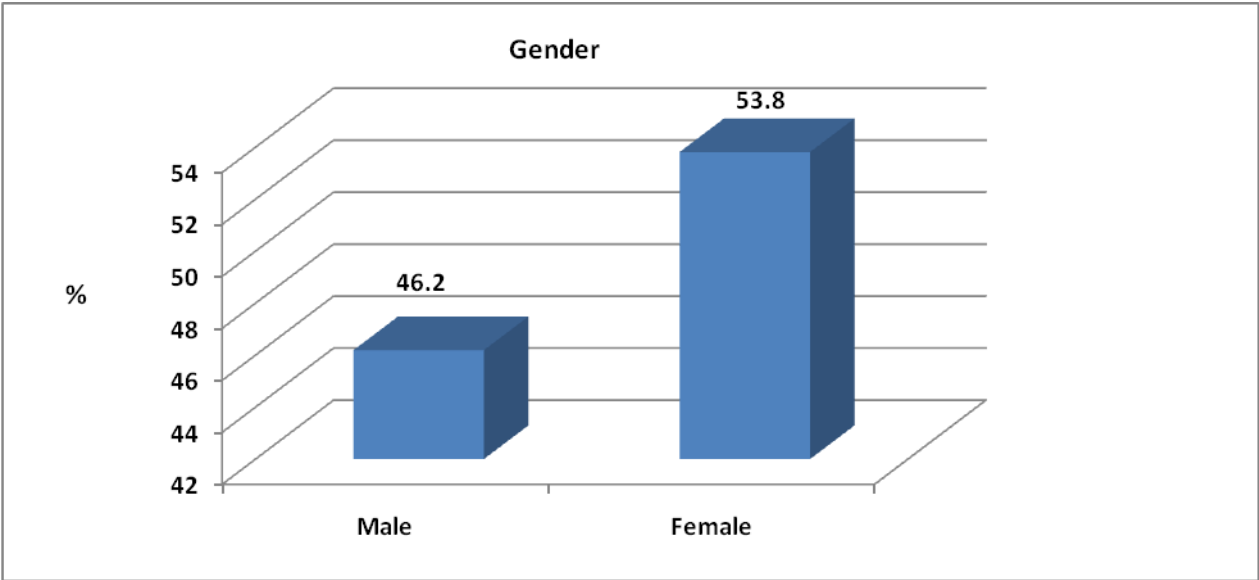
bernhard.moser@meduniwien.ac.at

Thymoma Section fields

Thymic Tumors: prospective cases
January 2007- December 2024
N=4212

Demographics: gender and age groups

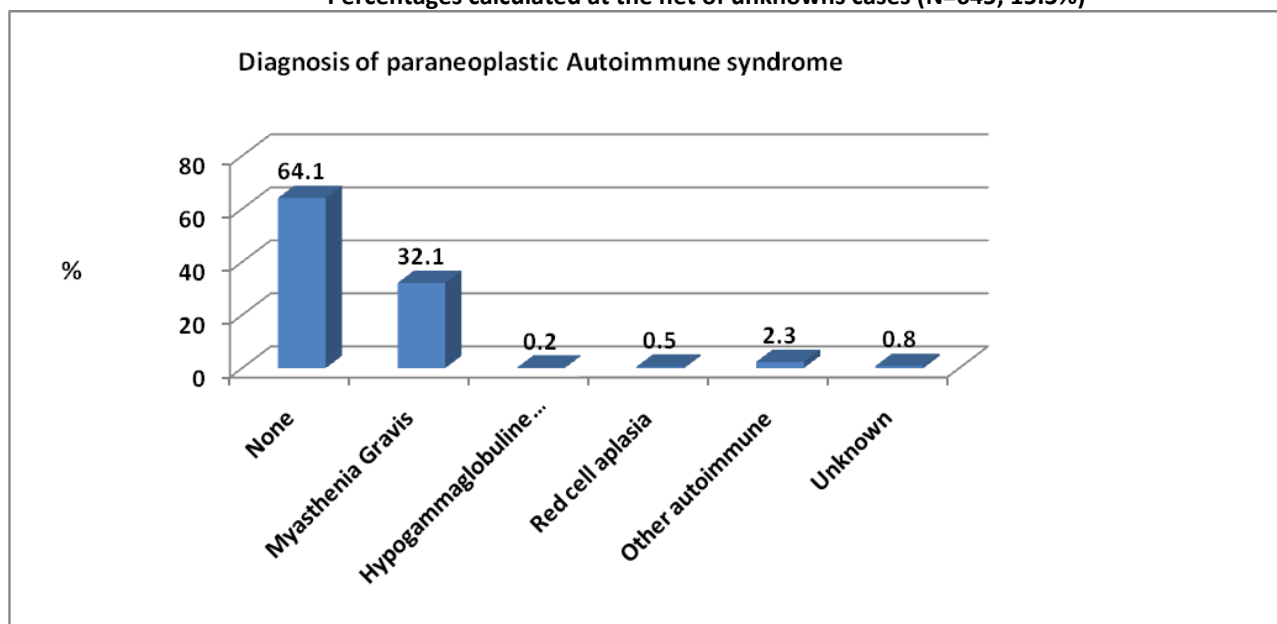
Gender	Occurrences	Percent
Male	1957	46.5
Female	2255	53.5
Total	4212	100.0



Associated paraneoplastic syndromes

Diagnosis of paraneoplastic -Autoimmune syndrome	Occurrences	Percent
None	2287	64.1
Myasthenia Gravis	1144	32.1
Hypogammaglobulinemia	6	0.2
Red cell aplasia	19	0.5
Other autoimmune	82	2.3
Unknown	29	0.8
Total number of patients	3567	100

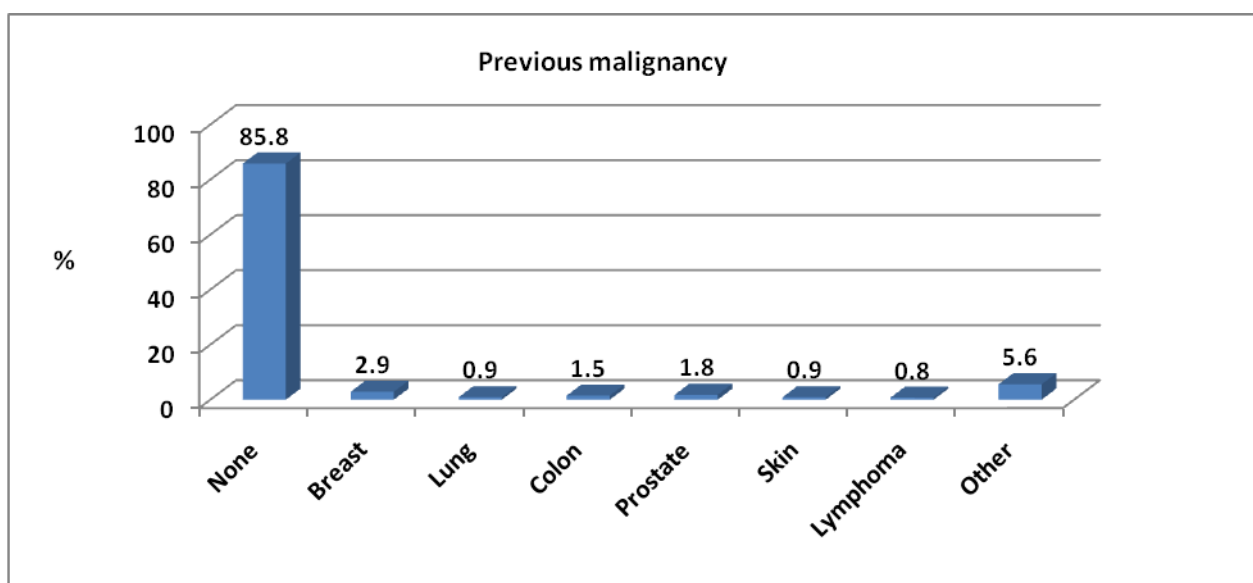
* Percentages calculated at the net of unknowns cases (N=645; 15.3%)



Previous malignancy

Previous malignancy	Occurrences	Percent
None	1942	85.8
Breast	65	2.9
Lung	20	0.9
Colon	33	1.5
Prostate	40	1.8
Skin	20	0.9
Lymphoma	17	0.8
Other	126	5.6
Total number of patients	2263	100

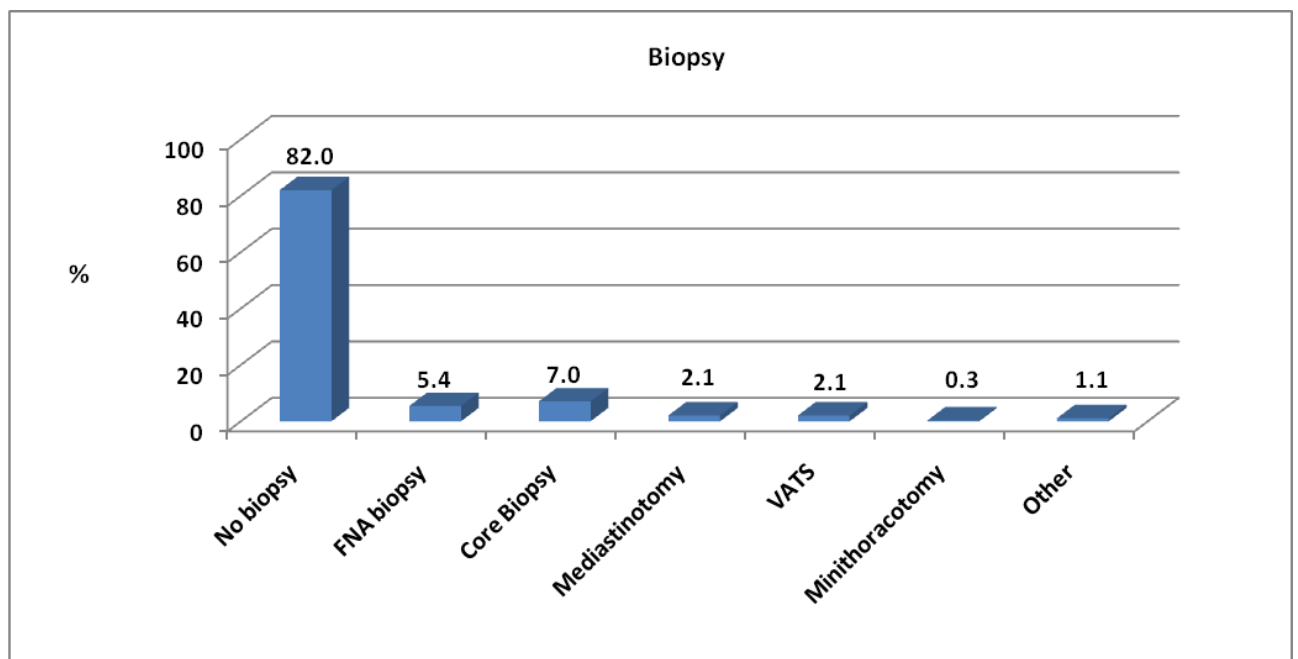
* Percentages calculated at the net of unknowns cases (N=1942; 46.3%)



Preoperative diagnosis

Biopsy	Occurrences	Percent
No biopsy	1866	82.0
FNA biopsy	123	5.4
Core Biopsy	160	7.0
Mediastinotomy	47	2.1
VATS	47	2.1
Minithoracotomy	7	0.3
Other	25	1.1
Total	2275	100.0

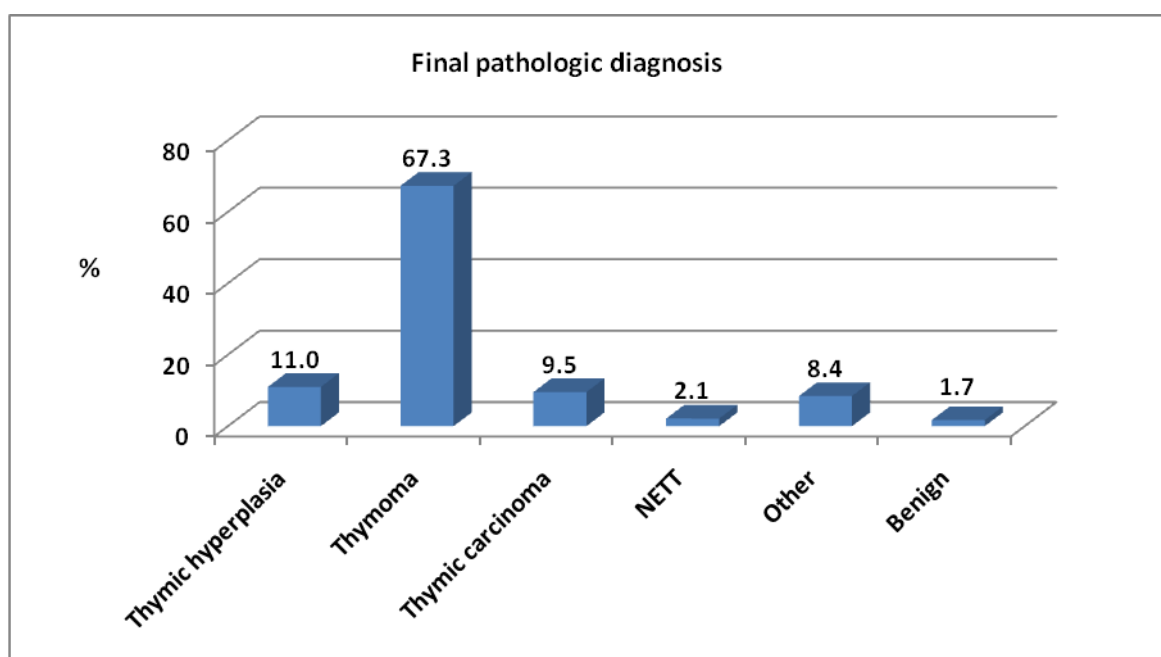
* Percentages calculated at the net of unknowns cases (N=1937; 46%)



Final pathologic diagnosis

Final pathologic diagnosis	Occurrences	Percent
Thymic hyperplasia	425	11.0
Thymoma	2608	67.3
Thymic carcinoma	369	9.5
NETT	82	2.1
Other	326	8.4
Benign	65	1.7
Total	3875	100.0

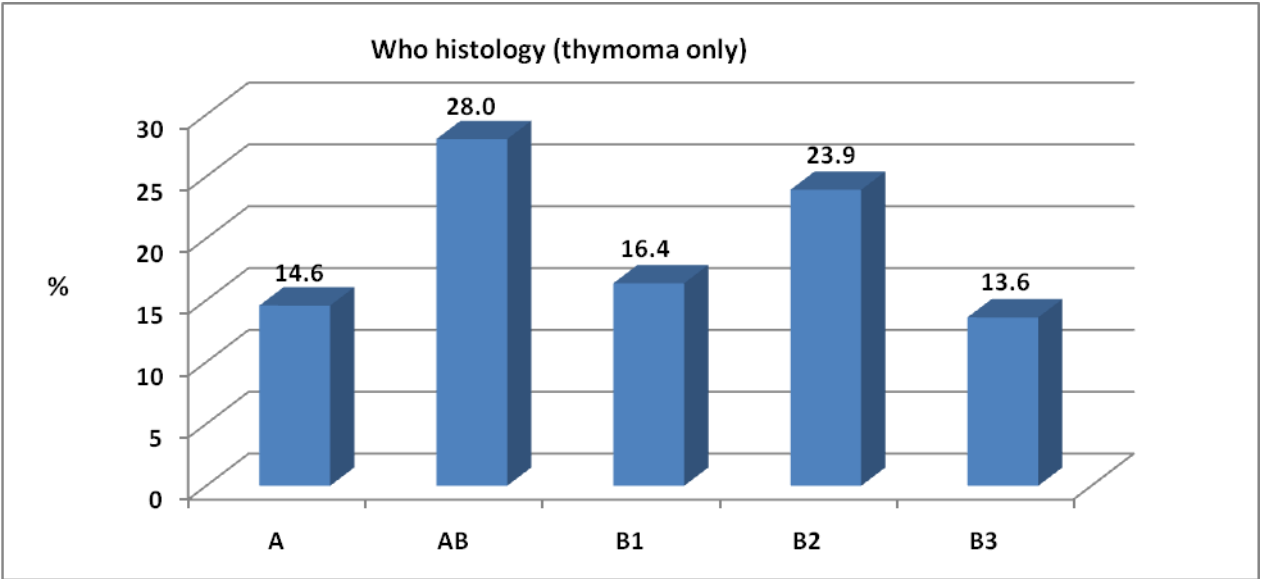
* Percentages calculated at the net of unknowns cases (N=337; 8%)



WHO histology (thymoma only)

WHO histology	Occurrences	Percent
A	380	14.6
AB	731	28.0
B1	427	16.4
B2	624	23.9
B3	355	13.6
Total	2608	100.0

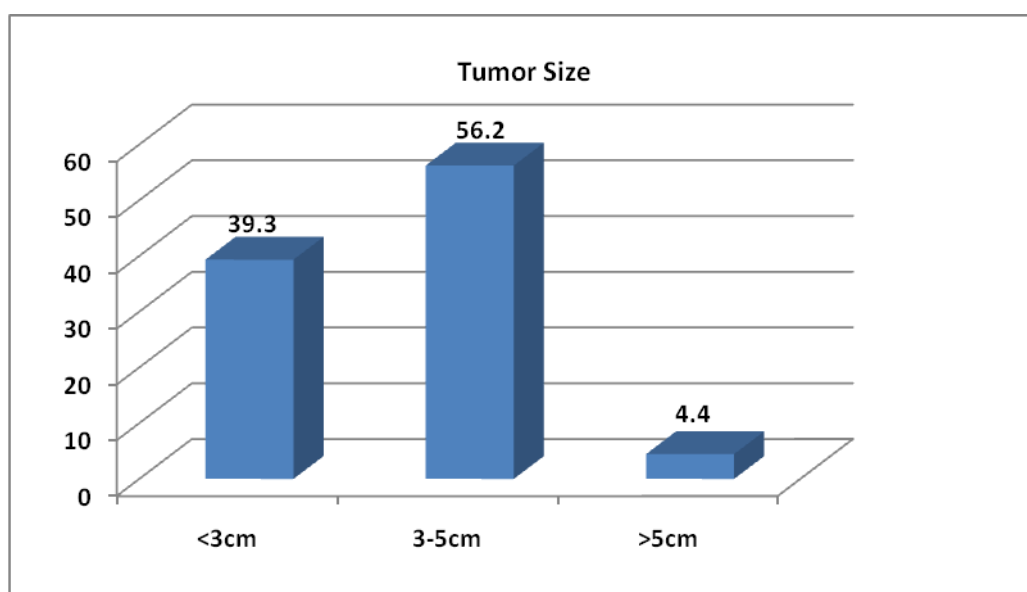
* Percentages calculated at the net of unknowns cases (N=91;3.4%)



Tumor size

Tumor size	Occurrences	Percent
<3cm	964	39.3
3-5cm	1378	56.2
>5cm	109	4.4
Total	2451	100.0

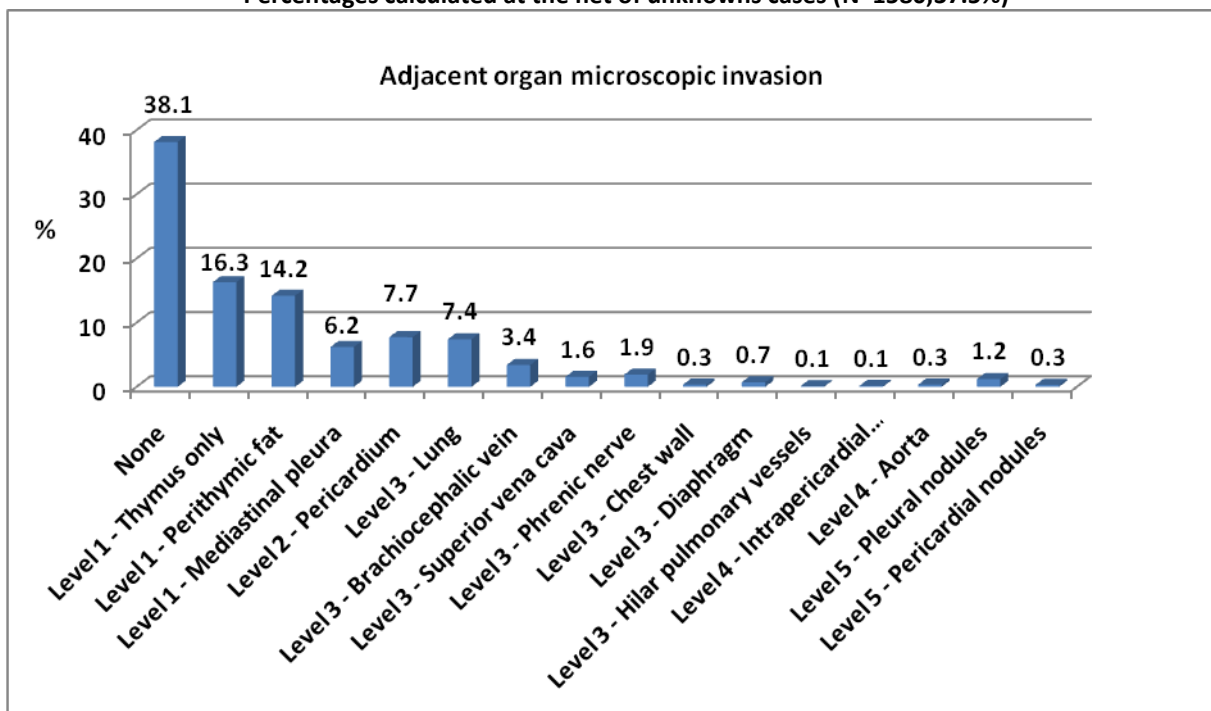
* Percentages calculated at the net of unknowns cases (N=1761; 41.8%)



Invasion to surrounding organs

Adjacent organ microscopic invasion	Occurrences	Percent
None	1347	38.1
Level 1 - Thymus only	576	16.3
Level 1 - Perithymic fat	501	14.2
Level 1 - Mediastinal pleura	219	6.2
Level 2 - Pericardium	273	7.7
Level 3 - Lung	262	7.4
Level 3 - Brachiocephalic vein	120	3.4
Level 3 - Superior vena cava	55	1.6
Level 3 - Phrenic nerve	67	1.9
Level 3 - Chest wall	12	0.3
Level 3 - Diaphragm	25	0.7
Level 3 - Hilar pulmonary vessels	4	0.1
Level 4 - Intrapericardial pulmonary artery	5	0.1
Level 4 - Aorta	12	0.3
Level 5 - Pleural nodules	42	1.2
Level 5 - Pericardial nodules	11	0.3
Total number of patients	3531	100

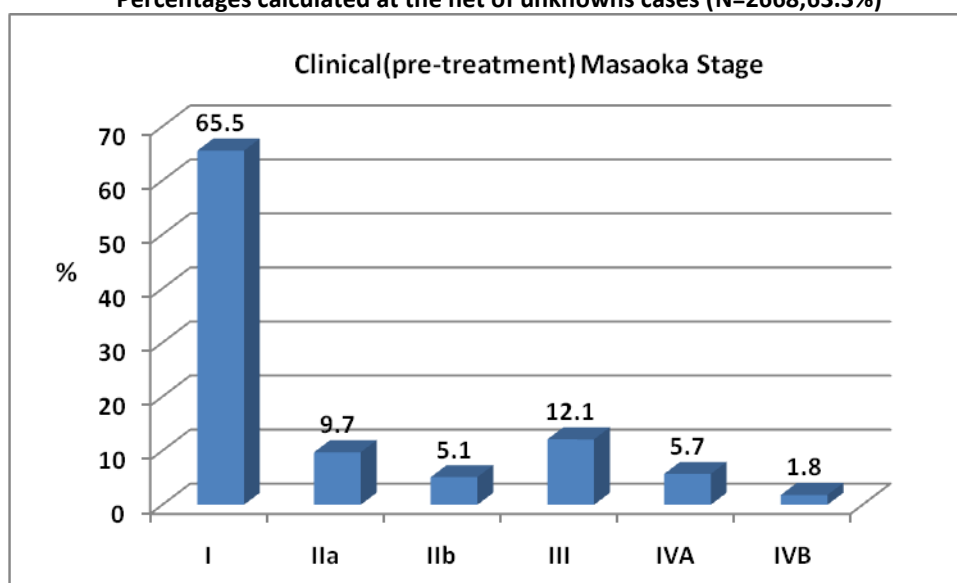
* Percentages calculated at the net of unknowns cases (N=1580;37.5%)



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

Clinical (pre-treatment) Masaoka Stage	Occurrences	Percent
I	1012	65.5
IIa	150	9.7
IIb	79	5.1
III	187	12.1
IVA	88	5.7
IVB	28	1.8
Total	1544	100.0

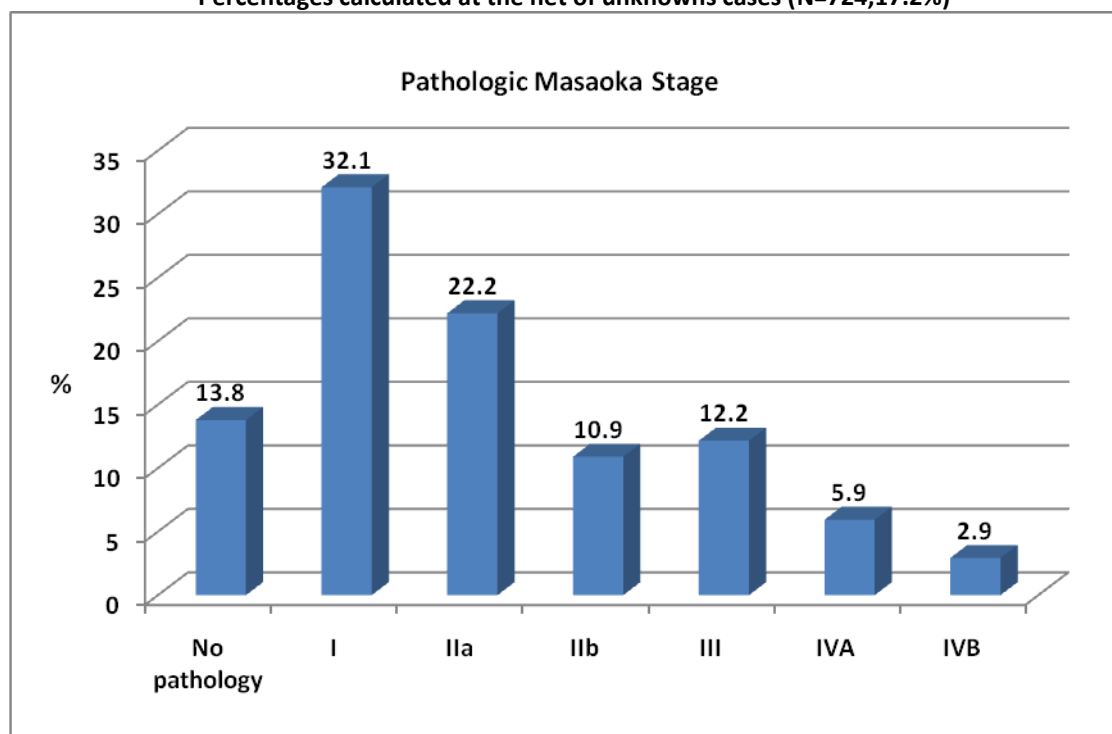
* Percentages calculated at the net of unknowns cases (N=2668;63.3%)



Pathologic Masaoka-Koga stage

Pathologic Masaoka Stage	Occurrences	Percent
No pathology	481	13.8
I	1120	32.1
Ila	774	22.2
Ilb	380	10.9
III	424	12.2
IVA	207	5.9
IVB	102	2.9
Total	3488	100.0

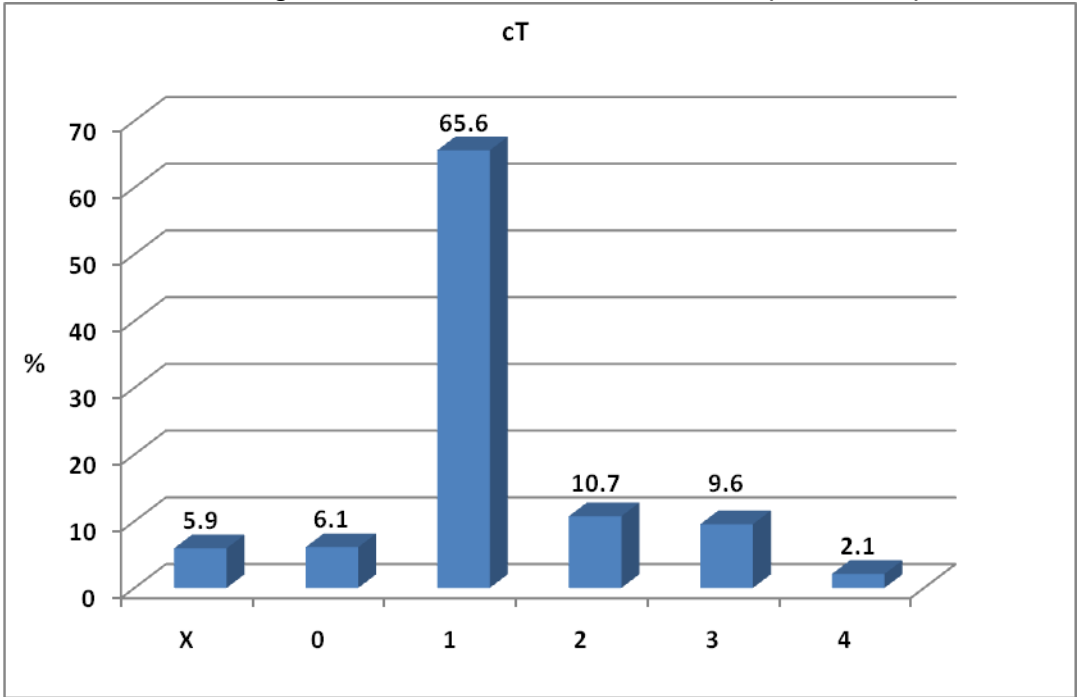
* Percentages calculated at the net of unknowns cases (N=724;17.2%)



Clinical TNM Staging

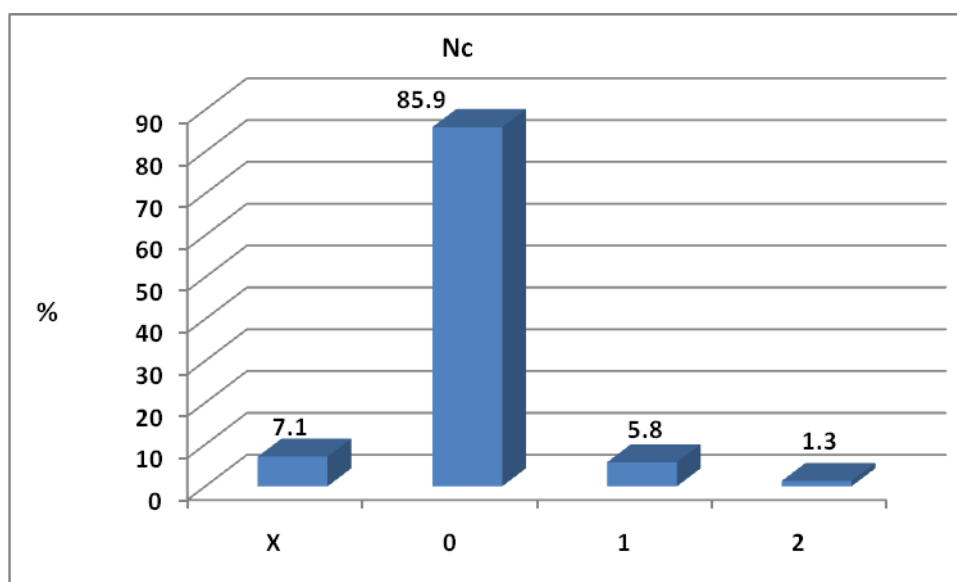
T Clinical	Occurrences	Percent
X	105	5.9
0	108	6.1
1	1160	65.6
2	190	10.7
3	169	9.6
4	37	2.1
Total	1769	100.0

* Percentages calculated at the net of unknowns cases (N=2443;58%)



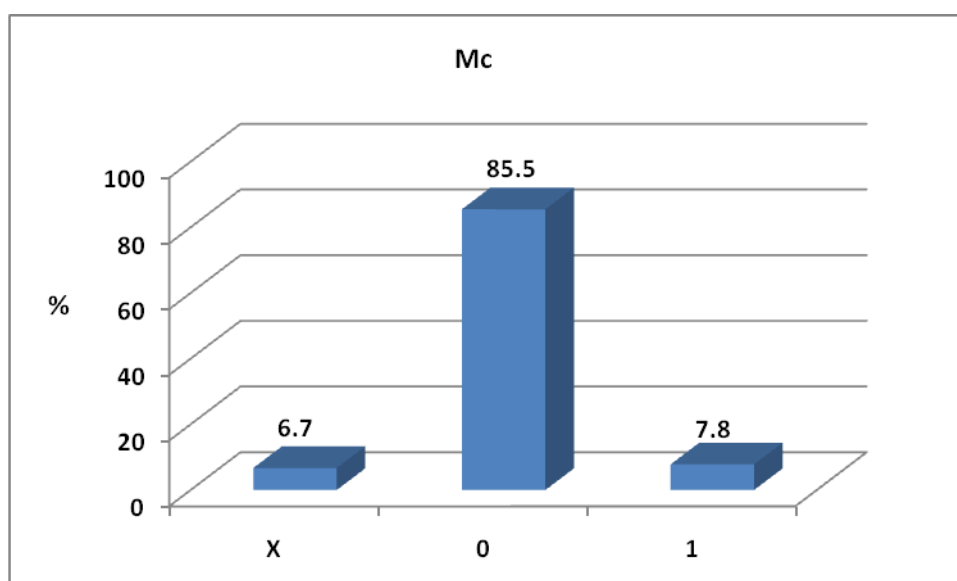
N Clinical	Occurrences	Percent
X	127	7.1
0	1537	85.9
1	103	5.8
2	23	1.3
Total	1790	100.0

* Percentages calculated at the net of unknowns cases (N=2422;57.5%)



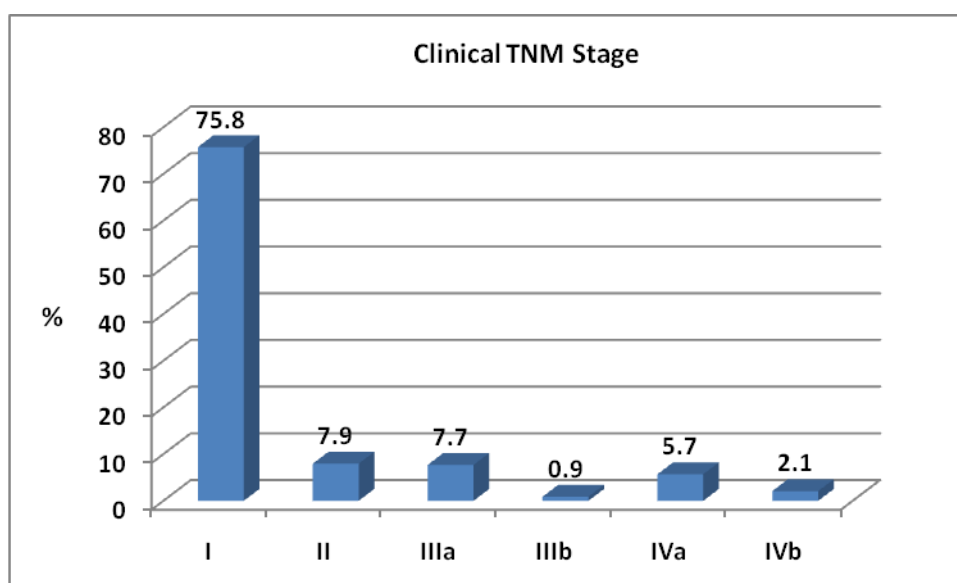
M Clinical	Occurrences	Percent
X	119	6.7
0	1521	85.5
1	139	7.8
Total	1779	100.0

* Percentages calculated at the net of unknowns cases (N=2433;57.7%)



Clinical TNM Stage	Occurrences	Percent
I	941	75.4
II	94	7.5
IIIa	105	8.4
IIIb	12	1.0
IVa	69	5.5
IVb	27	2.2
Total	1248	100.0

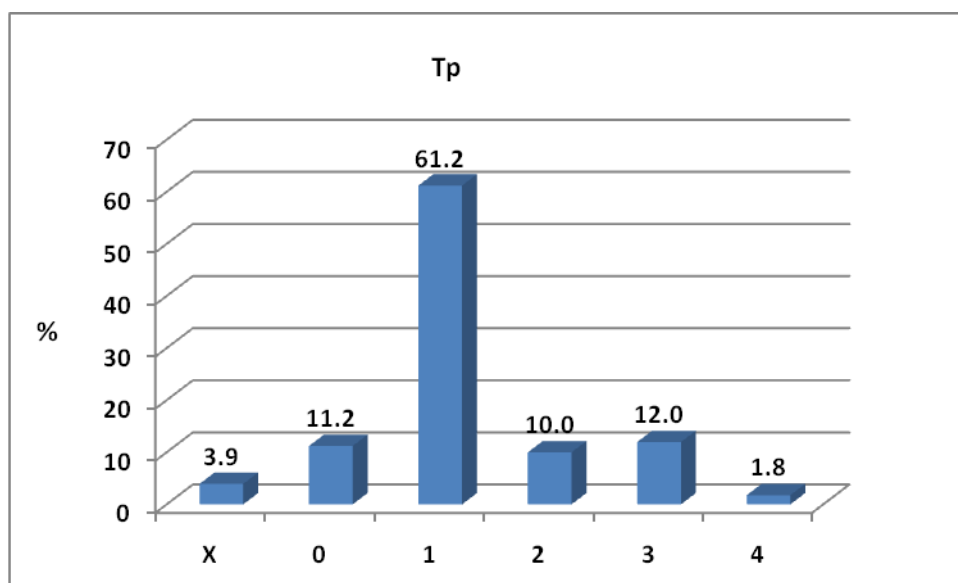
* Percentages calculated at the net of unknowns cases (N=2433;64.4%)



Pathologic TNM Staging

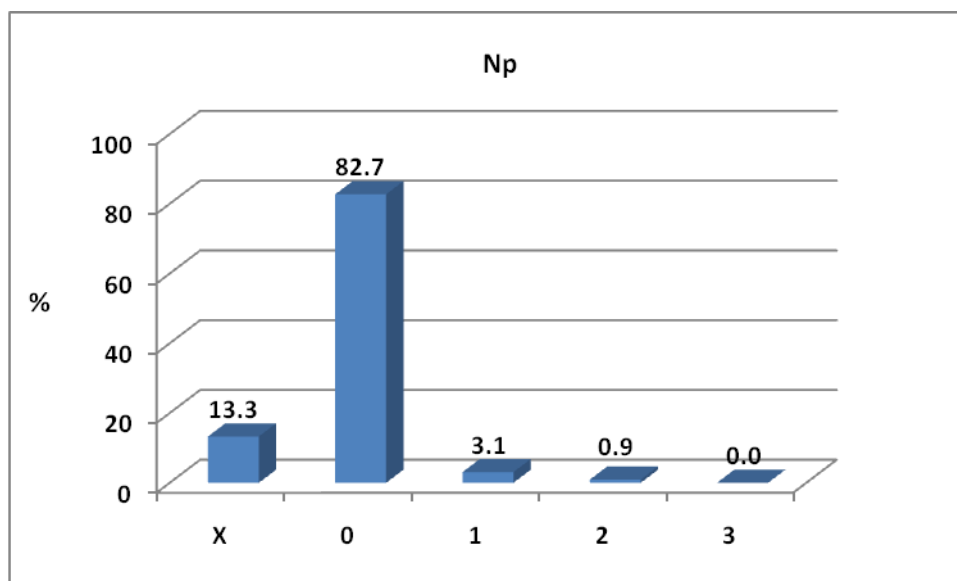
T pathology	Occurrences	Percent
X	103	3.9
0	294	11.2
1	1607	61.2
2	262	10.0
3	314	12.0
4	46	1.8
Total	2626	100.0

* Percentages calculated at the net of unknowns cases (N=1586;37.6%)



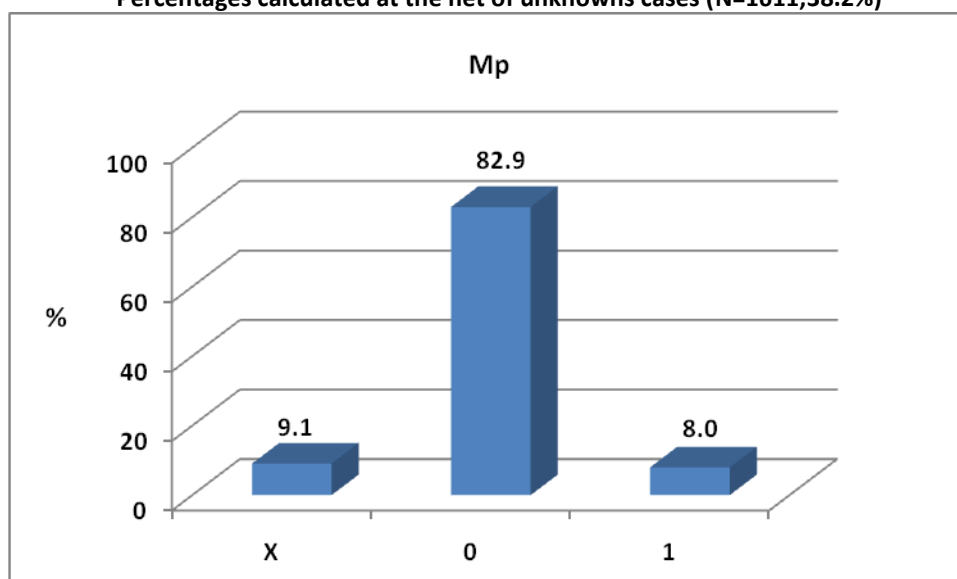
N pathology	Occurrences	Percent
X	321	13.3
0	2001	82.7
1	74	3.1
2	22	0.9
3	1	0.0
Total	2419	100.0

* Percentages calculated at the net of unknowns cases (N=1793;42.5%)



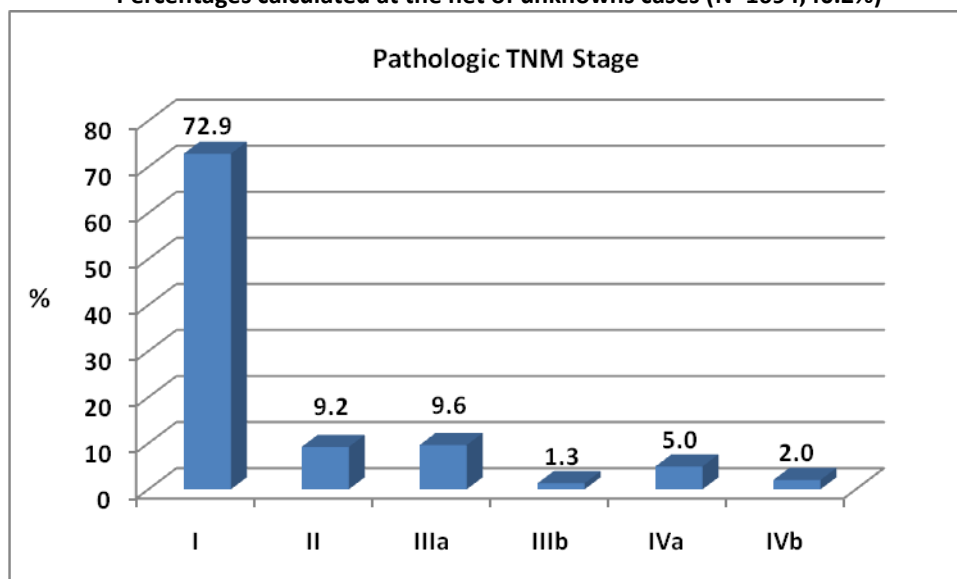
M pathology	Occurrences	Percent
X	236	9.1
0	2157	82.9
1	208	8.0
Total	2601	100.0

* Percentages calculated at the net of unknowns cases (N=1611;38.2%)



Pathologic TNM Stage	Occurrences	Percent
I	1835	72.9
II	232	9.2
IIIa	242	9.6
IIIb	33	1.3
IVa	125	5.0
IVb	51	2.0
Total	2518	100.0

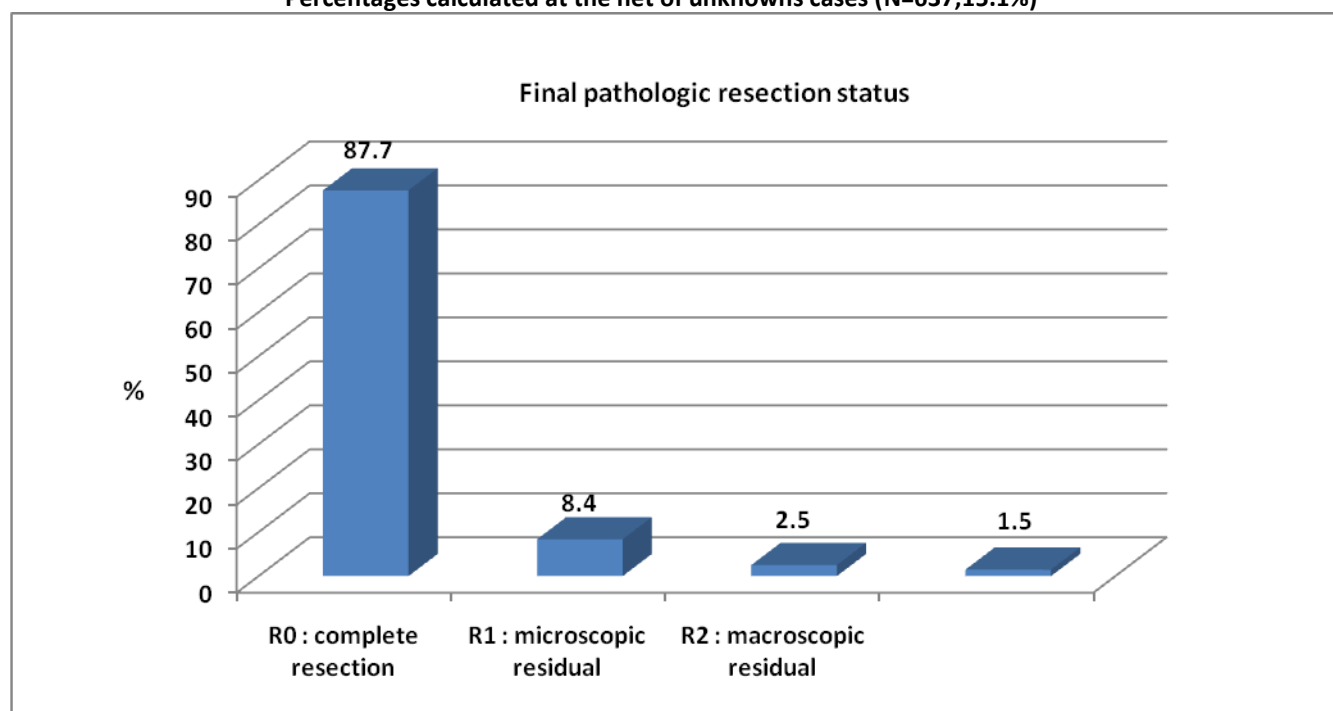
* Percentages calculated at the net of unknowns cases (N=1694;40.2%)



Final pathologic resection status

Final pathologic resection status	Occurrences	Percent
R0 : complete resection	3135	87.7
R1 : microscopic residual	299	8.4
R2 : macroscopic residual	89	2.5
RX : completeness of the resection unknown	52	1.5
Total	3575	100.0

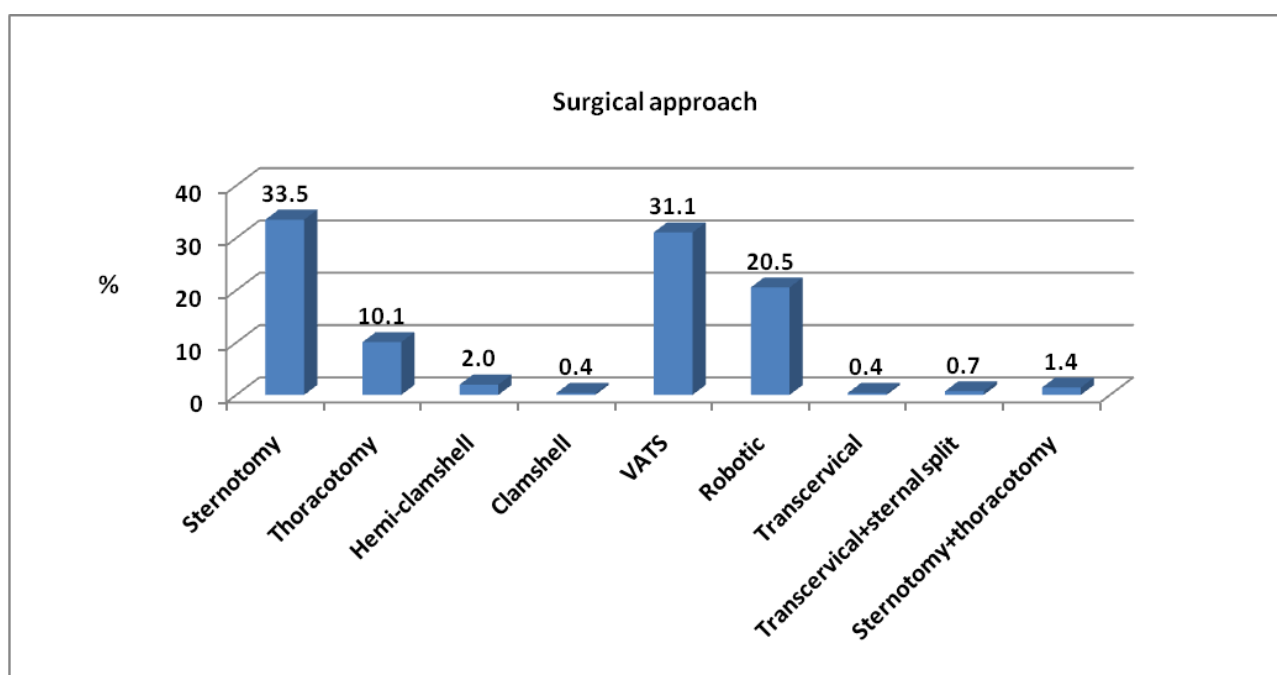
* Percentages calculated at the net of unknowns cases (N=637;15.1%)



Surgical approach

Surgical approach	Occurrences	Percent
Sternotomy	1163	33.5
Thoracotomy	350	10.1
Hemi-clamshell	68	2.0
Clamshell	13	0.4
VATS	1078	31.1
Robotic	713	20.5
Transcervical	13	0.4
Transcervical+sternal split	24	0.7
Sternotomy+thoracotomy	49	1.4
Total	3471	100.0

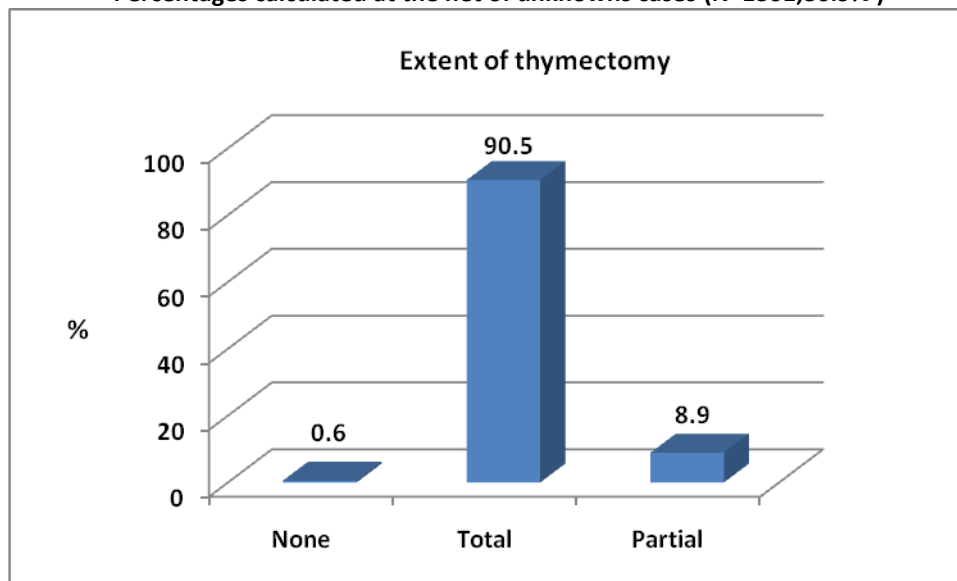
* Percentages calculated at the net of unknowns cases (N=741 17.6%)



Extent of associated thymectomy

Extent of thymectomy	Occurrences	Percent
None	17	0.6
Total	2635	90.5
Partial	259	8.9
Total	2911	100.0

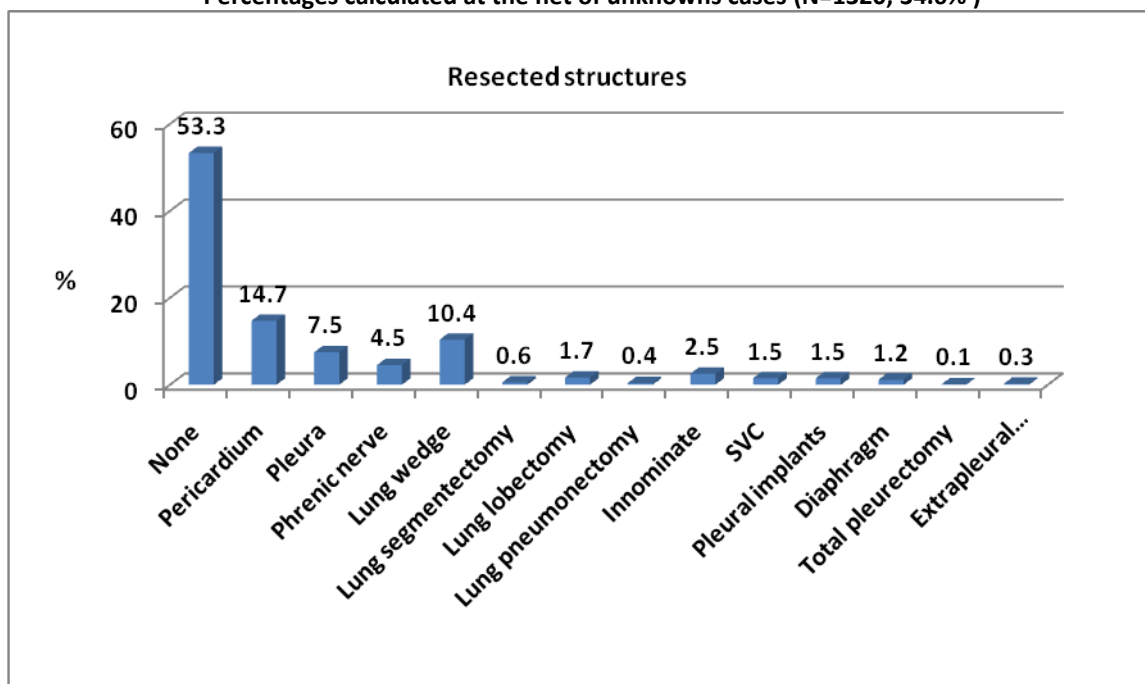
* Percentages calculated at the net of unknowns cases (N=1301;30.9%)



Resected structures associated with thymic tumor resection

Resected structures	Occurrences	Percent
None	1702	53.3
Pericardium	470	14.7
Pleura	239	7.5
Phrenic nerve	144	4.5
Lung wedge	331	10.4
Lung segmentectomy	18	0.6
Lung lobectomy	53	1.7
Lung pneumonectomy	12	0.4
Innominate	81	2.5
SVC	48	1.5
Pleural implants	48	1.5
Diaphragm	37	1.2
Total pleurectomy	2	0.1
Extrapleural pneumonectomy	8	0.3
Total number of patients	3193	100

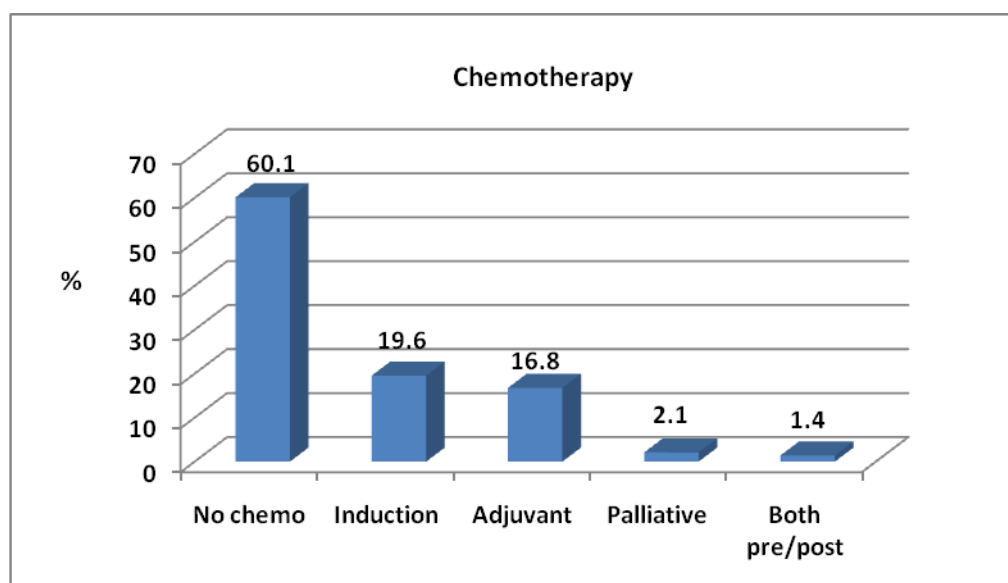
* Percentages calculated at the net of unknowns cases (N=1320; 34.6%)



Chemotherapy

Chemotherapy	Occurrences	Percent
No chemo	430	60.1
Induction	140	19.6
Adjuvant	120	16.8
Palliative	15	2.1
Both pre/post	10	1.4
Total	715	100.0

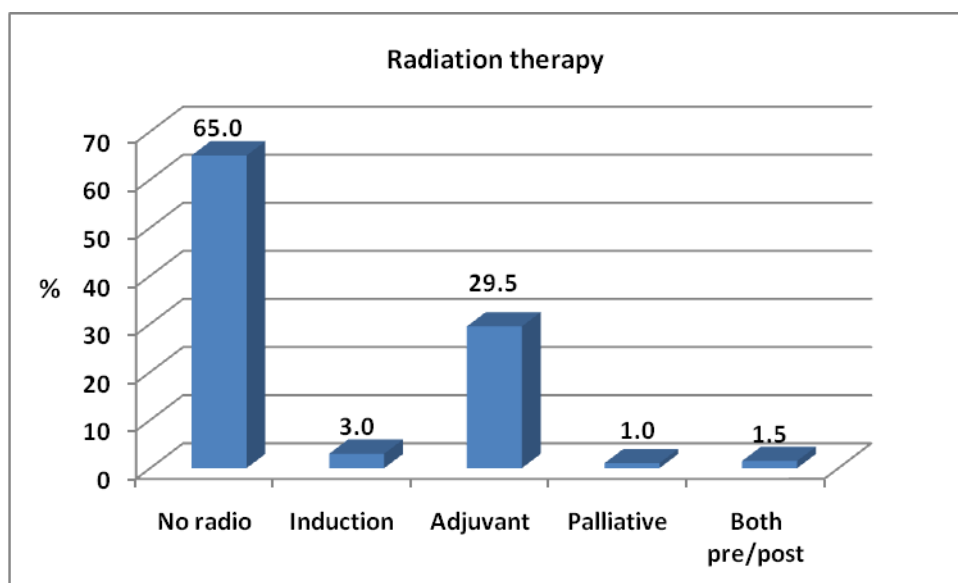
* Percentages calculated at the net of unknowns cases (N=3497;83.0%)



Radiotherapy

Radiation therapy	Occurrences	Percent
No radiotherapy	695	65.0
Induction	32	3.0
Adjuvant	315	29.5
Palliative	11	1.0
Both pre(post	16	1.5
Total	1069	100.0

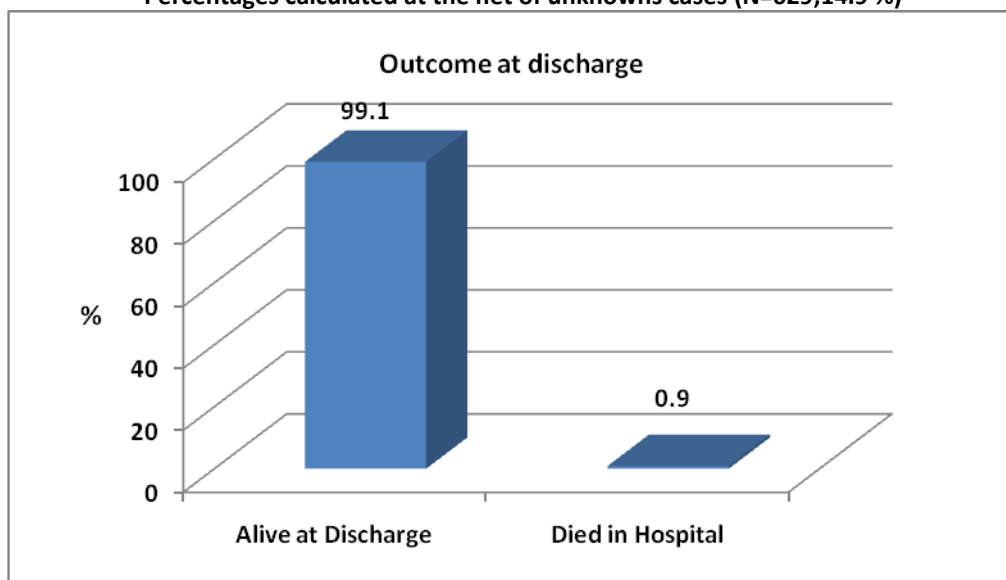
* Percentages calculated at the net of unknowns cases (N=3143;74.6%)



Outcome at hospital discharge

Outcome at Discharge	Occurrences	Percent
Alive at Discharge	3550	99.1
Died in Hospital	33	0.9
Total	3583	100.0

* Percentages calculated at the net of unknowns cases (N=629;14.9 %)



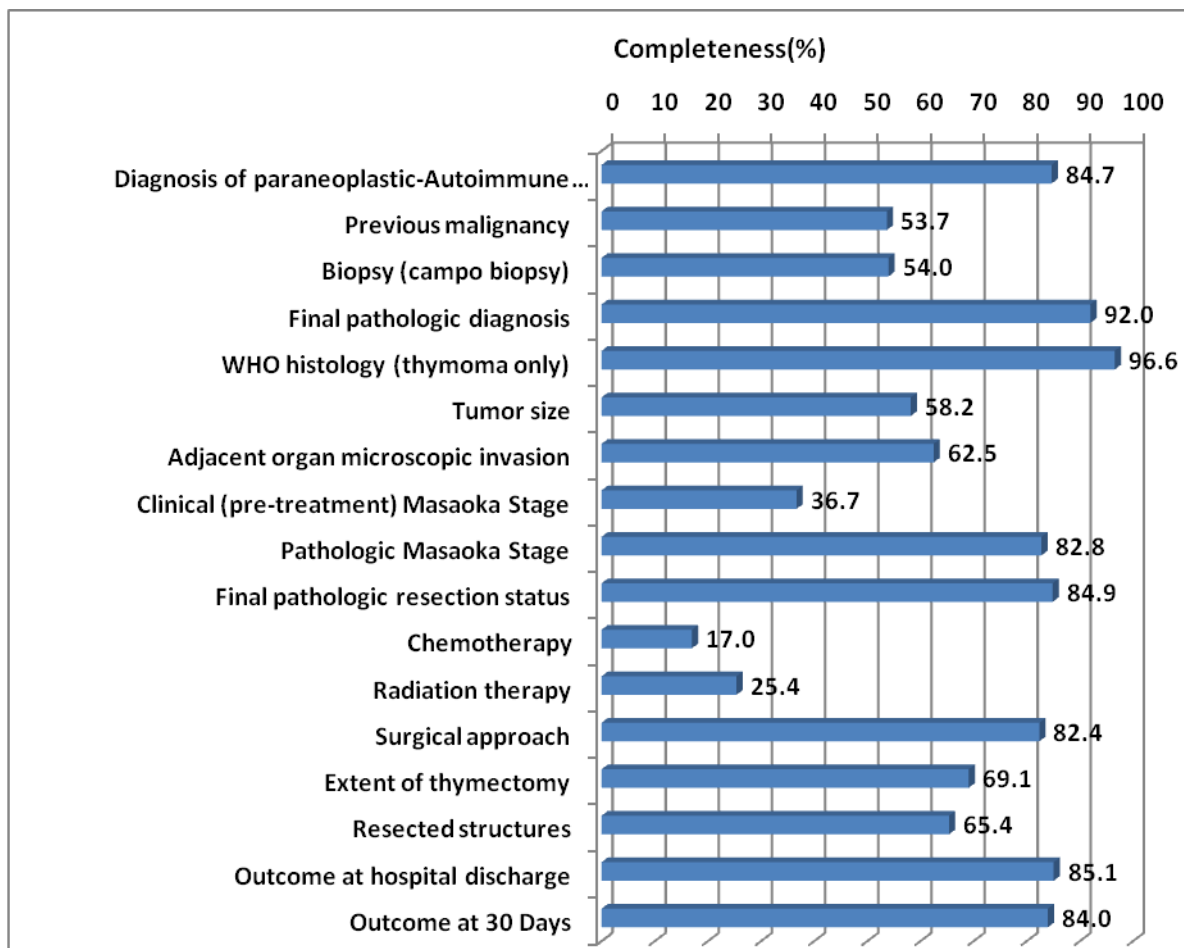
Outcome at 30 days

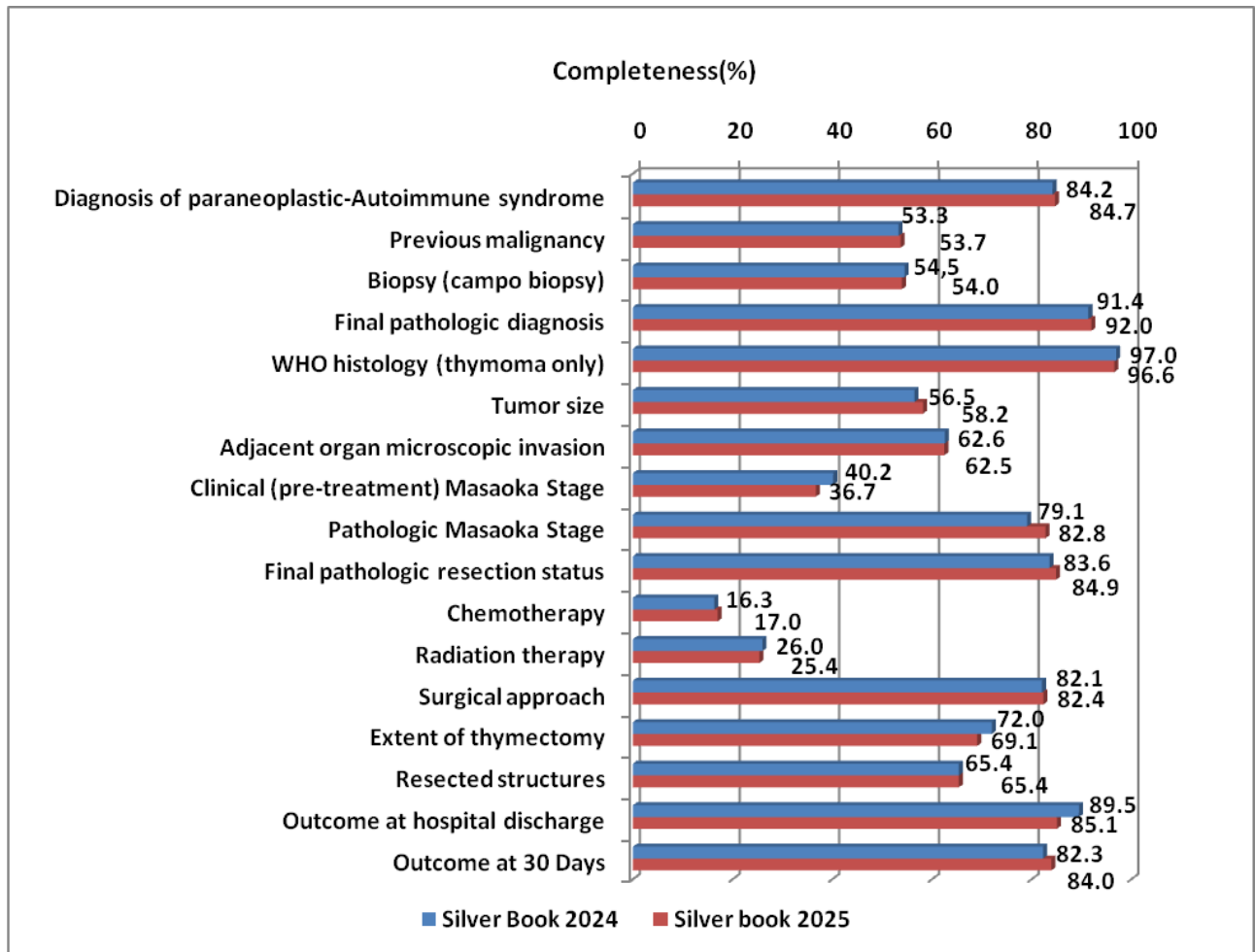
Outcome at 30 Days	Occurrences	Percent
Alive at Discharge	3500	99.0
Died in Hospital	37	1.0
Total	3537	100.0

* Percentages calculated at the net of unknowns cases (N=675;16%)

Data Completeness

Name of Field	Unknown (%)	Completeness(%)
Diagnosis of paraneoplastic-Autoimmune syndrome	15.3	84.7
Previous malignancy	46.3	53.7
Biopsy (campo biopsy)	46.0	54.0
Final pathologic diagnosis	8.0	92.0
WHO histology (thymoma only)	3.4	96.6
Tumor size	41.8	58.2
Adjacent organ microscopic invasion	37.5	62.5
Clinical (pre-treatment) Masaoka Stage	63.3	36.7
Pathologic Masaoka Stage	17.2	82.8
Final pathologic resection status	15.1	84.9
Chemotherapy	83.0	17.0
Radiation therapy	74.6	25.4
Surgical approach	17.6	82.4
Extent of thymectomy	30.9	69.1
Resected structures	34.6	65.4
Outcome at hospital discharge	14.9	85.1
Outcome at 30 Days	16.0	84.0





PART 4

MESOTHELIOMA SECTION

(Database users only)

Message from Clinical Leader of ESTS Registry Mesothelioma section

By ESTS Mesothelioma Clinical Leader Dr Andrea Billè
GUY'S and ST THOMAS' NHS FOUNDATION TRUST,
London, UK

Dear ESTS members.

We would like to thank all the contributors for the unevaluable support in creating the ESTS mesothelioma database.

This years` Silver book summarizes the data of already 2537 patients! With the 9th TNM edition and the recent results from MARS2 trial the mesothelioma registry will play a crucial role in describing every day clinical practice and outcome

We need to focus to improve completeness of the data and collect more data on clinical and pathological staging according to the new staging systems. A

Thank you for your engagement, and we look forward to advancing the management of patients with mesothelioma and possibly as ESTS to contribute and validate the TNM data! Please contact me or Dr. Stefano Passani for your new log in data or the possibility of 3rd party imports (=upload of your .xls, spss or other databases to the ESTS mesothelioma database)!

We encourage the mesothelioma database members to propose clinical questions and actively use this precious resource to generate clinical evidence based on real world data

We already thank you now for your continuous support! If you are not a member of the ESTS mesothelioma database but you want to actively contribute – PLEASE JOIN US NOW.

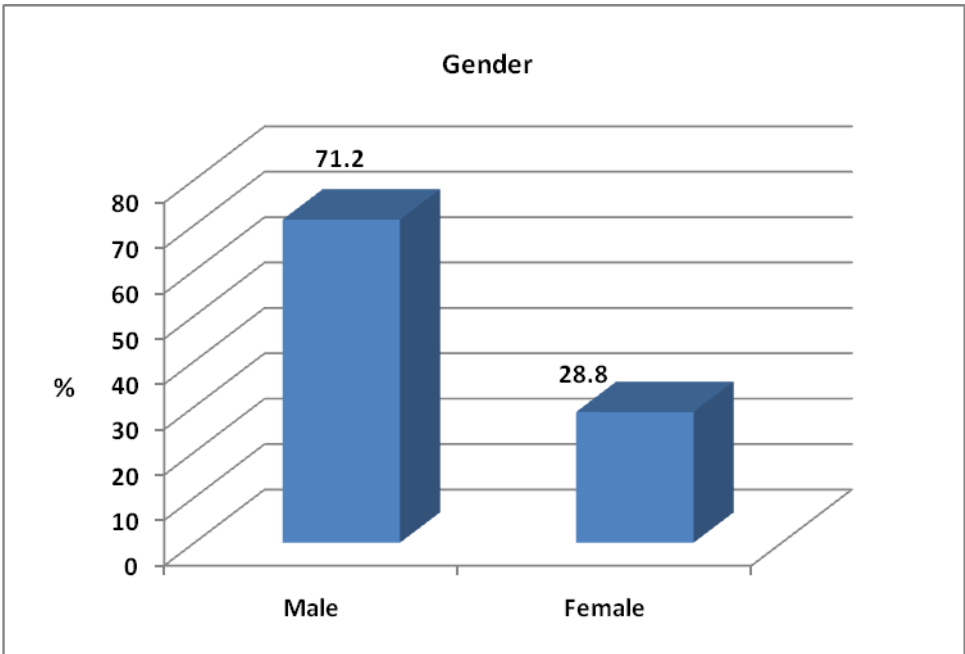
Andrea Billè

Mesothelioma Section fields

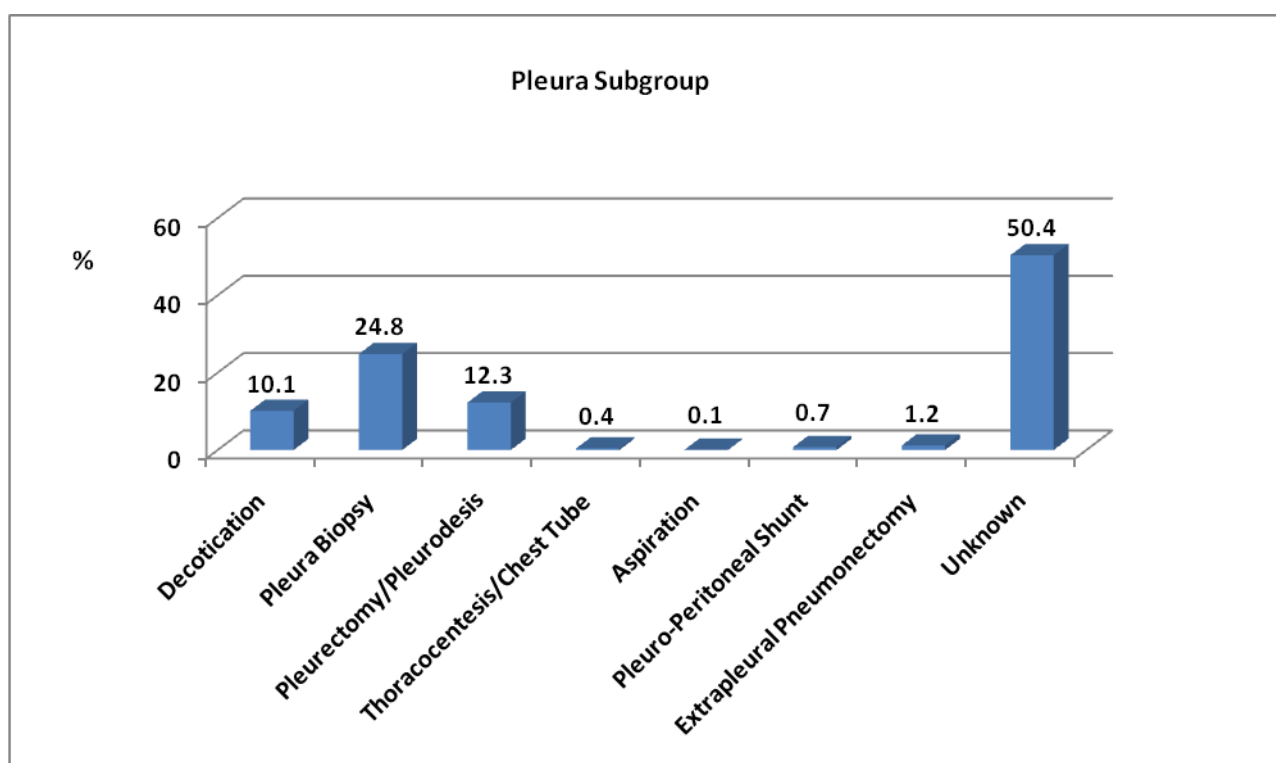
Group definition: Pleura – Diagnosis : Mesothelioma; prospective cases
January 1990- May 2025
N=2537

Demographics: gender

Gender	Occurrences	Percent
Male	1806	71.2
Female	731	28.8
Total	2537	100

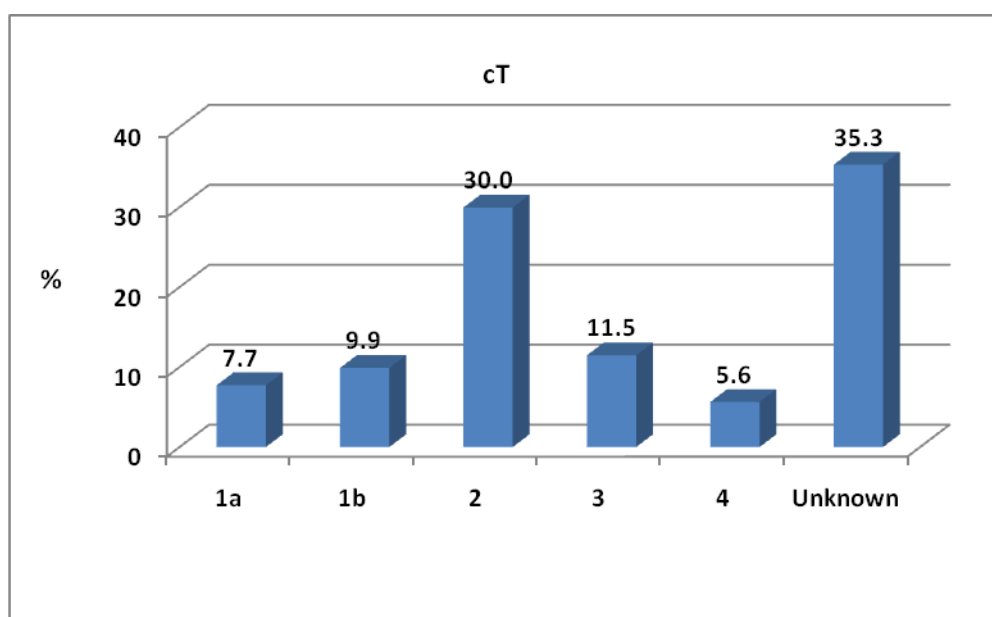


Pleura Subgroup	Occurrences	Percent
Decotication	257	10.1
Pleura Biopsy	630	24.8
Pleurectomy/Pleurodesis	311	12.3
Thoracocentesis/Chest Tube	10	0.4
Aspiration	2	0.1
Pleuro-Peritoneal Shunt	19	0.7
Extrapleural Pneumonectomy	30	1.2
Unknown	1278	50.4
Total	2537	100.0

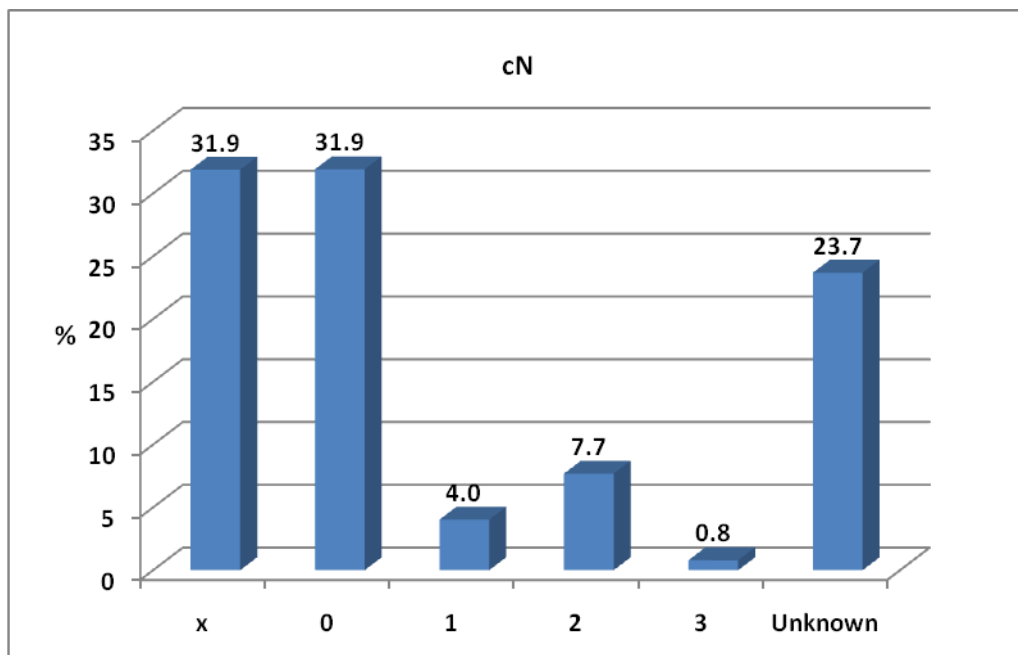


Clinical Staging : cT,cN,cM

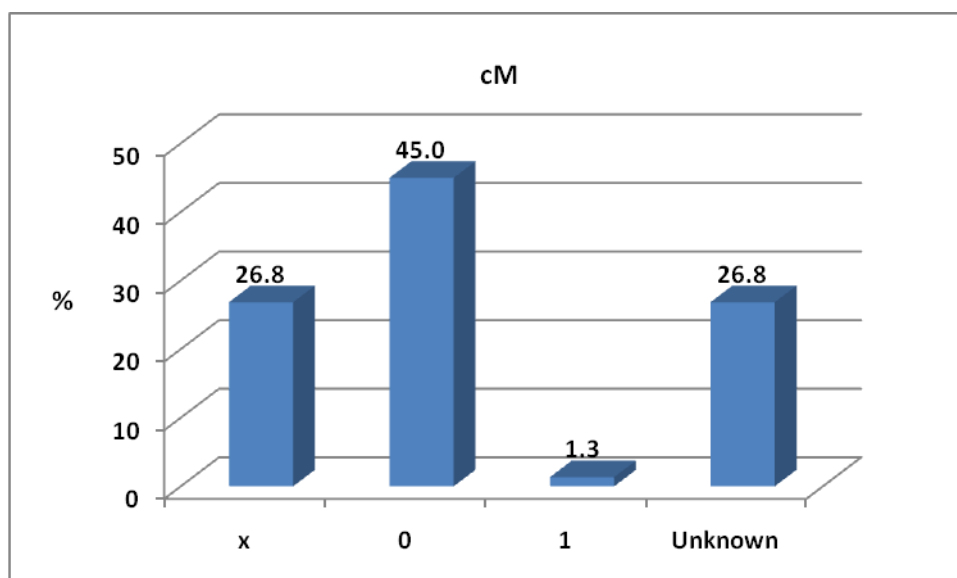
cT	Occurrences	Percent
1a	196	7.7
1b	251	9.9
2	760	30.0
3	291	11.5
4	143	5.6
Unknown	896	35.3
Total	2537	100.0



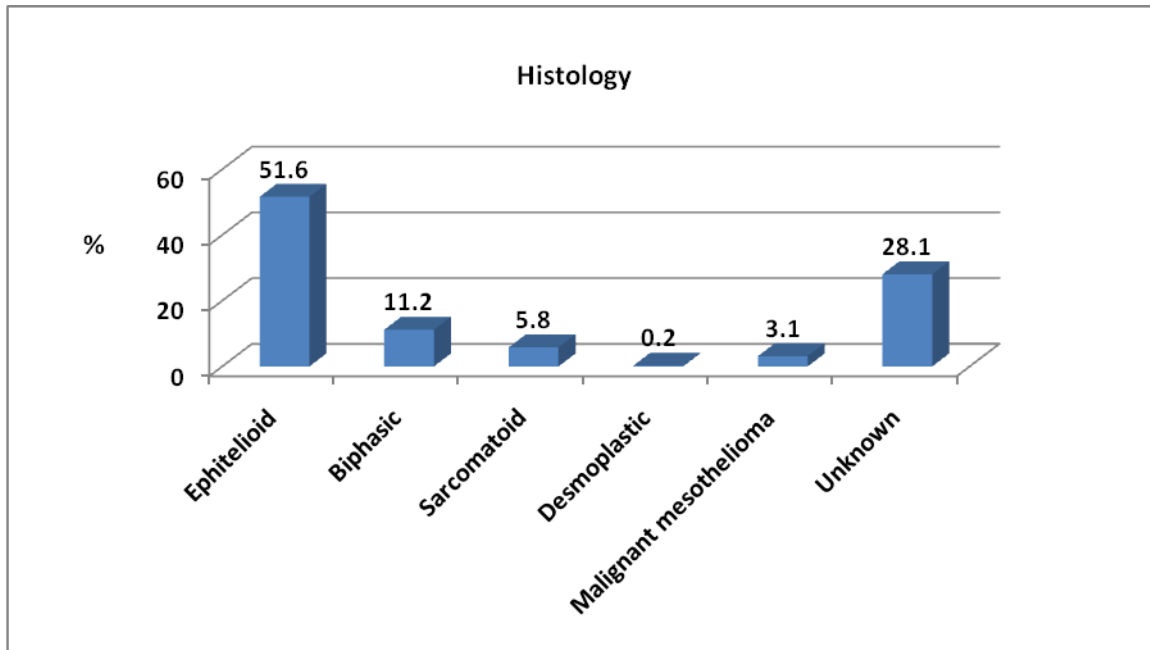
cN	Occurrences	Percent
X	809	31.9
0	810	31.9
1	102	4.0
2	195	7.7
3	20	0.8
Unknown	601	23.7
Total	2537	100.0



cM	Occurrences	Percent
X	681	26.8
0	1141	45.0
1	34	1.3
Unknown	681	26.8
Total	2537	100.0

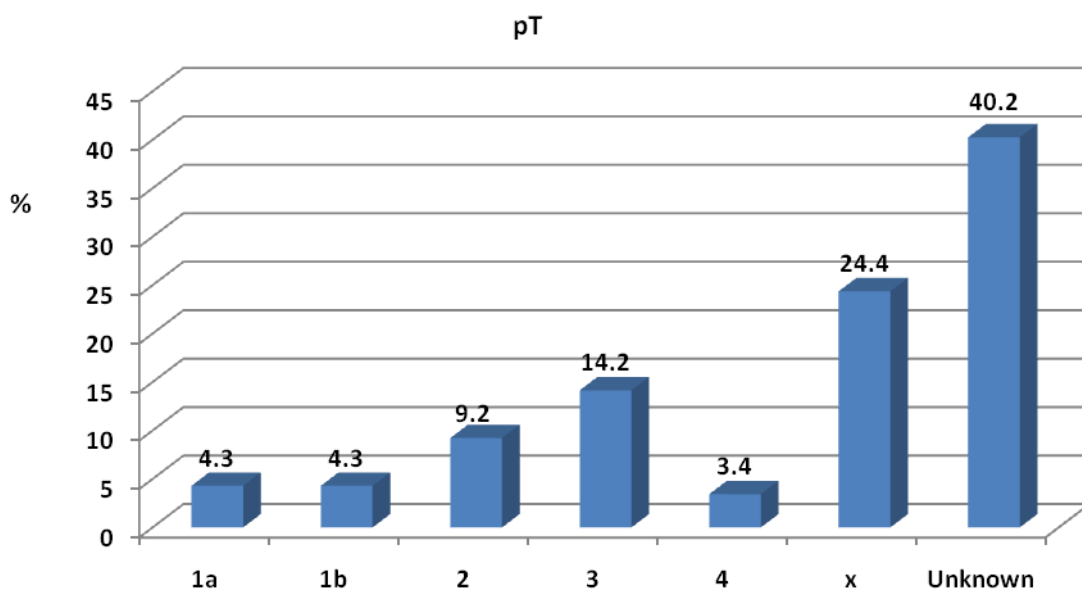


Histology	Occurrences	Percent
Ephitelioid	1310	51.6
Biphasic	283	11.2
Sarcomatoid	147	5.8
Desmoplastic	6	0.2
Malignant mesothelioma	79	3.1
Unknown	712	28.1
Total	2537	100.0

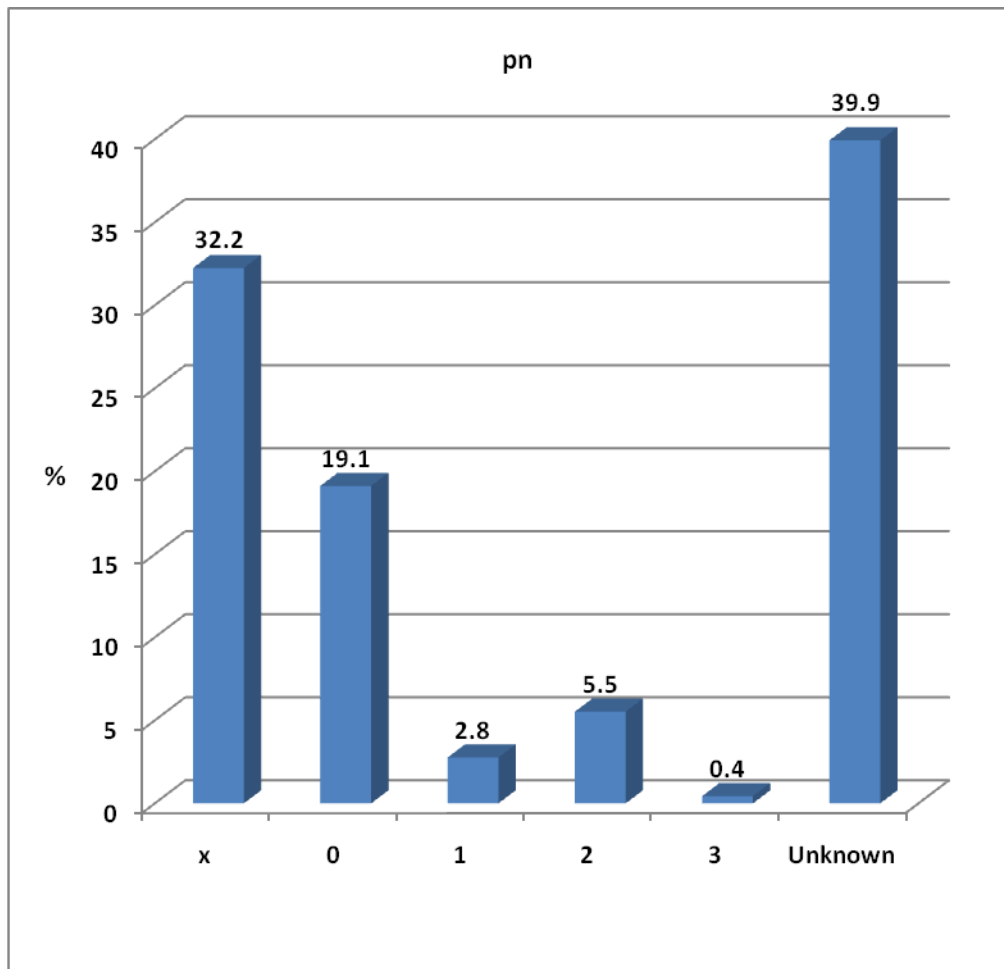


Pathological Staging : pT,pN,pM

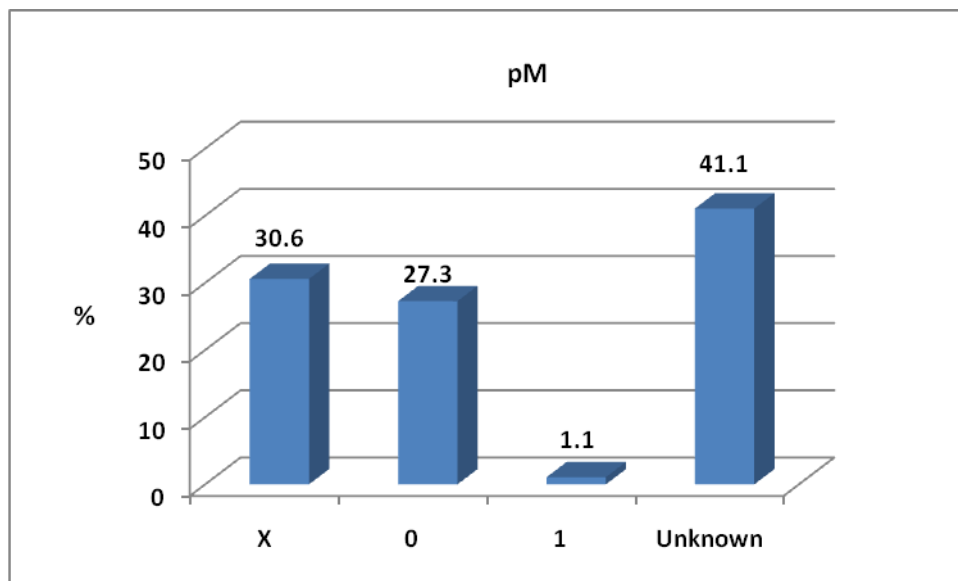
pT	Occurrences	Percent
1a	109	4.3
1b	109	4.3
2	234	9.2
3	359	14.2
4	87	3.4
X	618	24.4
Unknown	1021	40.2
Total	2537	100.0



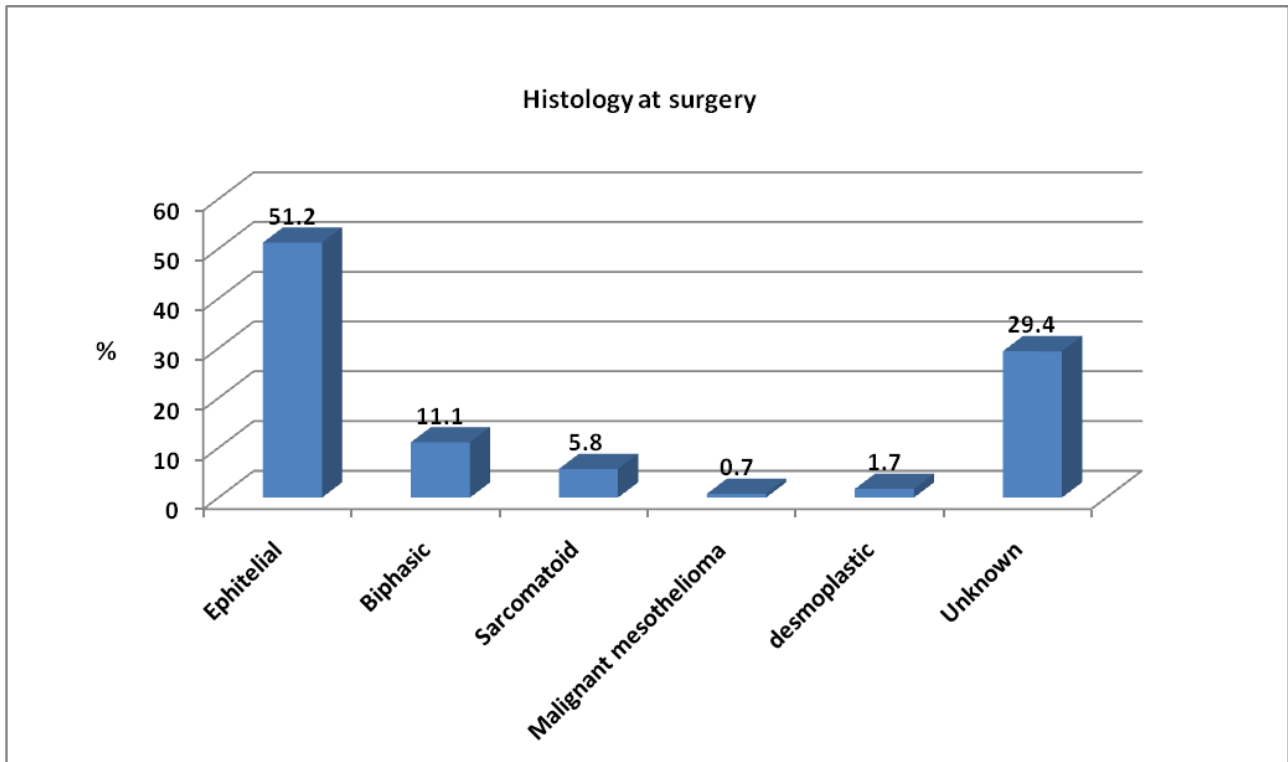
pN	Occurrences	Percent
X	818	32.2
0	485	19.1
1	70	2.8
2	140	5.5
3	11	0.4
Unknown	1013	39.9
Total	2537	100.0



pM	Occurrences	Percent
X	776	30.6
0	692	27.3
1	27	1.1
Unknown	1042	41.1
Total	2537	100.0



Histology at surgery	Occurrences	Percent
Ephitelial	1300	51.2
Biphasic	282	11.1
Sarcomatoid	146	5.8
Malignant mesothelioma	19	0.7
desmoplastic	44	1.7
Unknown	746	29.4
Total	2537	100.0

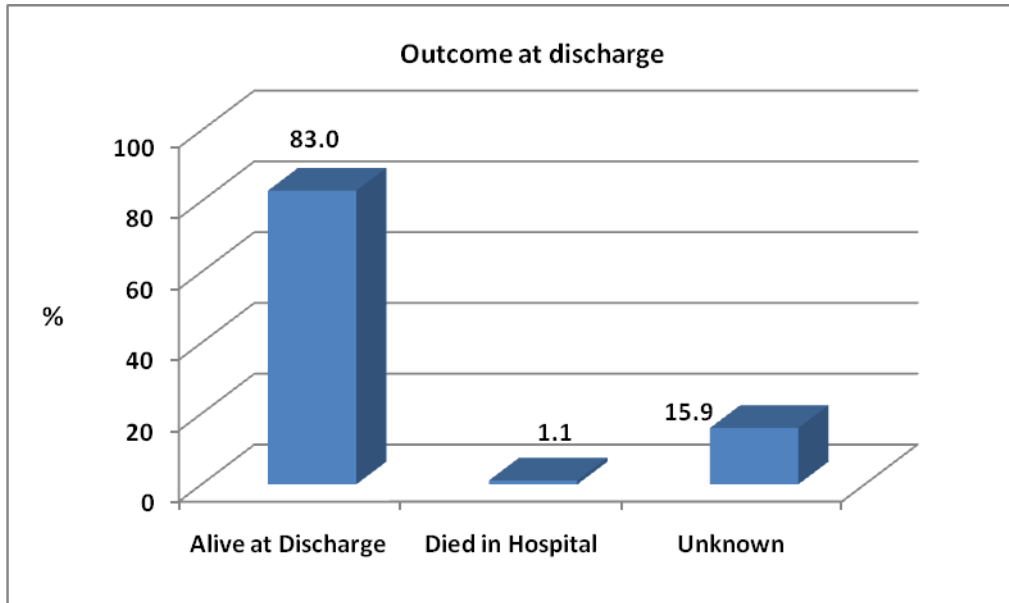


First Treatment at sequence	Occurrences	Percent
None	132	5.2
Surgery	385	15.2
Chemotherapy	403	15.9
Radiotherapy	8	0.3
Other	10	0.4
Unknown	1599	63.0
Total	2537	100.0

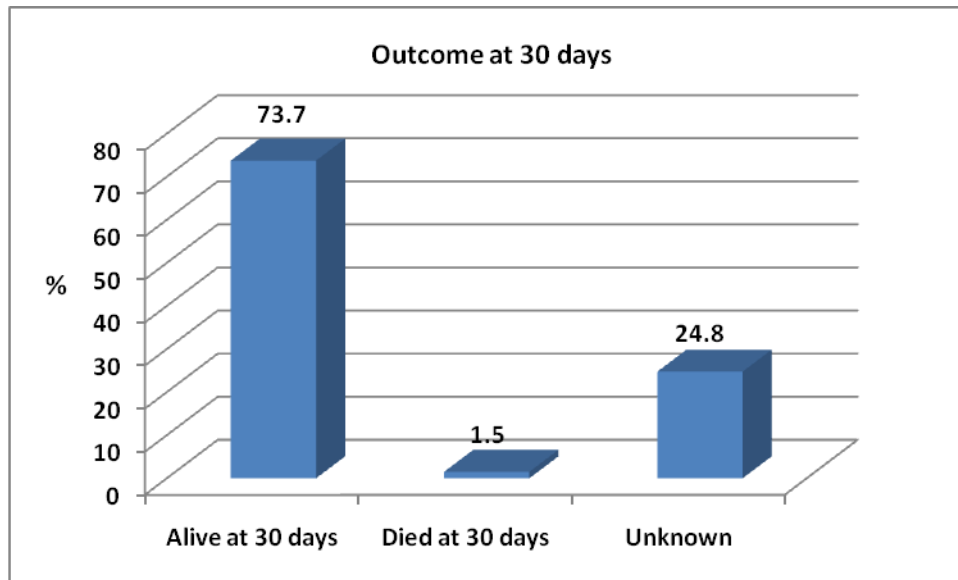
Second Treatment at sequence	Occurrences	Percent
None	202	8.0
Surgery	156	6.1
Chemotherapy	259	10.2
Radiotherapy	28	1.1
Other	12	0.5
Unknown	1880	74.1
Total	2537	100.0

Third Treatment at sequence	Occurrences	Percent
None	288	11.4
Surgery	8	0.3
Chemotherapy	28	1.1
Radiotherapy	91	3.6
Other	20	0.8
Unknown	2102	82.9
Total	2537	100.0

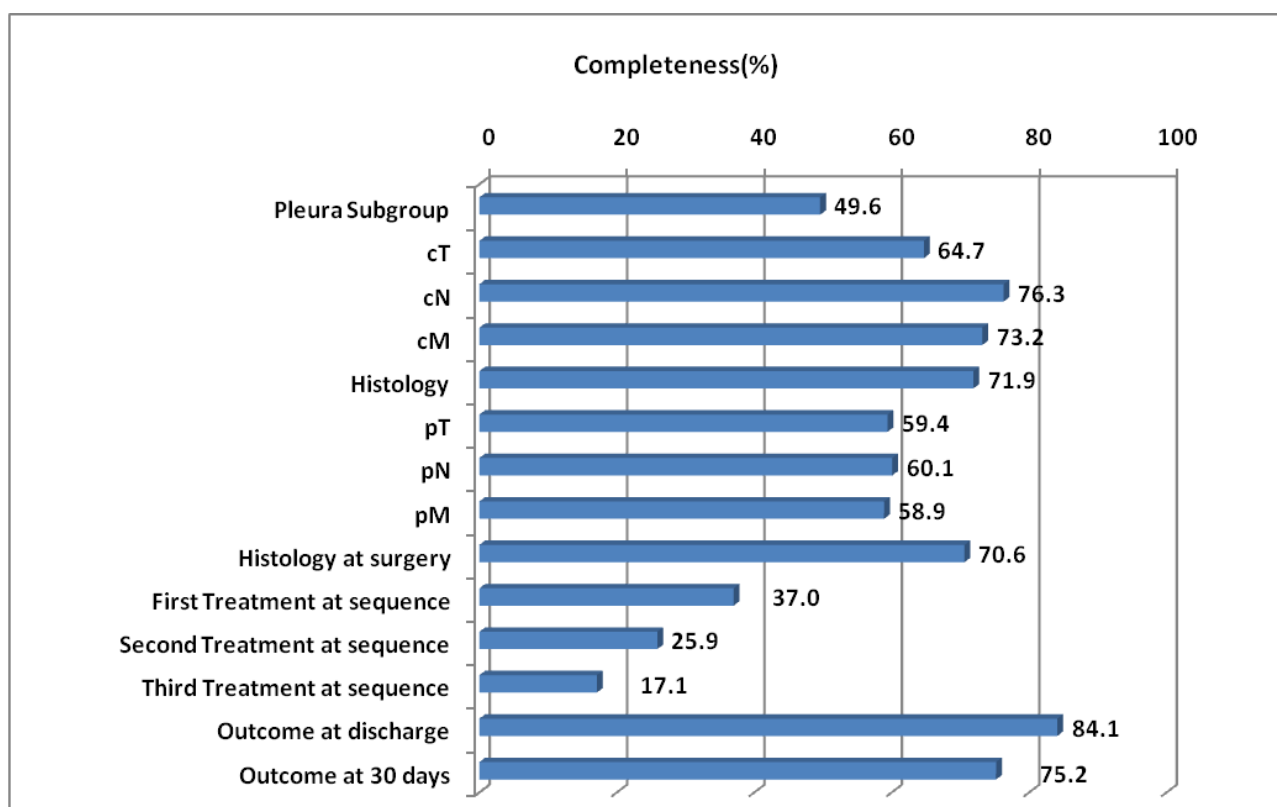
Outcome at discharge	Occurrences	Percent
Alive at Discharge	2105	83.0
Died in Hospital	28	1.1
Unknown	404	15.9
Total	2537	100.0



Outcome at 30 days	Occurrences	Percent
Alive at 30 days	1871	73.7
Died at 30 days	38	1.5
Unknown	628	24.8
Total	2537	100.0



Name of Field	Unknown (%)	Completeness(%)
Pleura Subgroup	50.4	49.6
cT	35.3	64.7
cN	23.7	76.3
cM	26.8	73.2
Histology	28.1	71.9
pT	40.6	59.4
pN	39.9	60.1
pM	41.1	58.9
Histology at surgery	29.4	70.6
First Treatment at sequence	63	37.0
Second Treatment at sequence	74.1	25.9
Third Treatment at sequence	82.9	17.1
Outcome at discharge	15.9	84.1
Outcome at 30 days	24.8	75.2



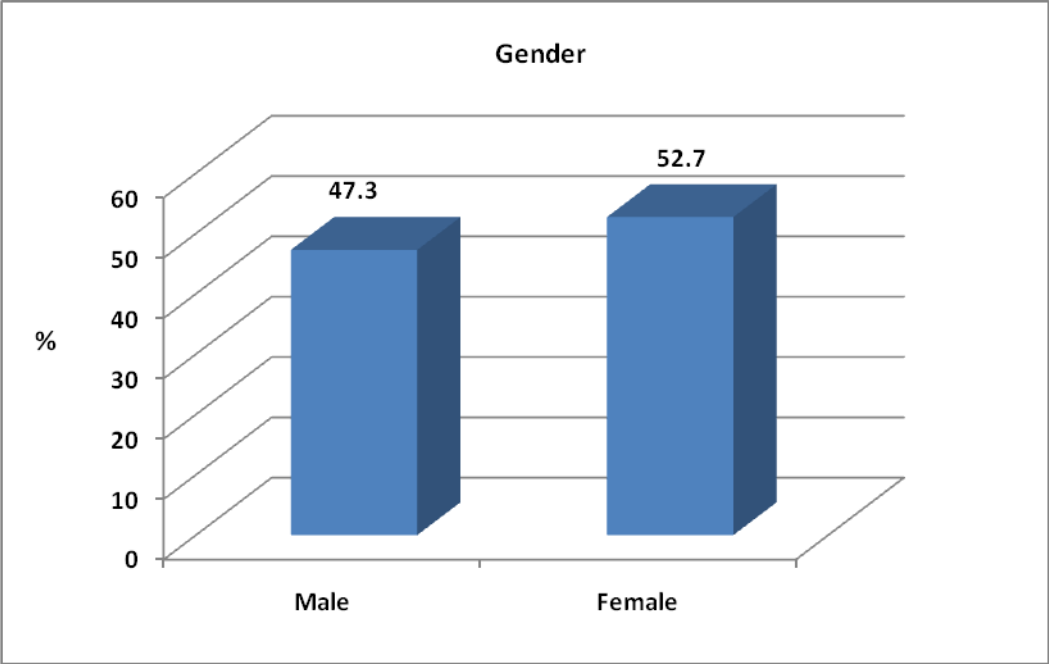
PART 5

NETTS SECTION (Database users only)

Group Definition : Lung And Diagnosis : Lung Cancer (NSCLC)
January 1980- December 2024
N=1819

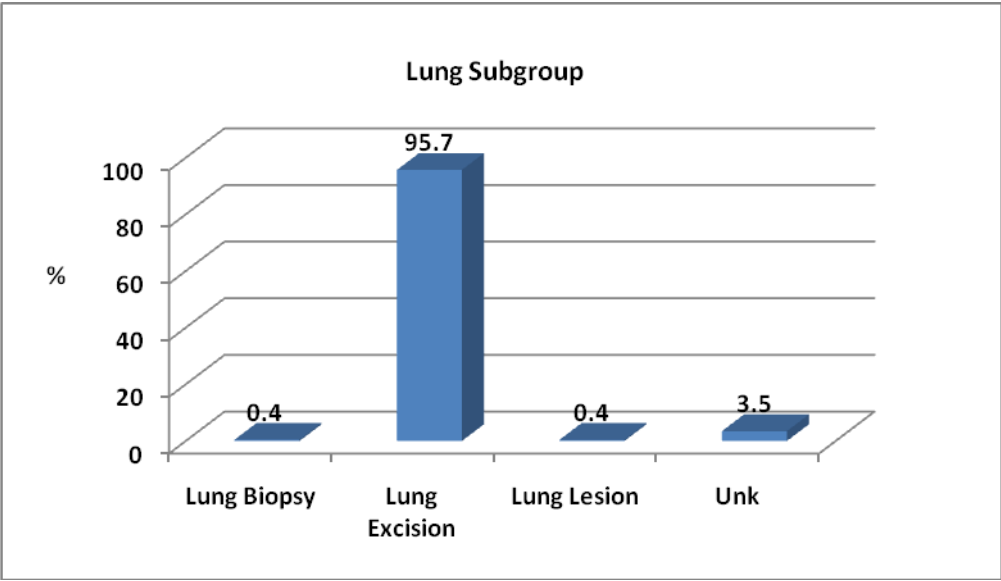
Demographics: gender

Gender	Occurrences	Percent
Male	860	47.3
Female	959	52.7
Total	1819	100



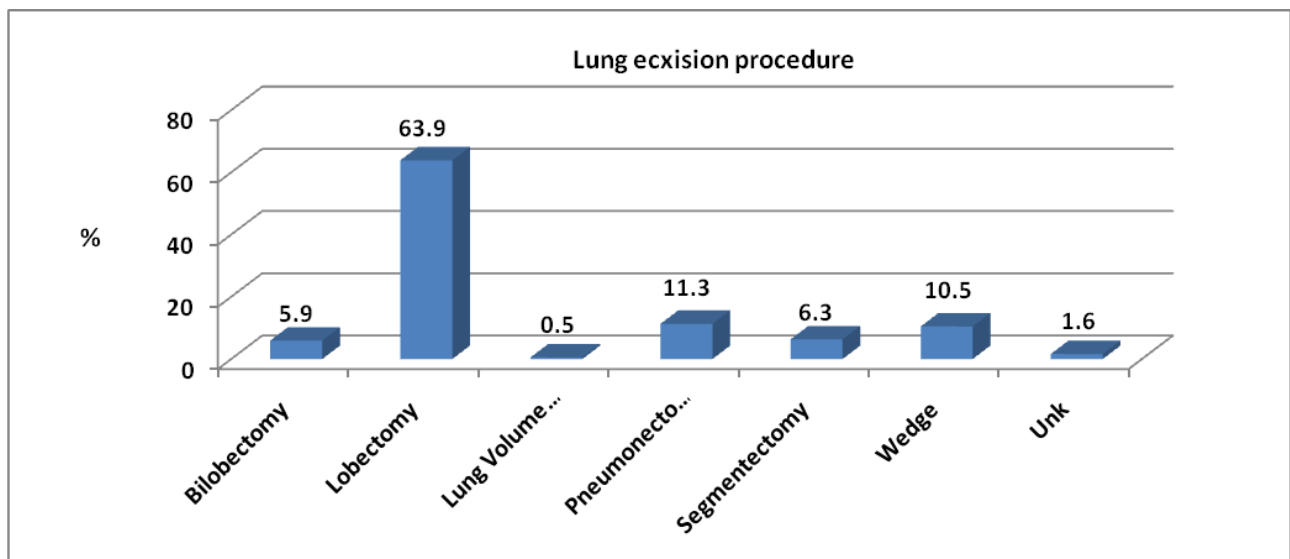
Lung Subgroup

Lungsubgroup	Occurrences	Percent
Lung Biopsy	8	0.4
Lung Excision	1741	95.7
Lung Lesion	7	0.4
Unk	63	3.5
Total	1819	100



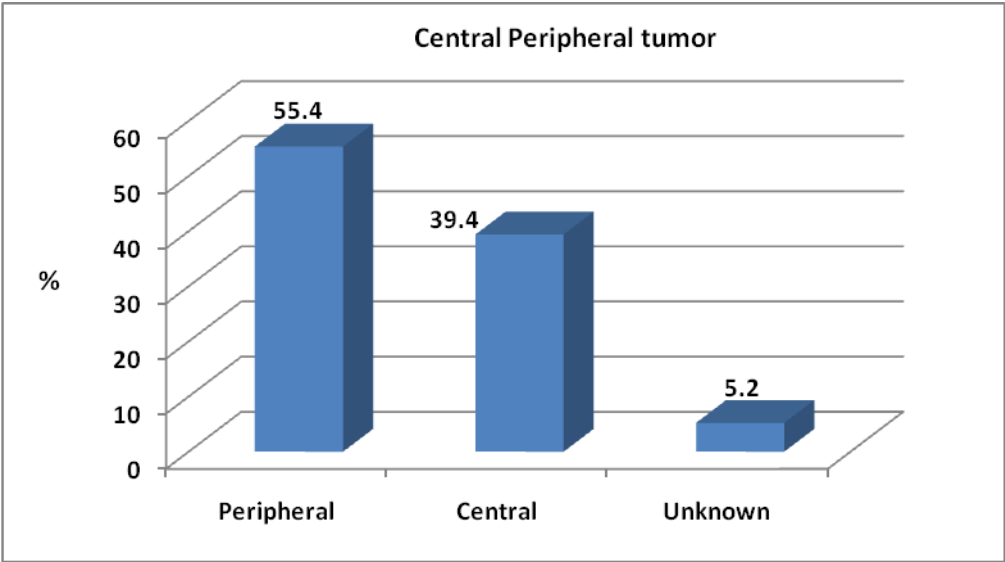
Lung Excision Procedure

Lung excision procedure	Occurrences	Percent
Bilobectomy	103	5.9
Lobectomy	1112	63.9
Lung Volume Reduction	9	0.5
Pneumonectomy	197	11.3
Segmentectomy	110	6.3
Wedge	182	10.5
Unk	28	1.6
Total	1819	100



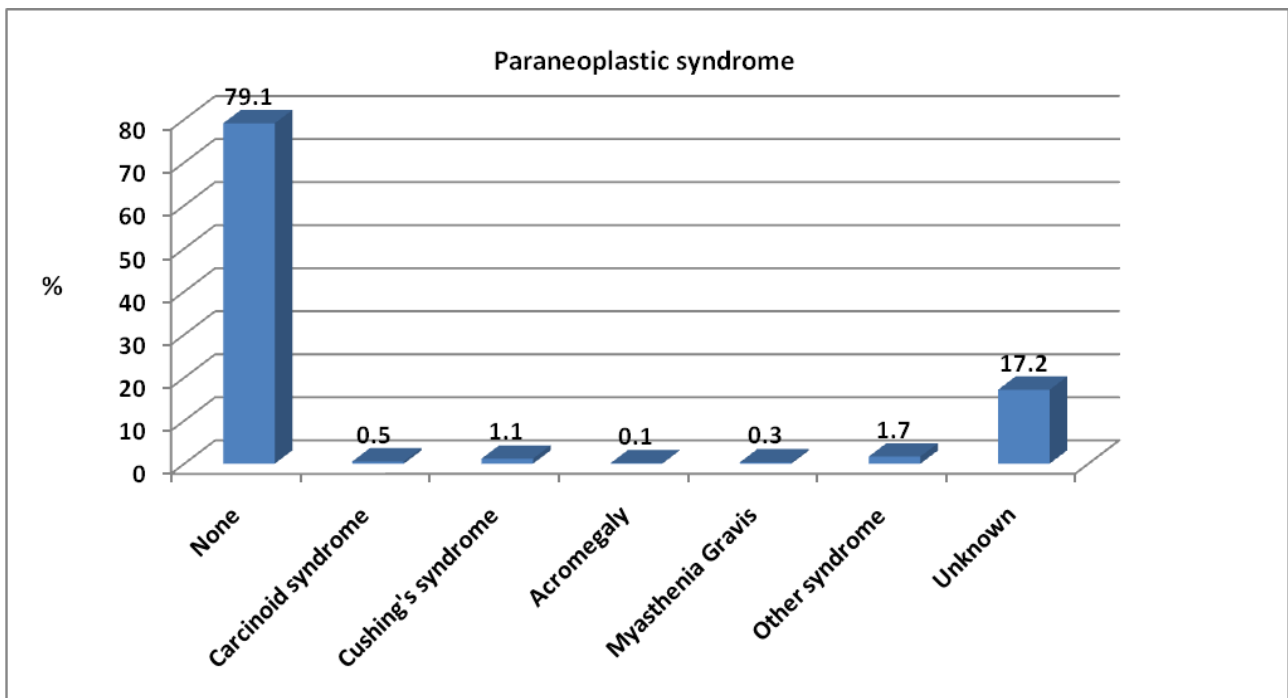
Centralperipheralumor

centralperipheralumor	Occurrences	Percent
Peripheral	964	55.4
Central	686	39.4
Unknown	91	5.2
Total	1741	100



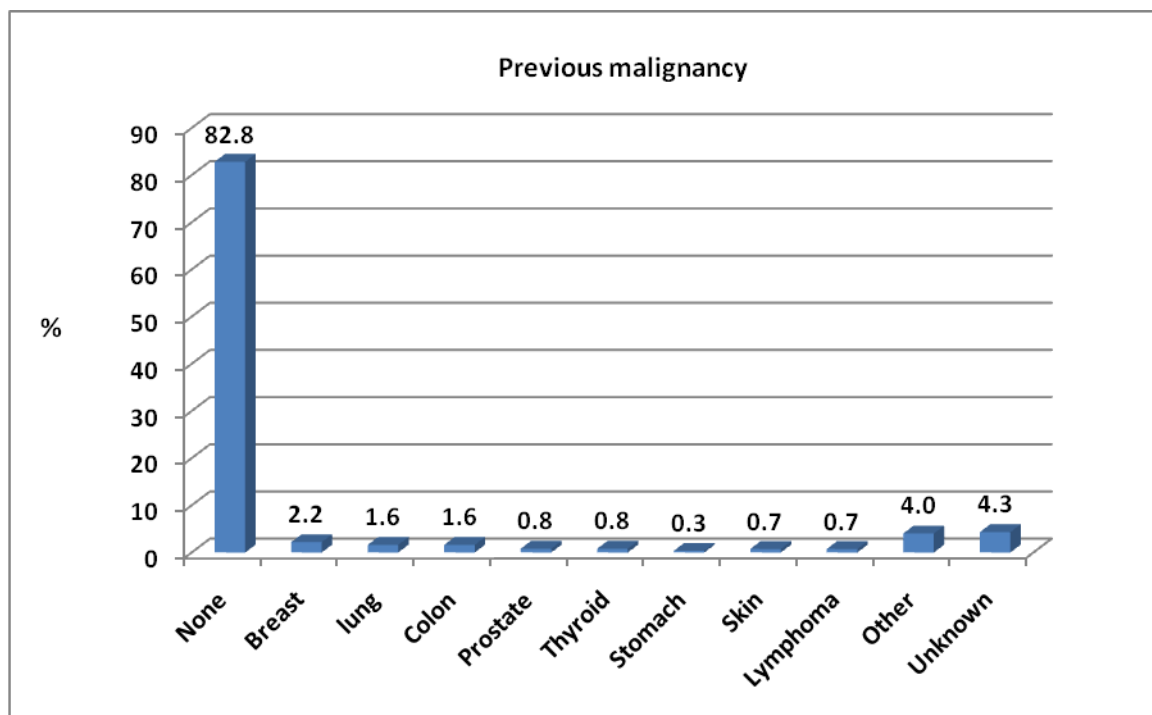
Paraneoplastic syndrome

paraneoplasticsyndrome	Occurrences	Percent
None	1377	79.1
Carcinoid syndrome	9	0.5
Cushing's syndrome	20	1.1
Acromegaly	2	0.1
Myasthenia Gravis	5	0.3
Other syndrome	29	1.7
Unknown	299	17.2
Total	1741	100



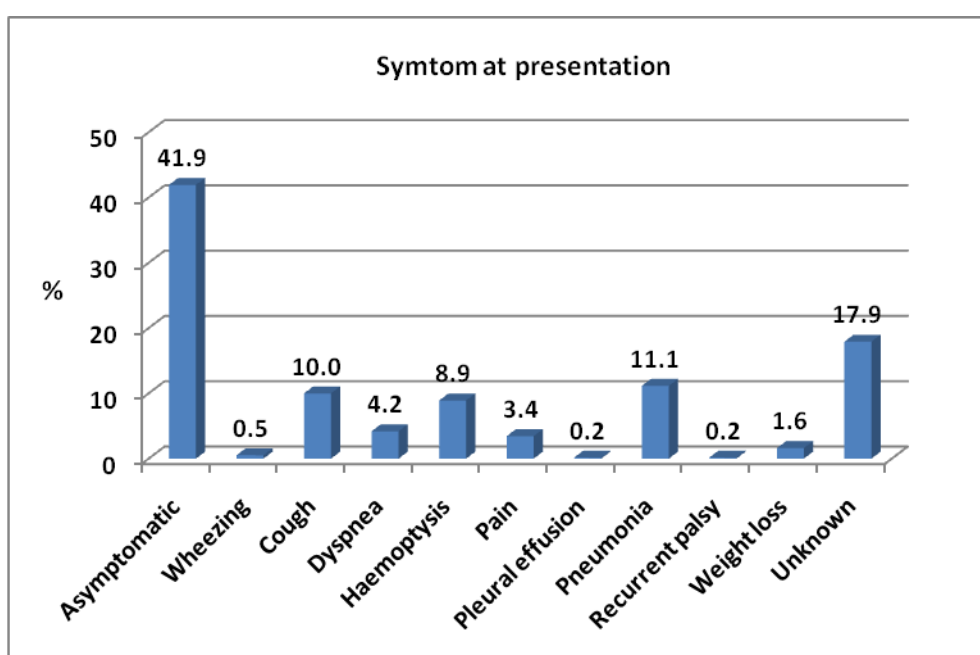
Previous Malignancy

previous malignancy	Occurrences	Percent
None	1442	82.8
Breast	38	2.2
lung	28	1.6
Colon	28	1.6
Prostate	14	0.8
Thyroid	14	0.8
Stomach	6	0.3
Skin	13	0.7
Lymphoma	13	0.7
Other	70	4.0
Unknown	75	4.3
Total	1741	100



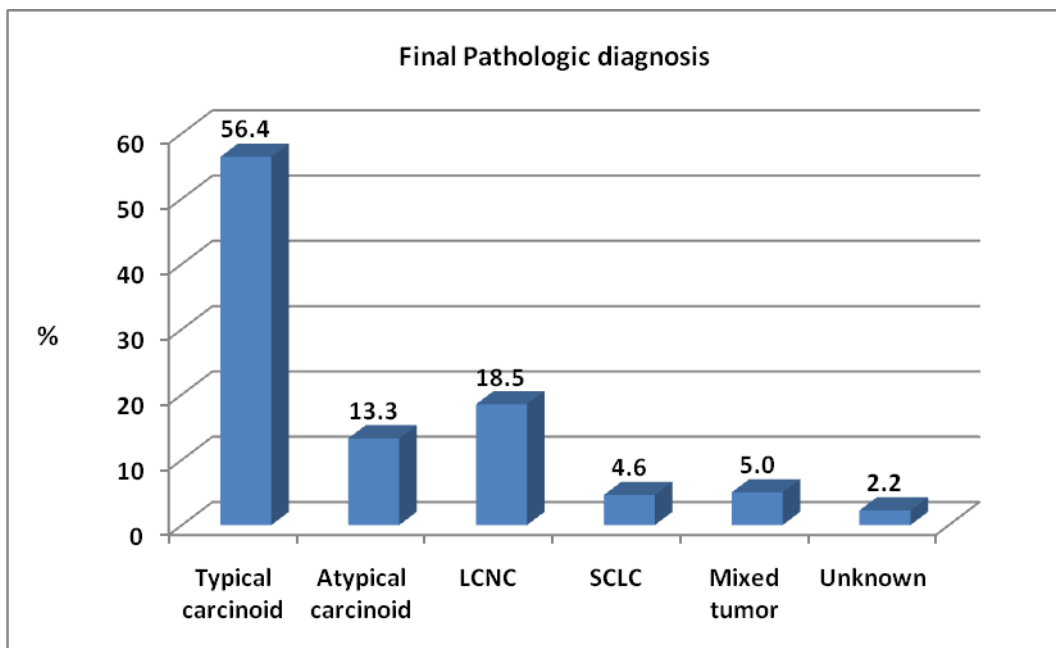
Symptom at presentation

symptomsatpresentation	Occurrences	Percent
Asymptomatic	730	41.9
Wheezing	9	0.5
Cough	174	10.0
Dyspnea	73	4.2
Haemoptysis	155	8.9
Pain	60	3.4
Pleural effusion	3	0.2
Pneumonia	194	11.1
Recurrent palsy	3	0.2
Weight loss	28	1.6
Unknown	312	17.9
Total	1741	100



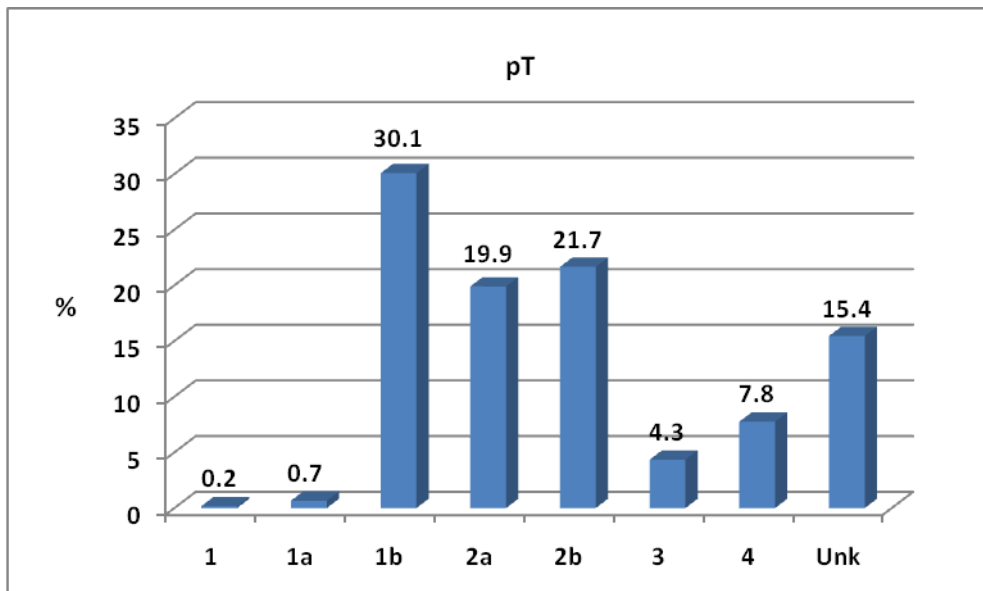
Final pathologic diagnosis

finalpathologicdiagnosis	Occurrences	Percent
Typical carcinoid	982	56.4
Atypical carcinoid	231	13.3
LCNC	322	18.5
SCLC	80	4.6
Mixed tumor	87	5.0
Unknown	39	2.2
Total	1741	100

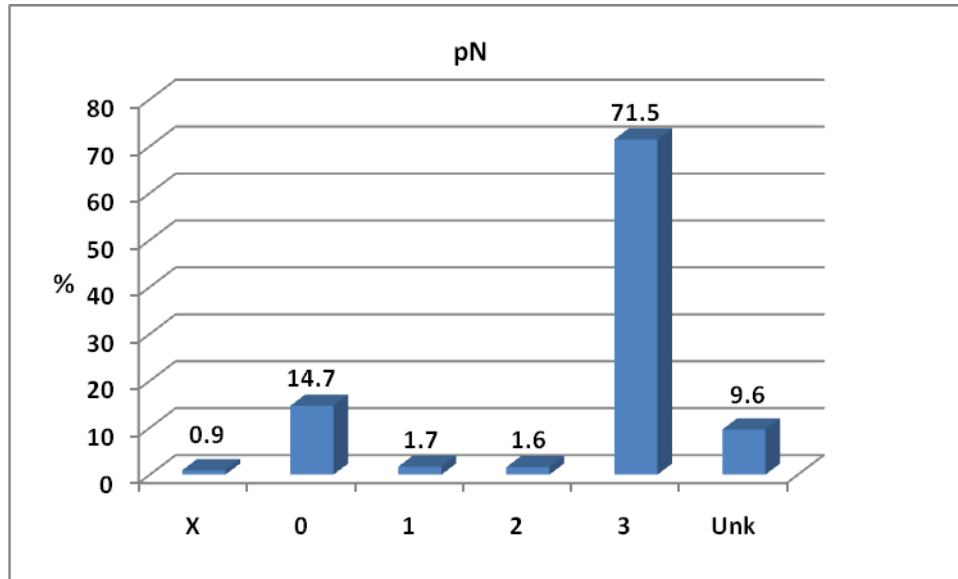


Pathological Staging (On all Lung Subgroup) : pT,pN,pM

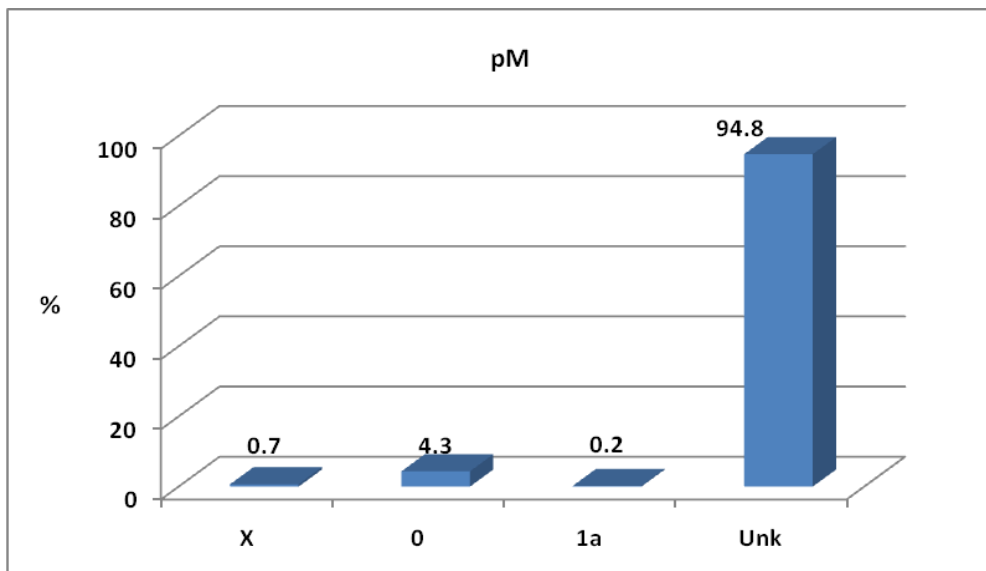
pT	Occurrences	Percent
1	3	0.2
1a	12	0.7
1b	547	30.1
2a	362	19.9
2b	394	21.7
3	79	4.3
4	141	7.8
Unk	281	15.4
Total	1819	100.0



pN	Occurrences	Percent
X	17	0.9
0	267	14.7
1	31	1.7
2	29	1.6
3	1300	71.5
Unk	175	9.6
Total	1819	100.0

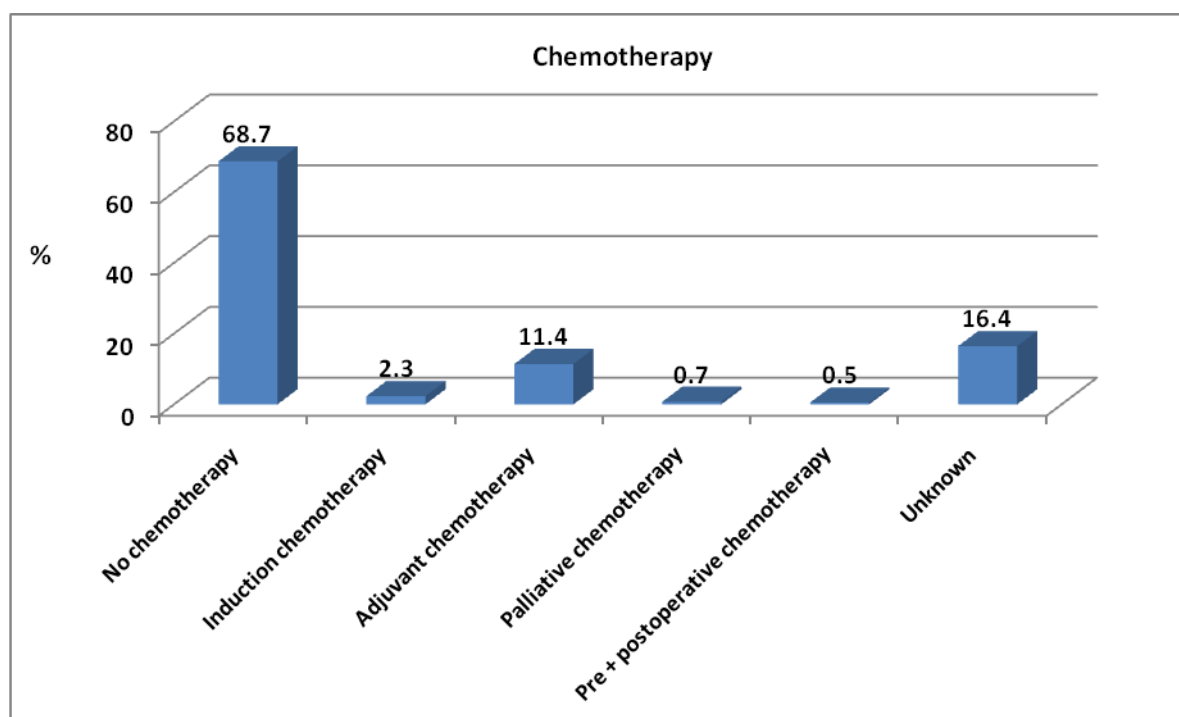


pM	Occurrences	Percent
X	12	0.7
0	79	4.3
1a	4	0.2
Unk	1724	94.8
Total	1819	100.0



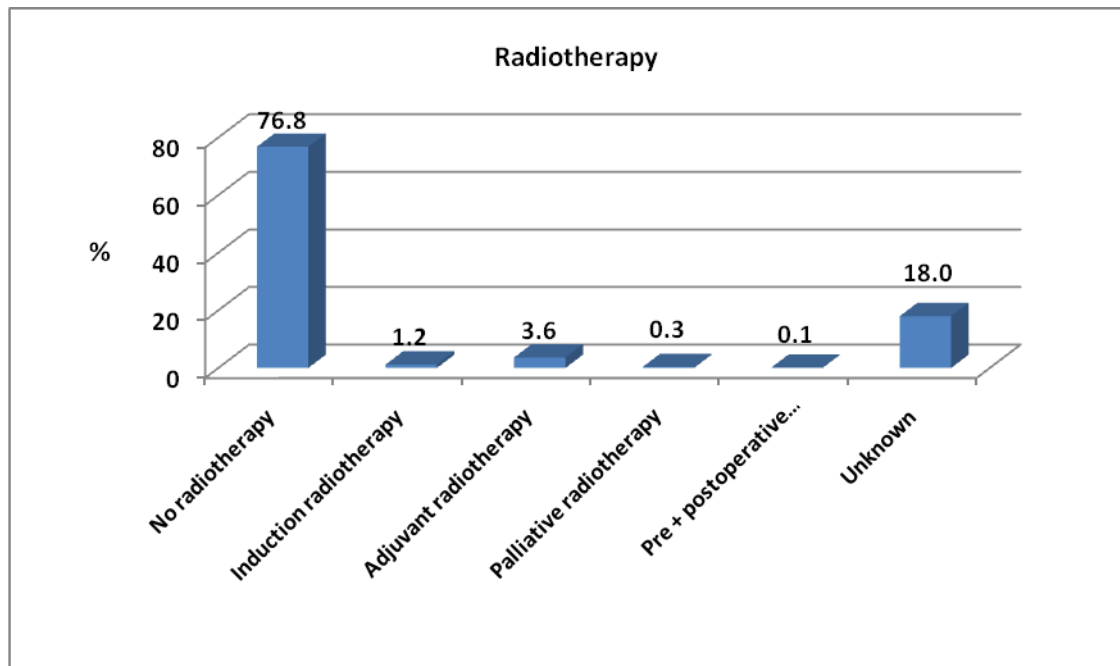
Chemotherapy

chemotherapy	Occurrences	Percent
No chemotherapy	1249	68.7
Induction chemotherapy	42	2.3
Adjuvant chemotherapy	207	11.4
Palliative chemotherapy	13	0.7
Pre + postoperative chemotherapy	9	0.5
Unknown	299	16.4
Total	1819	100



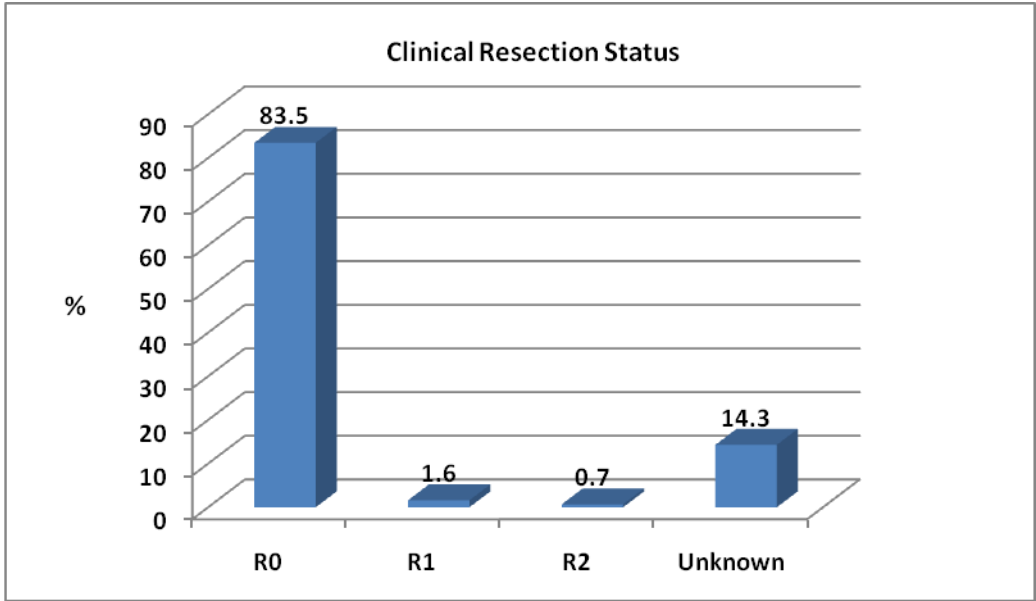
Radiotherapy

Radiotherapy	Occurrences	Percent
No radiotherapy	1397	76.8
Induction radiotherapy	21	1.2
Adjuvant radiotherapy	66	3.6
Palliative radiotherapy	6	0.3
Pre + postoperative radiotherapy	2	0.1
Unknown	327	18.0
Total	1819	100



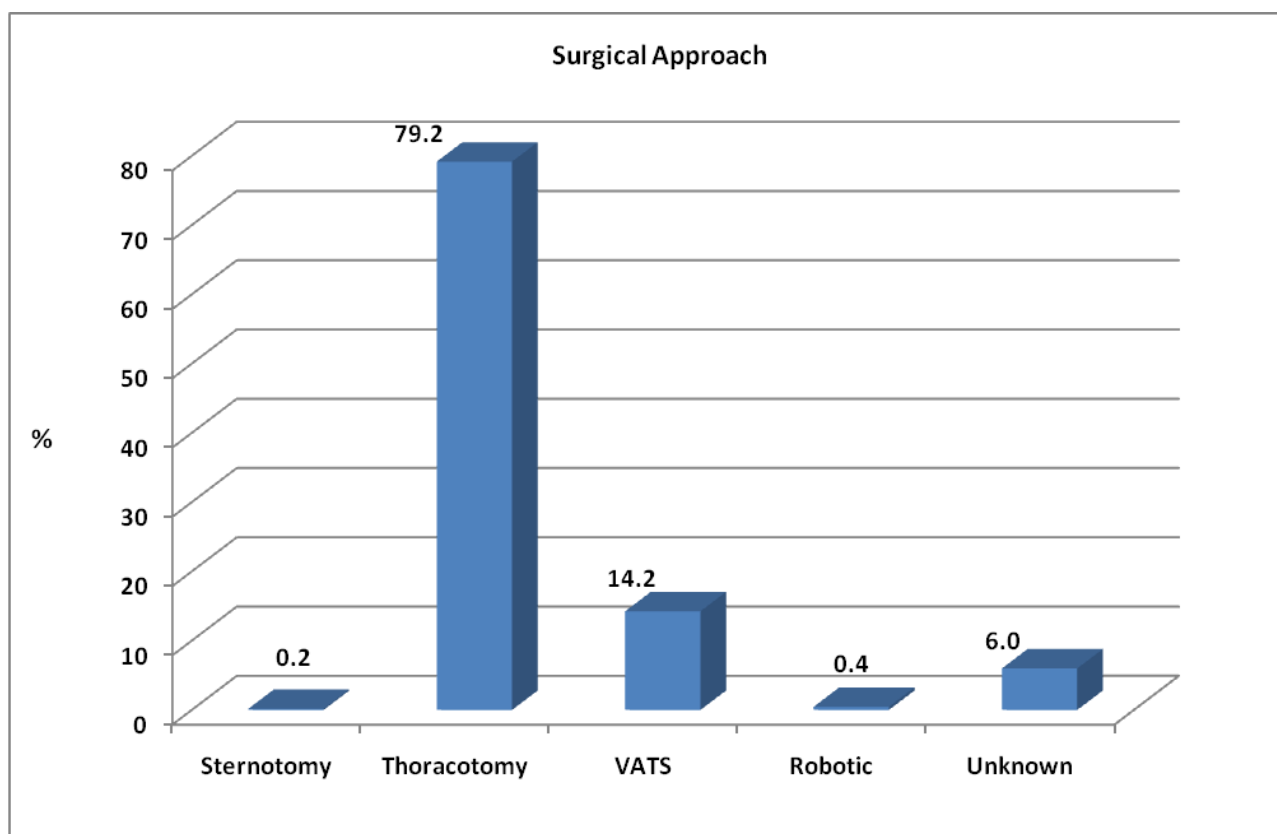
Clinical Resection Status

Clinical Resection Status	Occurrences	Percent
R0	1518	83.5
R1	29	1.6
R2	12	0.7
Unknown	260	14.3
Total	1819	100



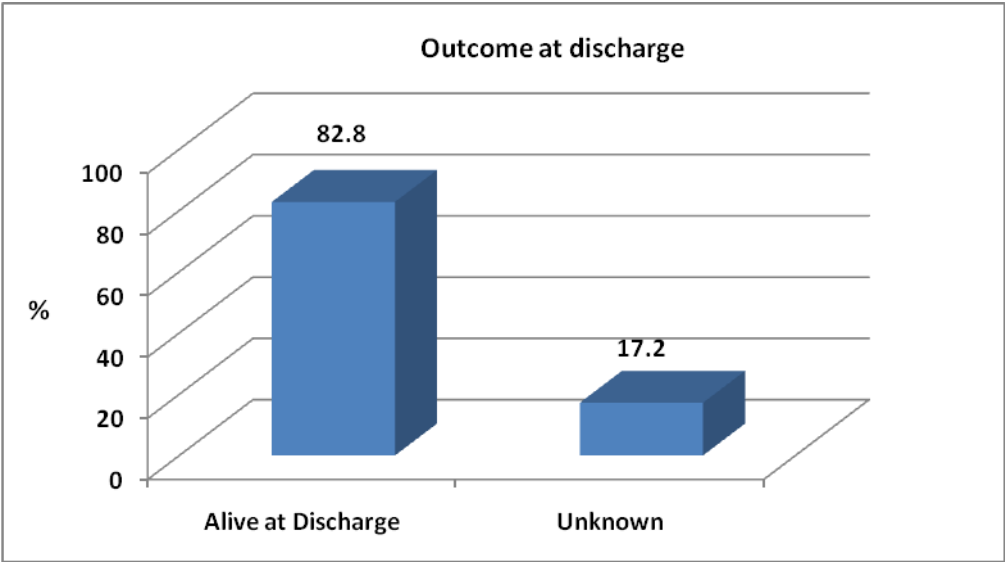
Surgical Approach

Surgical Approach	Occurrences	Percent
Sternotomy	3	0.2
Thoracotomy	1440	79.2
VATS	259	14.2
Robotic	8	0.4
Unknown	109	6.0
Total	1819	100



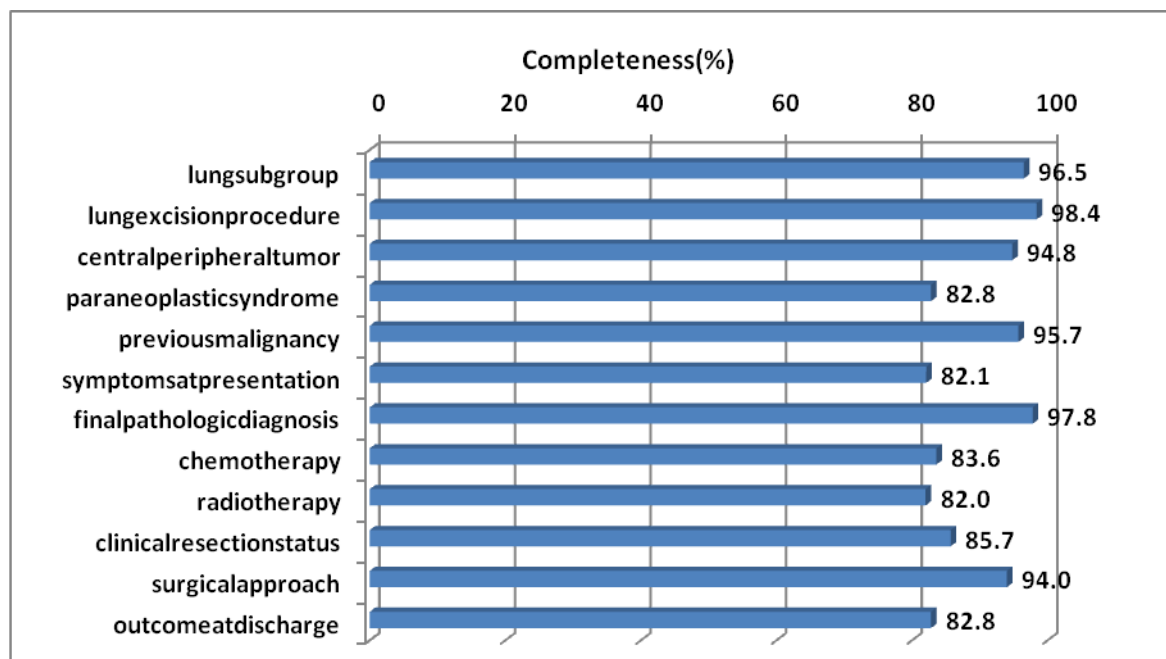
Outcome at discharge

Surgical Approach	Occurrences	Percent
Alive at Discharge	1506	82.8
Unknown	313	17.2
Total	1819	100



Data Completeness

Name of Field	Unknown (%)	Completeness(%)
lungsubgroup	3.5	96.5
lungexcisionprocedure	1.6	98.4
centralperipheralumor	5.2	94.8
paraneoplasticsyndrome	17.2	82.8
previousmalignancy	4.3	95.7
symptomsatpresentation	17.9	82.1
finalpathologicdiagnosis	2.2	97.8
chemotherapy	16.4	83.6
radiotherapy	18.0	82.0
clinicalresectionstatus	14.3	85.7
surgicalapproach	6.0	94.0
outcomeatdischarge	17.2	82.8



PART 6

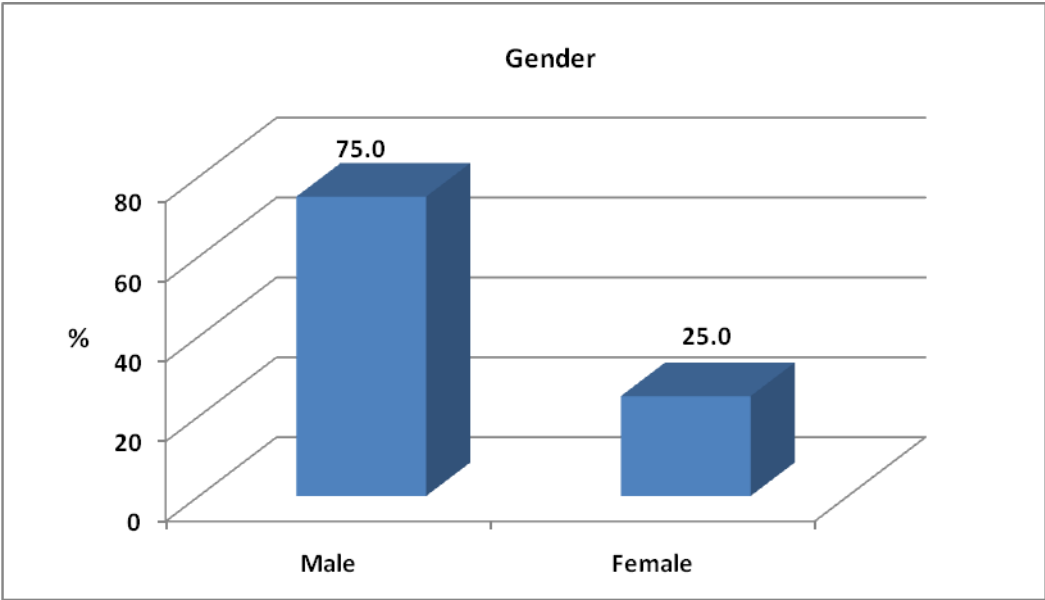
CHEST WALL SECTION (Database users only)

CHEST WALL Section fields

Group Definition Chest Wall
January 2003- December 2024
N=1747

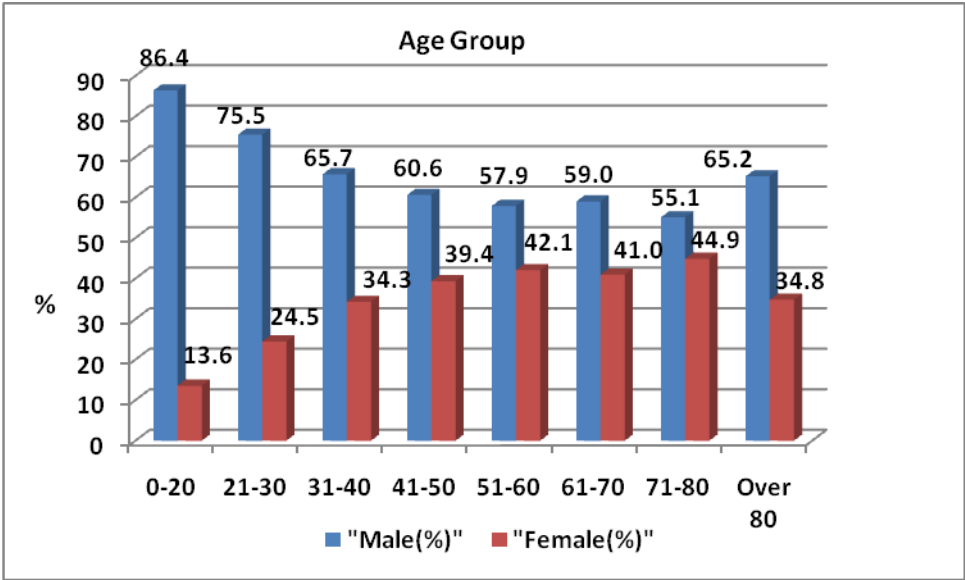
Demographics: gender

Gender	Occurrences	Percent
Male	1310	75.0
Female	437	25.0
Total	1747	100



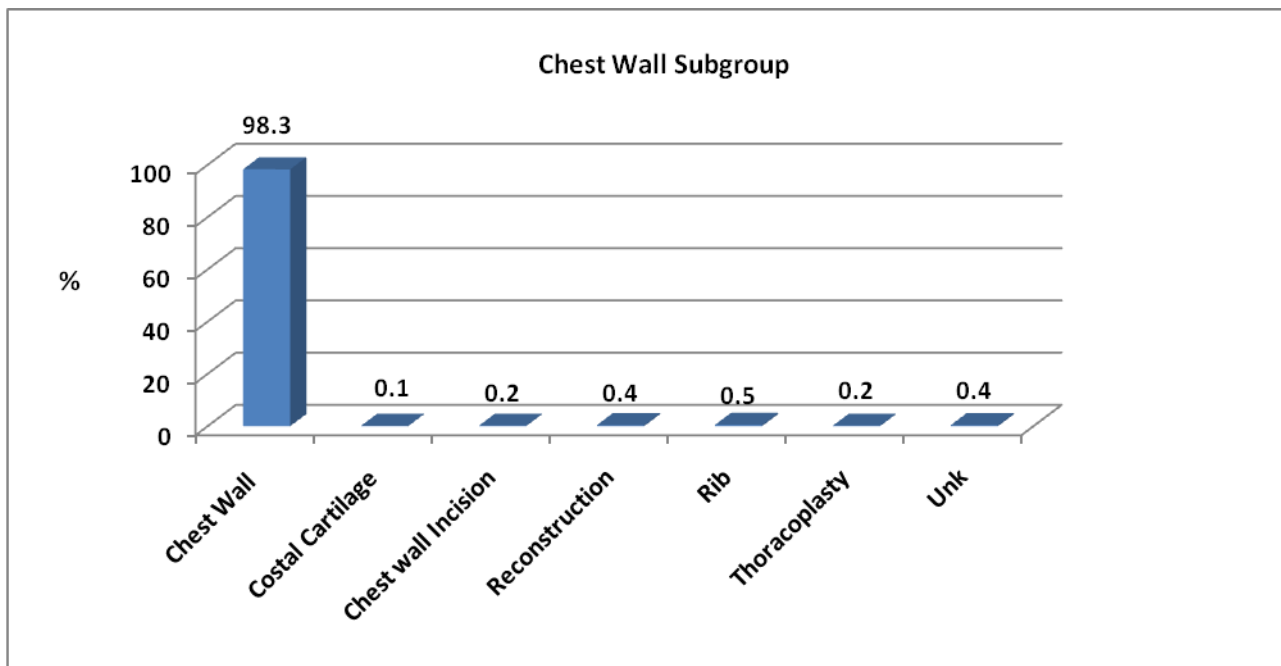
Age Group

Age Group	Male(%)	Female(%)
0-20	86.4	13.6
21-30	75.5	24.5
31-40	65.7	34.3
41-50	60.6	39.4
51-60	57.9	42.1
61-70	59.0	41.0
71-80	55.1	44.9
Over 80	65.2	34.8



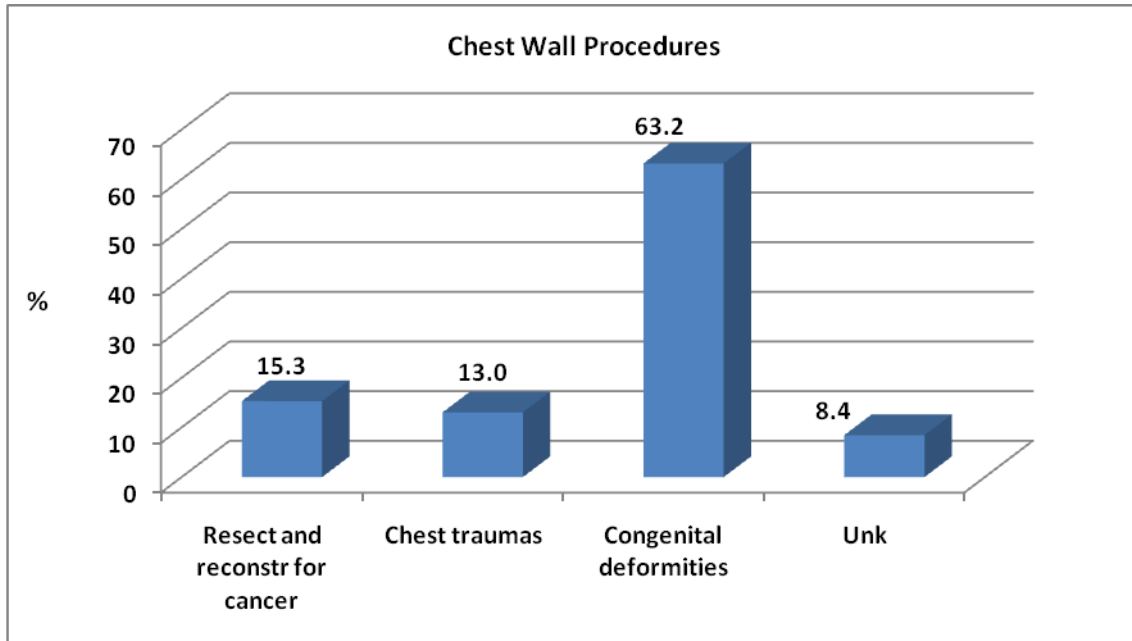
Chest Wall Subgroup

Chestwallsubgroup	Occurrences	Percent
Chest Wall (autosetting)	1717	98.3
Costal Cartilage	2	0.1
Chest wall Incision	3	0.2
Reconstruction	7	0.4
Rib	8	0.5
Thoracoplasty	3	0.2
Unk	7	0.4
Total	1747	100



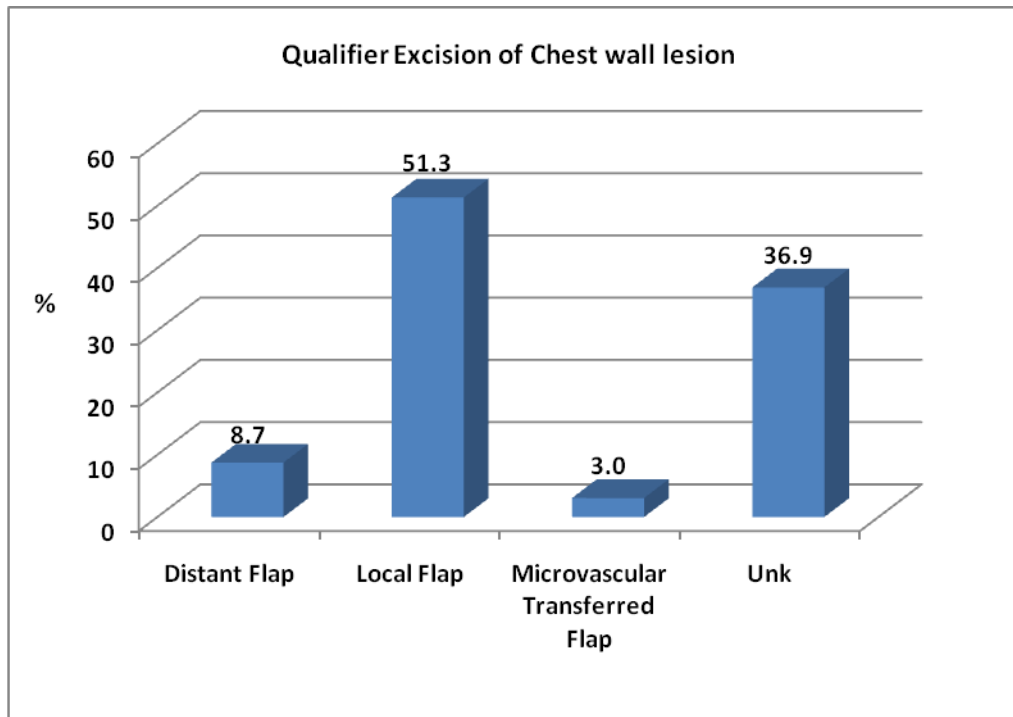
Chest Wall Procedures

Chest Wall procedures	Occurrences	Percent
Resect and reconstr for cancer	263	15.3
Chest traumas	224	13.0
Congenital deformities	1085	63.2
Unk	145	8.4
Total	1717	100



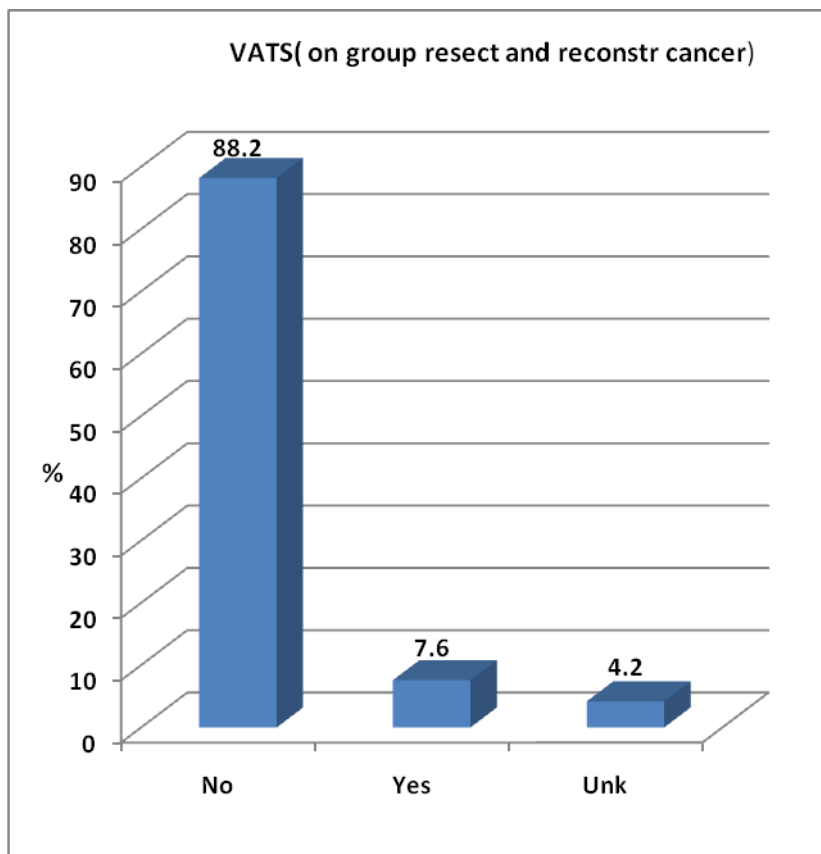
On Group Resect and reconstr Cancer

qualifierexcisionofchestwalllesion	Occurrences	Percent
Distant Flap	23	8.7
Local Flap	135	51.3
Microvascular Transferred Flap	8	3.0
Unk	97	36.9
Total	263	100



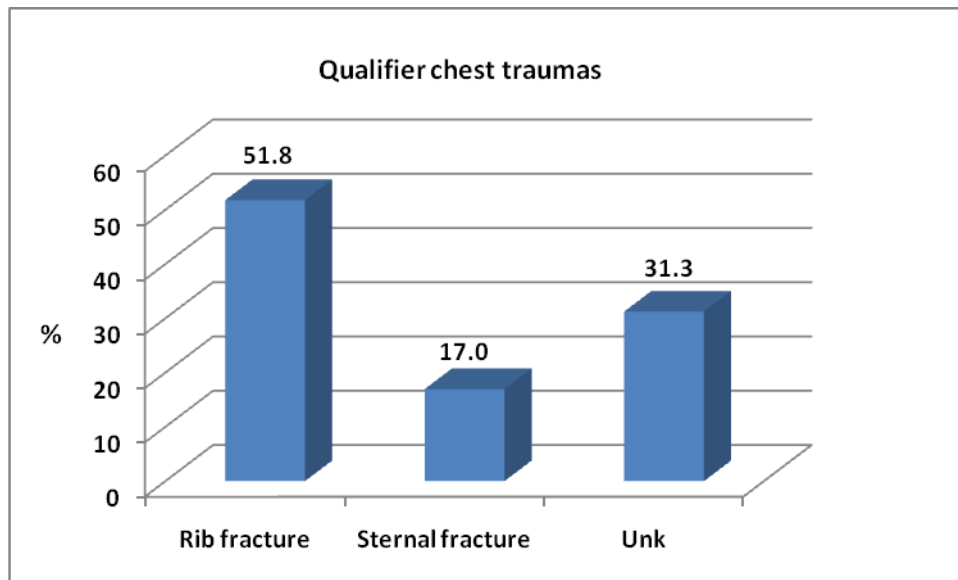
VATS

vats	Occurrences	Percent
No	232	88.2
Yes	20	7.6
Unk	11	4.2
Total	263	100



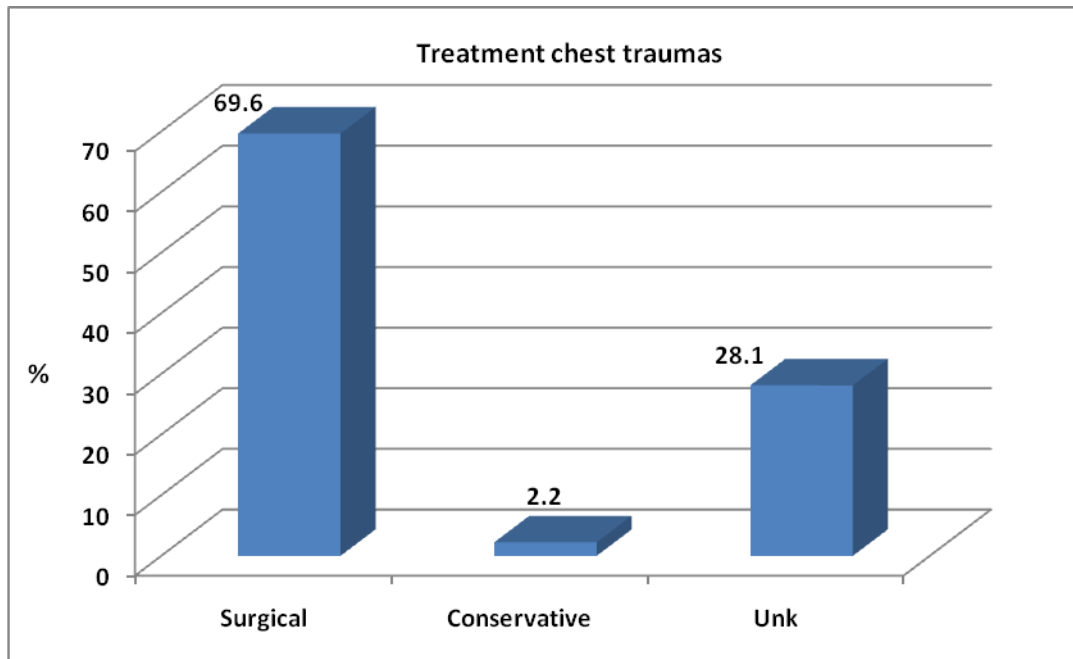
On Group Chest Traumas

qualifierchesttraumas	Occurrences	Percent
Rib fracture	116	51.8
Sternal fracture	38	17.0
Unk	70	31.3
Total	224	100



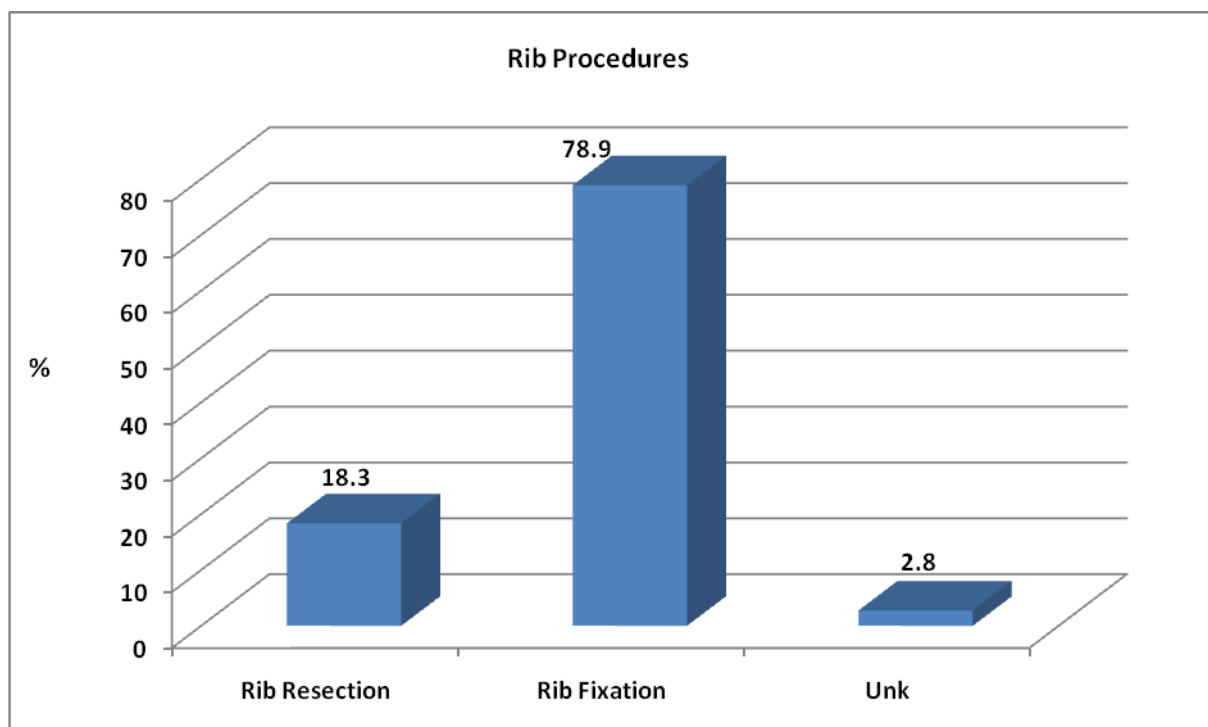
Treatment chest Traumas

Treatment chest traumas	Occurrences	Percent
Surgical	156	69.6
Conservative	5	2.2
Unk	63	28.1
Total	224	100



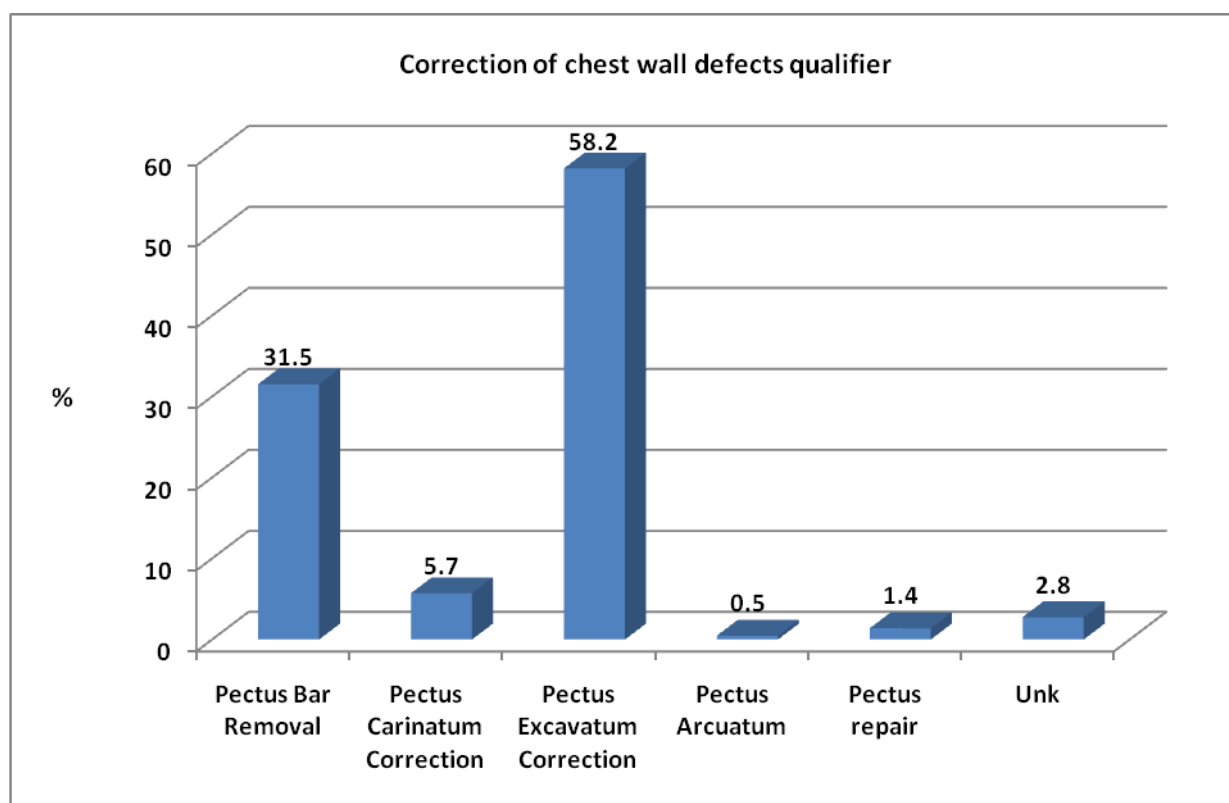
On Group Rib Fracture And Surgical

Rib procedures	Occurrences	Percent
Rib Resection	20	18.3
Rib Fixation	86	78.9
Unk	3	2.8
Total	109	100



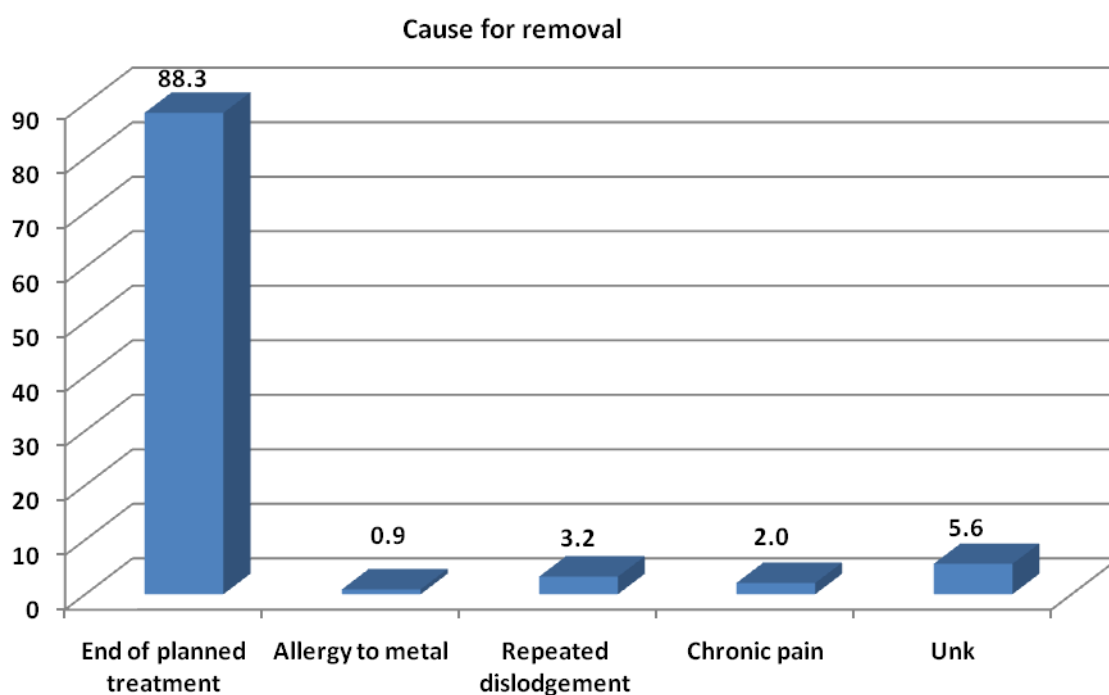
On Group Congenital deformities

Correction of chest wall defectsqualifier	Occurrences	Percent
Pectus Bar Removal	342	31.5
Pectus Carinatum Correction	62	5.7
Pectus Excavatum Correction	631	58.2
Pectus Arcuatum	5	0.5
Pectus repair	15	1.4
Unk	30	2.8
Total	1085	100.0



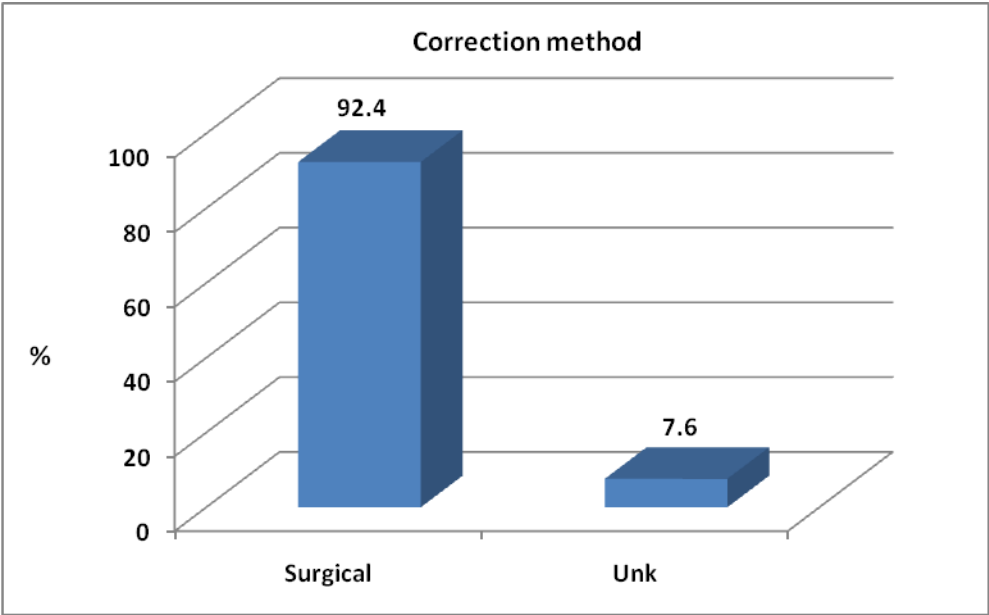
On Group Pectus Bar Removal

Cause for removal	Occurrences	Percent
End of planned treatment	302	88.3
Allergy to metal	3	0.9
Repeated dislodgement	11	3.2
Chronic pain	7	2.0
Unk	19	5.6
Total	342	100.0



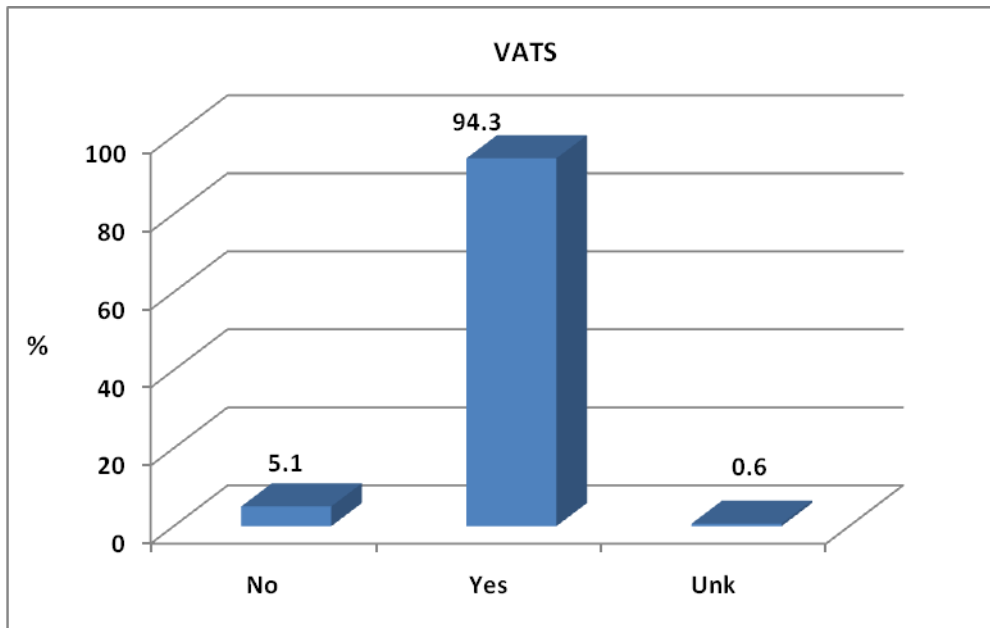
On Group Pectus Excavatum Correction

Correction method	Occurrences	Percent
Surgical	583	92.4
Unk	48	7.6
Total	631	100



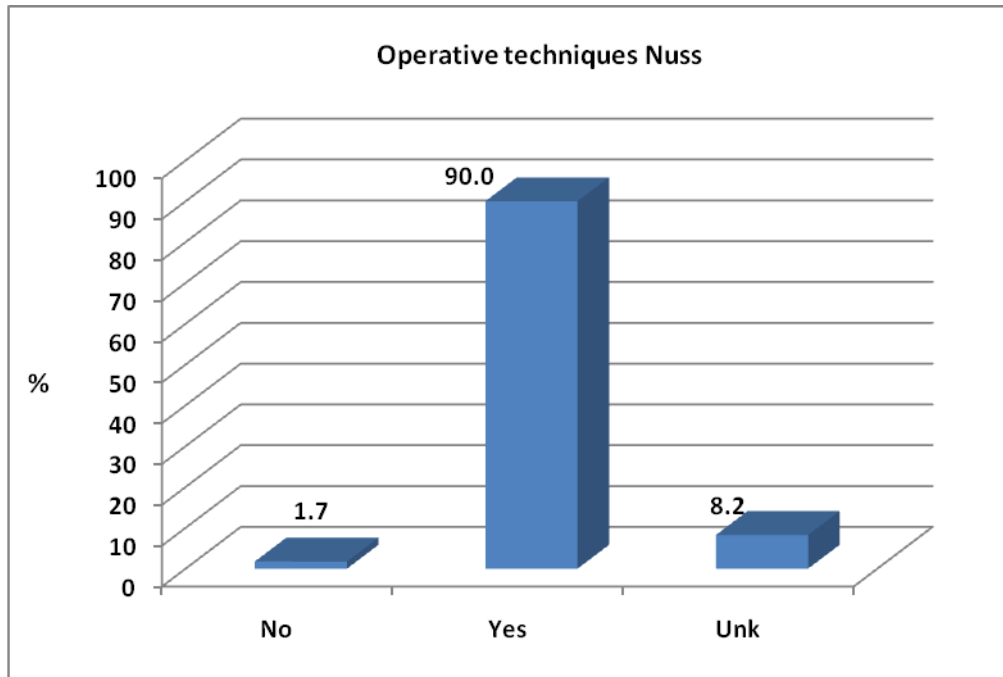
VATS

vats	Occurrences	Percent
No	32	5.1
Yes	595	94.3
Unk	4	0.6
Total	631	100



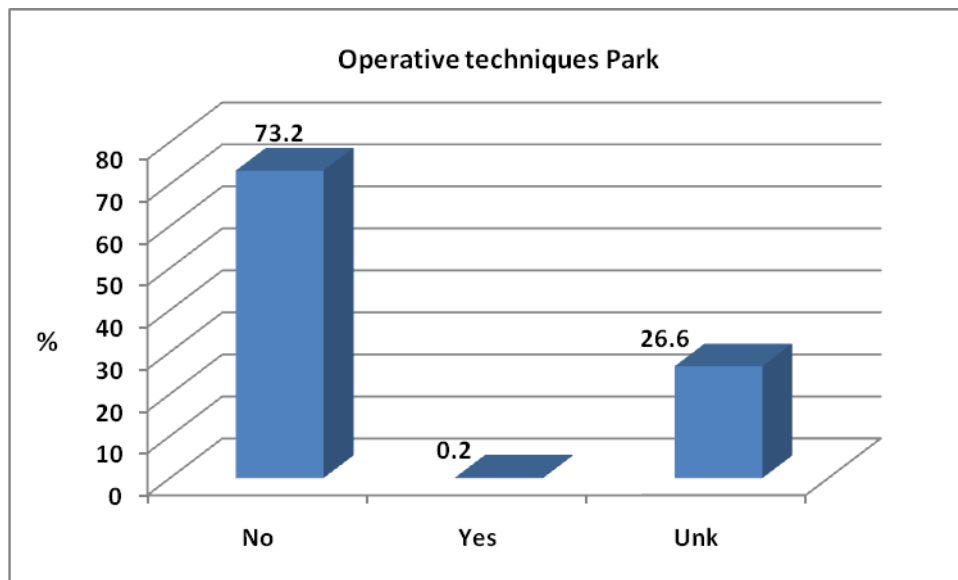
Operative technique Nuss

Operative techniques Nuss	Occurrences	Percent
No	11	1.7
Yes	568	90.0
Unk	52	8.2
Total	631	100



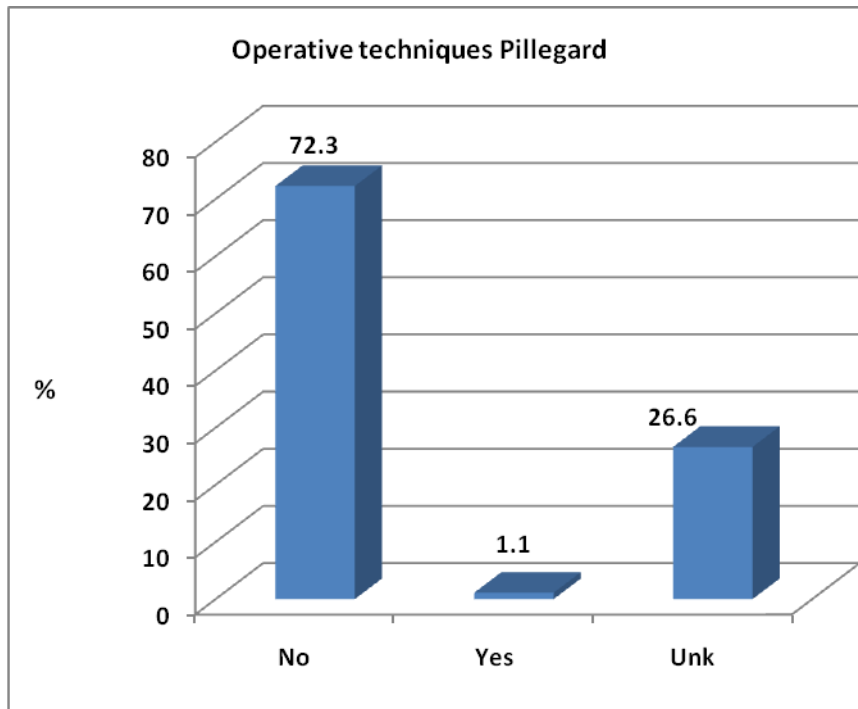
Operative Technique Park

Operative technique Park	Occurrences	Percent
No	462	73.2
Yes	1	0.2
Unk	168	26.6
Total	631	100



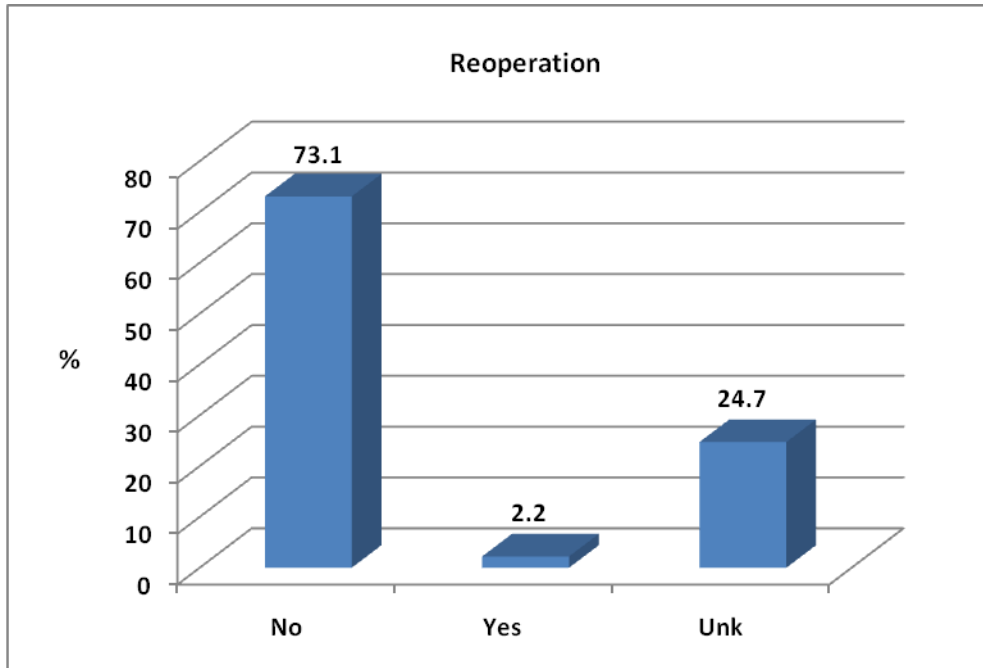
Operative Technique Pillegard

Operative technique Pillegard	Occurrences	Percent
No	456	72.3
Yes	7	1.1
Unk	168	26.6
Total	631	100



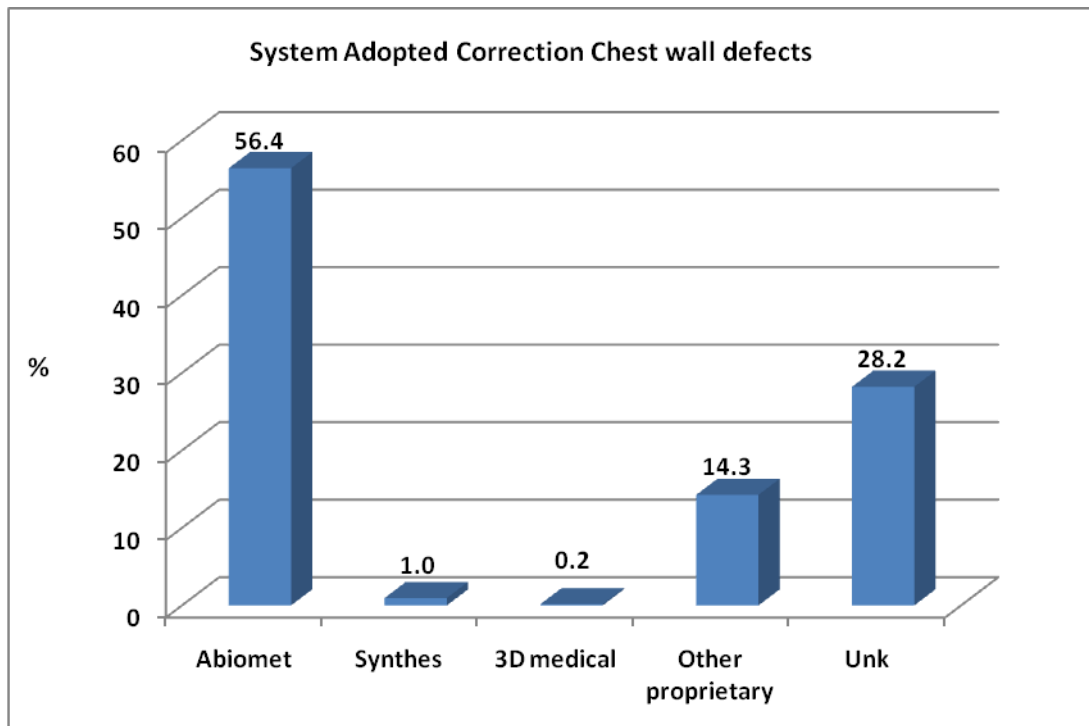
Reoperation

Reoperation	Occurrences	Percent
No	461	73.1
Yes	14	2.2
Unk	156	24.7
Total	631	100



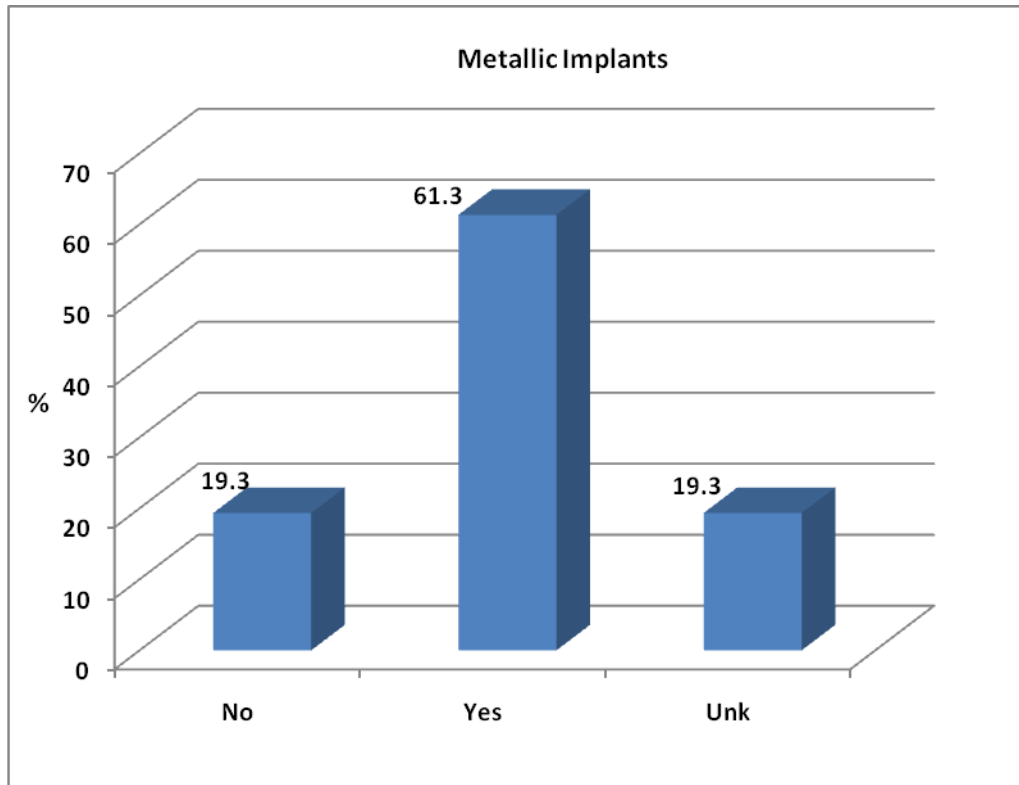
System Adopted Correction chest wall defects

systemadoptedcorrectioncwaldefects	Occurrences	Percent
Abiomet	356	56.4
Synthes	6	1.0
3D medical	1	0.2
Other proprietary	90	14.3
Unk	178	28.2
Total	631	100



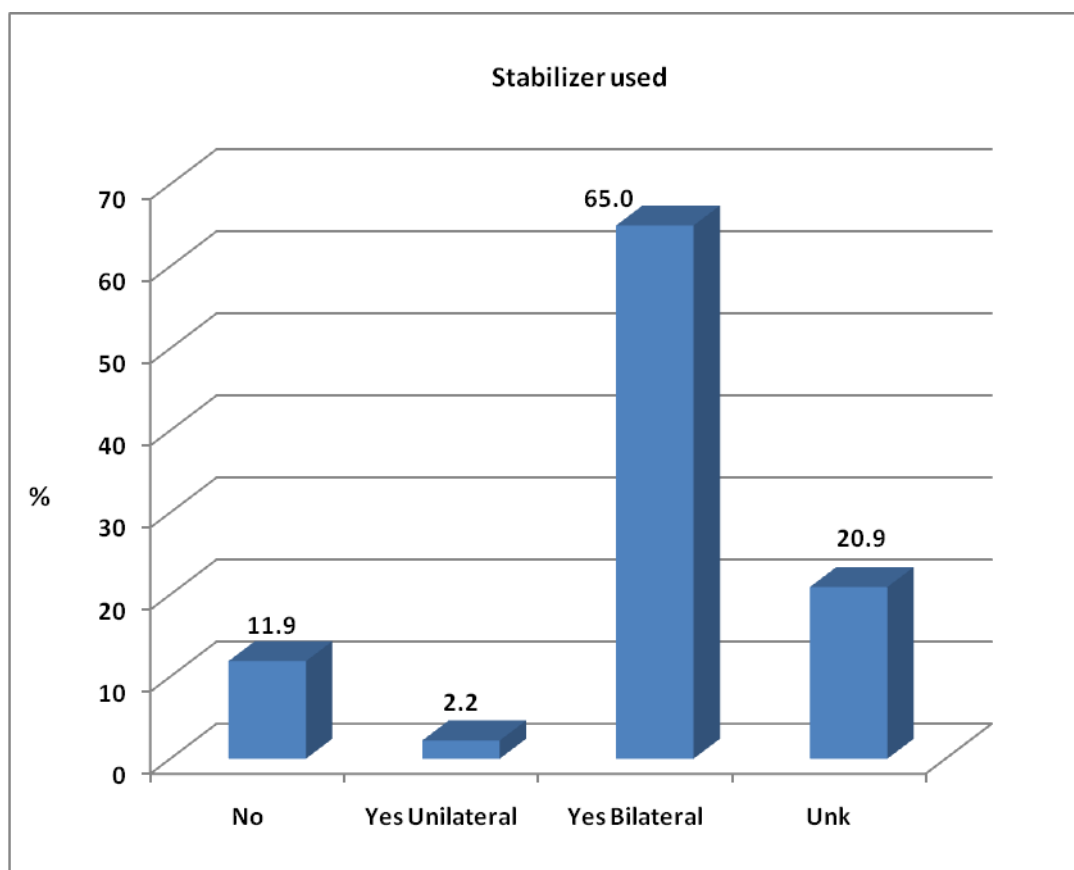
Metallic Implants

Metallic implants	Occurrences	Percent
No	122	19.3
Yes	387	61.3
Unk	122	19.3
Total	631	100



Stabilizer used

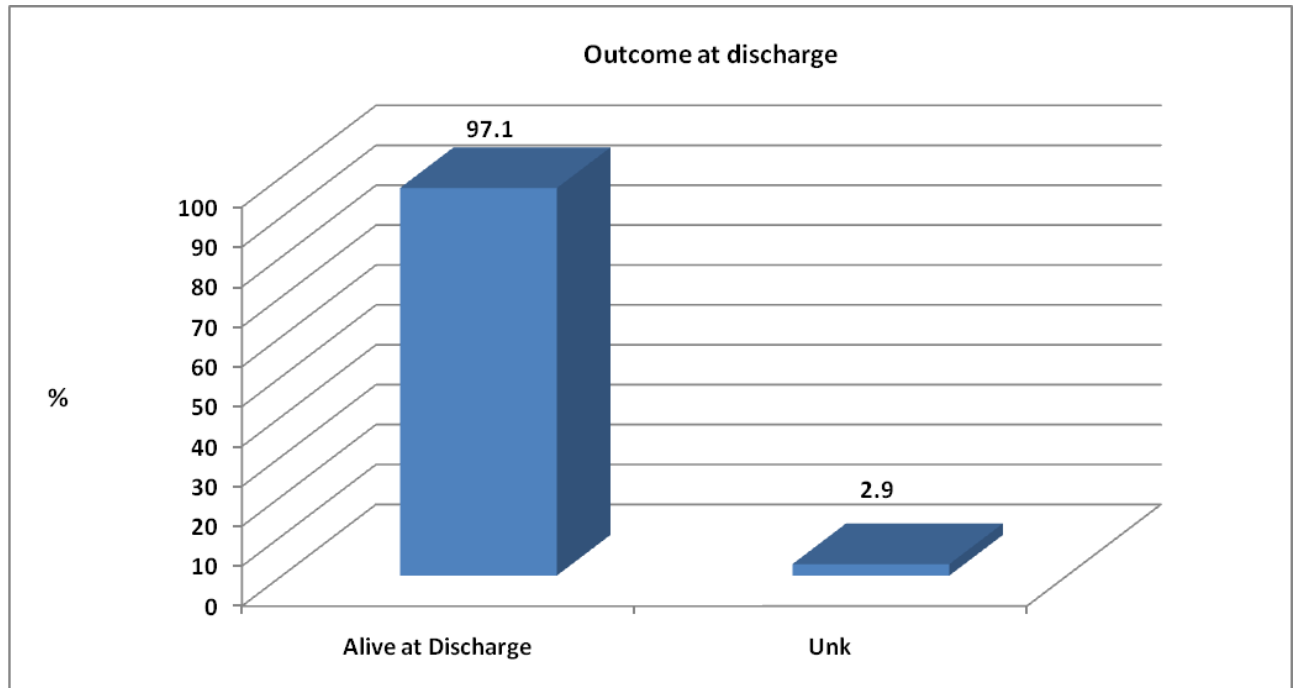
Stabilizer used	Occurrences	Percent
No	75	11.9
Yes Unilateral	14	2.2
Yes Bilateral	410	65.0
Unk	132	20.9
Total	631	100



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

Outcome at discharge	Occurrences	Percent
Alive at Discharge [°]	613	97.1
Unk	18	2.9
Total	631	100

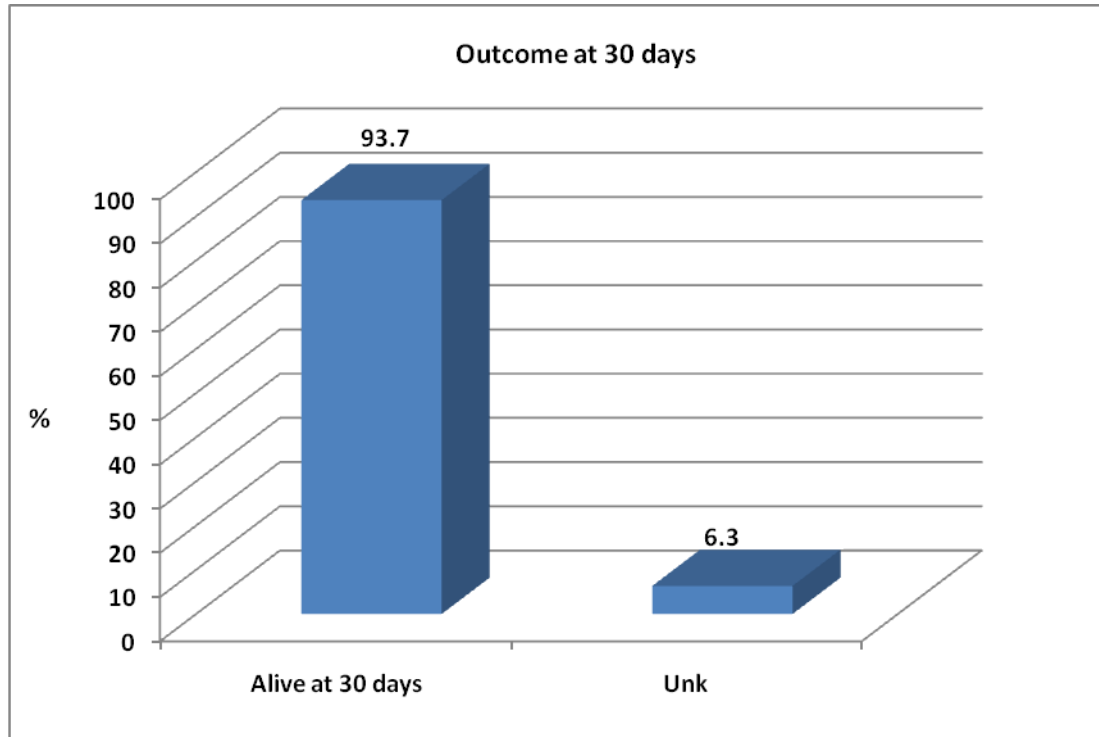
(°): Units with less than 500 patients included, results must be interpreted with caution



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

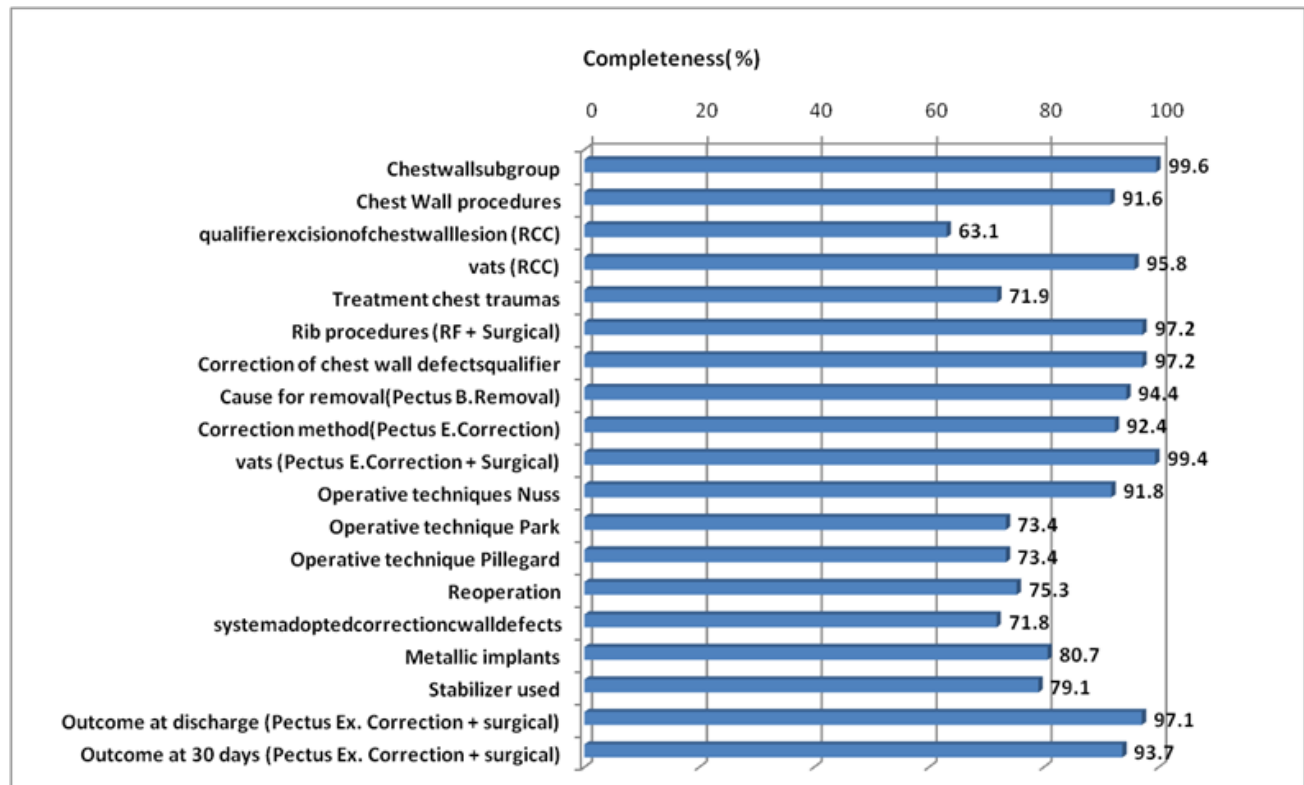
Outcome at 30 days	Occurrences	Percent
Alive at 30 days [°]	591	93.7
Unk	40	6.3
Total	631	100

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



Data Completeness

Name of Field	Unknown (%)	Completeness(%)
Chestwallsubgroup	0.4	99.6
Chest Wall procedures	8.4	91.6
qualifierexcisionofchestwalllesion (RCC)	36.9	63.1
vats (RCC)	4.2	95.8
Treatment chest traumas	28.1	71.9
Rib procedures (RF + Surgical)	2.8	97.2
Correction of chest wall defectsqualifier	2.8	97.2
Cause for removal(Pectus B.Removal)	5.6	94.4
Correction method(Pectus E.Correction)	7.6	92.4
vats (Pectus E.Correction + Surgical)	0.6	99.4
Operative techniques Nuss	8.2	91.8
Operative technique Park	26.6	73.4
Operative technique Pillegard	26.6	73.4
Reoperation	24.7	75.3
systemadoptedcorrectioncwalldefects	28.2	71.8
Metallic implants	19.3	80.7
Stabilizer used	20.9	79.1
Outcome at discharge (Pectus Ex. Correction + surgical)	2.9	97.1
Outcome at 30 days (Pectus Ex. Correction + surgical)	6.3	93.7



PART 7

LID SECTION (Database users only)

Message from Clinical Leader of ESTS Registry LID section



Dear colleagues,

We are proud to announce the successful launch and early development of the **Thoracic Infections of Surgical Interest** working group and its dedicated international database. This initiative, which officially began this year, aims to foster collaboration and generate high-quality data to support surgical decision-making in the context of thoracic infections.

To ensure a robust foundation, we conducted both an **alpha** and **beta test** of the new database in 2024:

- The **alpha test** included **3 institutions** and a total of **53 cases**.
- The **beta test** followed with **5 institutions** contributing **109 cases**.

These pilot phases confirmed that the platform is **useful, user-friendly**, and offers **high-quality data**, particularly in terms of **completeness and consistency**.

A New Era of Structured Data for Thoracic Infections

The **Thoracic Infections of Surgical Interest Database** is designed to reflect the clinical complexity of infectious diseases requiring thoracic surgical intervention. It was built with direct input from participating clinicians and optimized through iterative feedback during the testing phases.

The database currently includes **85 variables**, of which **24 are mandatory**, ensuring a balance between detailed clinical insight and ease of data entry. Among the key features:

- Logical conditional formatting to streamline data entry and avoid unnecessary fields
- Pre-filled default values to reduce the likelihood of missing data
- Modular design allowing for future expansion based on evolving needs

A Platform for Collaborative Research

This new platform is intended to serve as the basis for **multicenter research, benchmarking practices**, and improving the quality of care for patients with thoracic infections. Our goal is to build a community of engaged contributors across diverse institutions and regions. We encourage all interested thoracic surgeons and researchers to join us in this collaborative effort. By participating, you contribute to an evolving international initiative aimed at advancing knowledge and improving outcomes in this often-overlooked but critical area of thoracic surgery.

For access credentials, guidance on data entry, or to explore the possibility of **third-party data import**, please don't hesitate to contact us.

Join the Thoracic Infections of Surgical Interest group now and be part of this global effort!

Alessandro Wasum Mariani

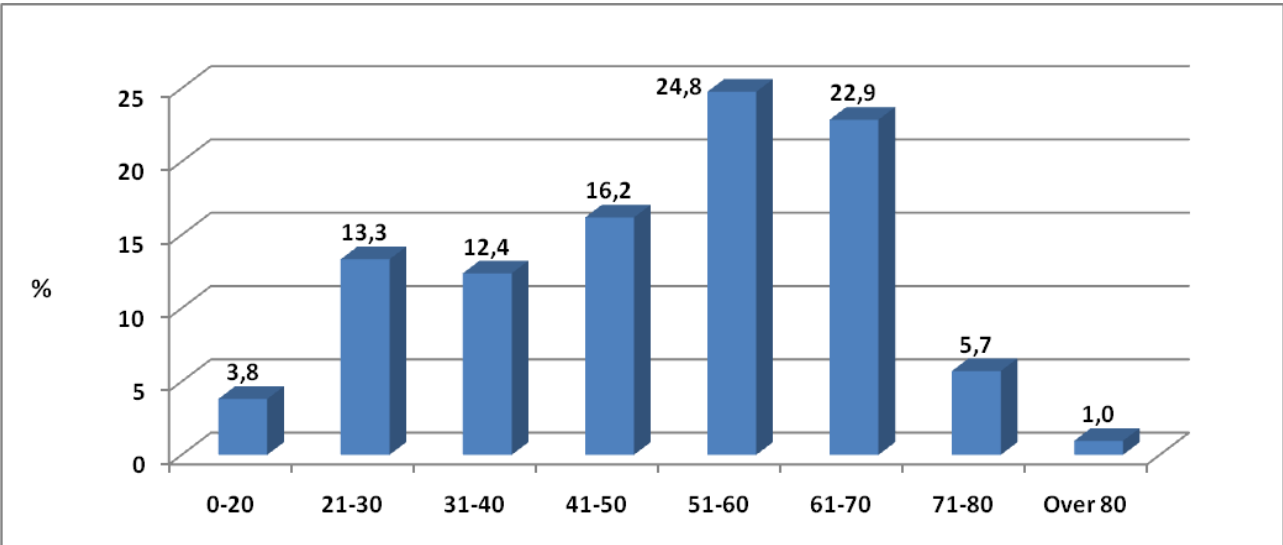
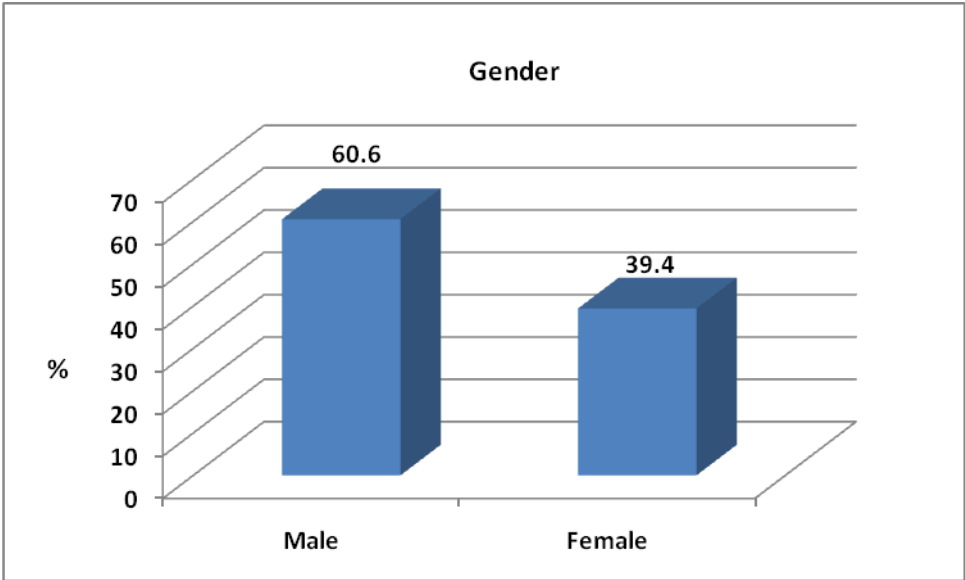
Former-chair of the **Thoracic Infections of Surgical Interest ESTS-WG**

LID Section fields

January 2007- December 2024
N=109

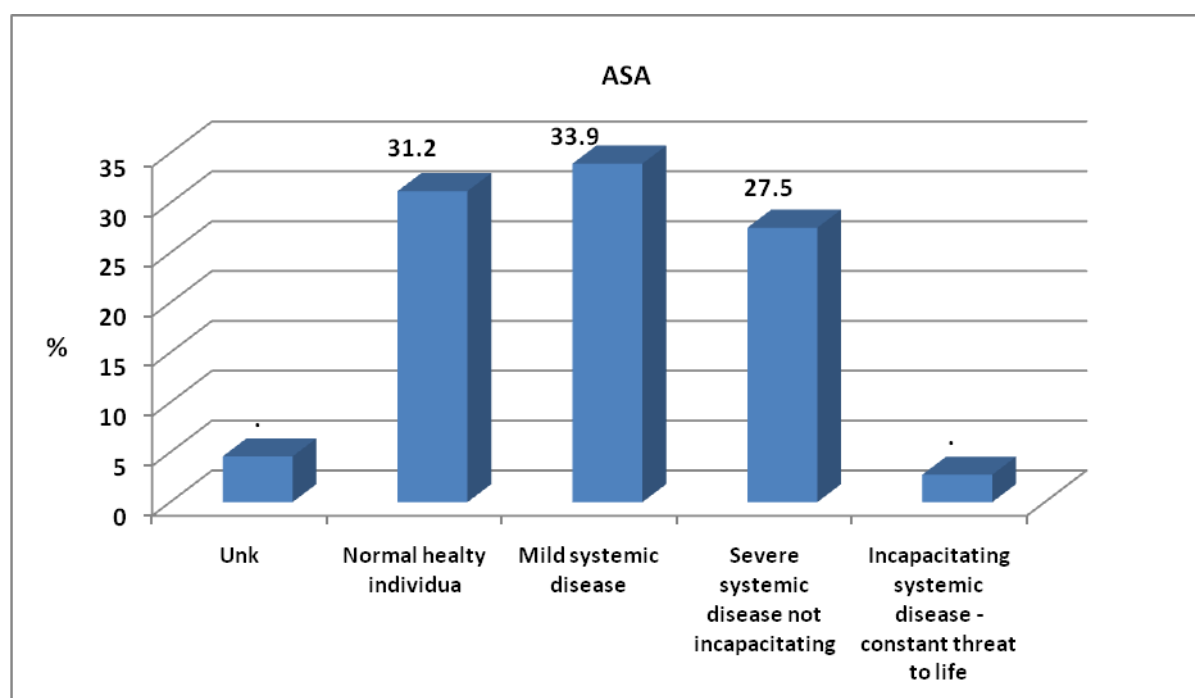
Demographics: gender and age groups

Gender	Occurrences	Percent
Male	66	60.6
Female	43	39.4
Total	109	100



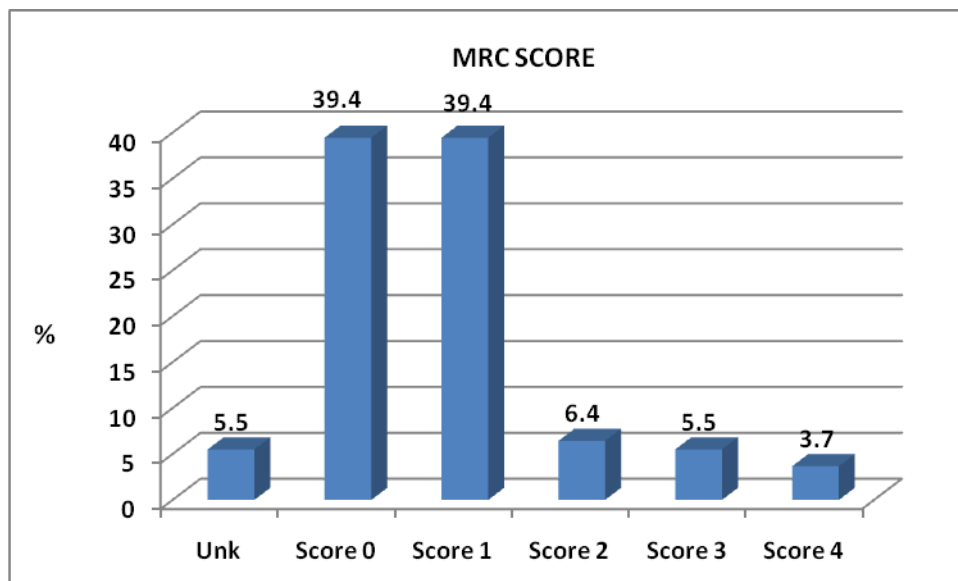
ASA

ASA	Occurrences	Percent
Normal healthy individual	5	4.6
Mild systemic disease	34	31.2
Severe systemic disease not incapacitating	37	33.9
Incapacitating systemic disease - constant threat to life	30	27.5
Unknown	3	2.8
Total number of patients	109	100



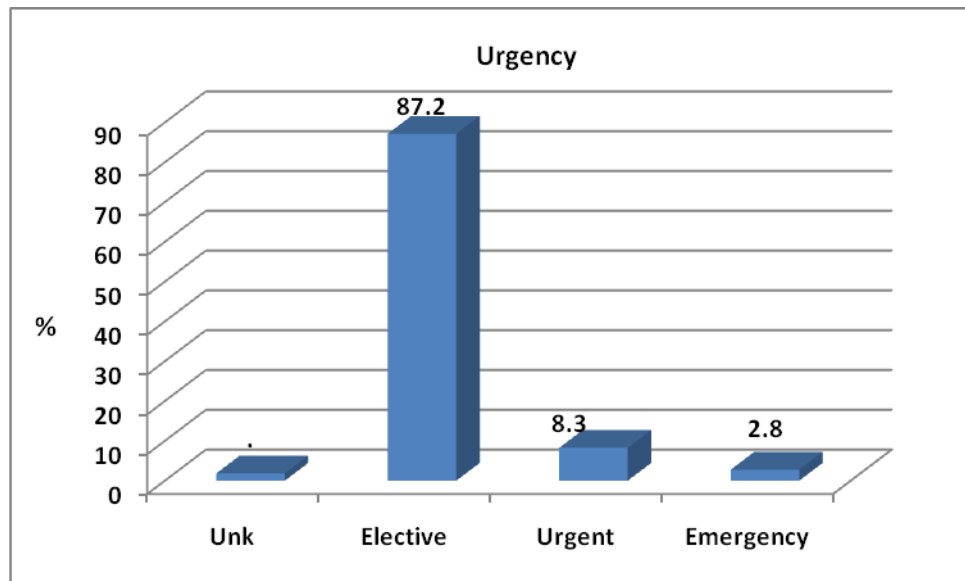
MRC SCORE

MRC SCORE	Occurrences	Percent
Unk	6	5.5
Score 0	43	39.4
Score 1	43	39.4
Score 2	7	6.4
Score 3	6	5.5
Score 4	4	3.7
Total number of patients	109	100



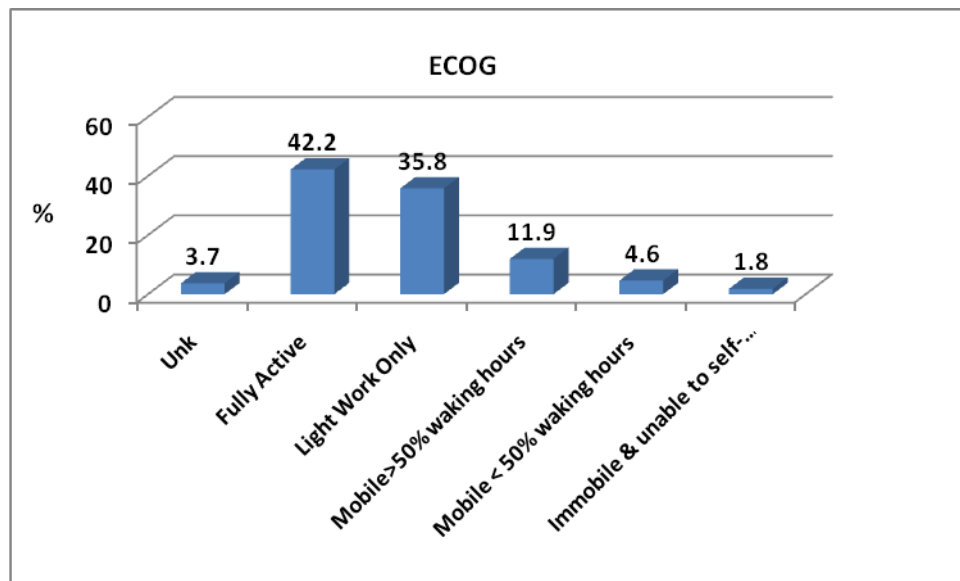
Urgency

Urgency	Occurrences	Percent
Unk	2	1.8
Elective	95	87.2
Urgent	9	8.3
Emergency	3	2.8
Total	109	100.0



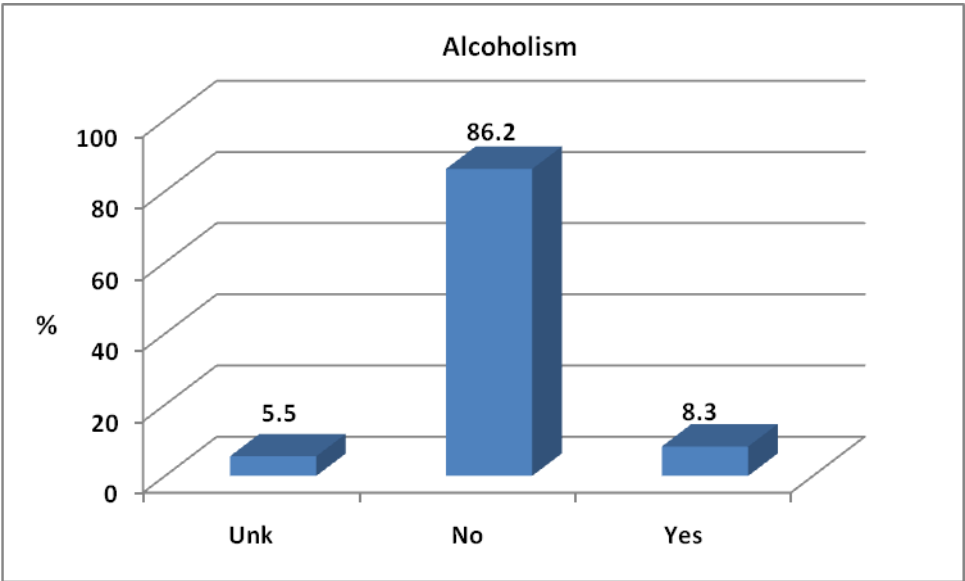
ECOG

ECOG	Occurrences	Percent
Unk	4	3.7
Fully Active	46	42.2
Light Work Only	39	35.8
Mobile>50% waking hours	13	11.9
Mobile < 50% waking hours	5	4.6
Immobile & unable to self-care	2	1.8
Total	109	100.0



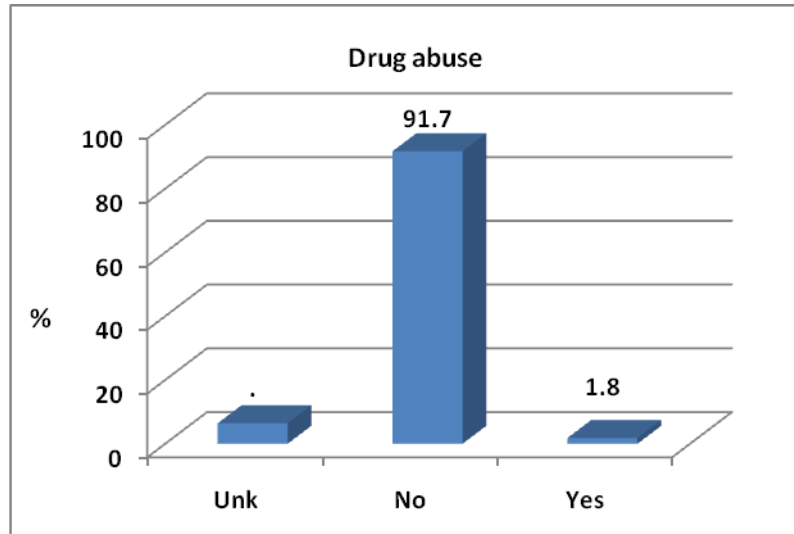
Alcoholism

Alcoholism	Occurrences	Percent
Unk	6	5.5
No	94	86.2
Yes	9	8.3
Total	109	100.0



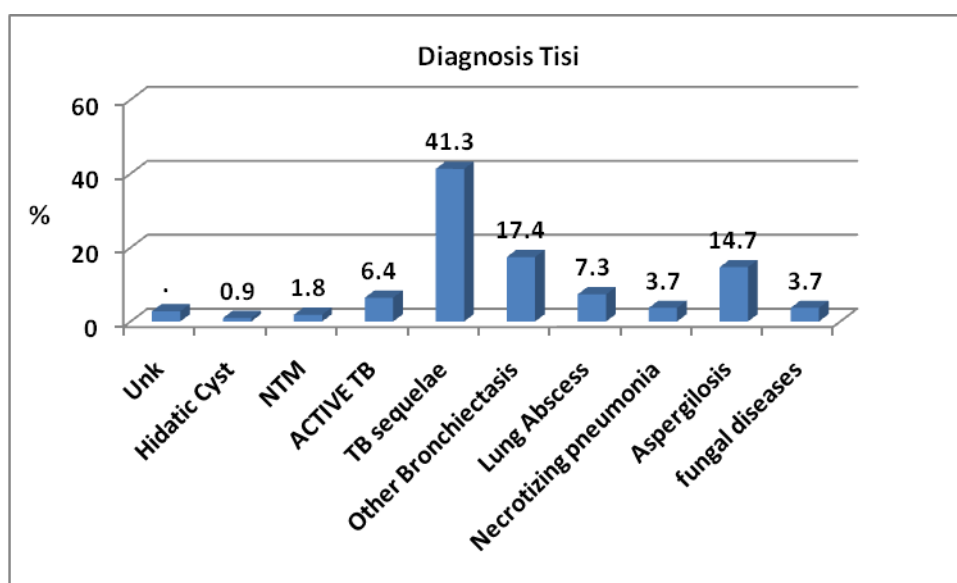
Drug abuse

Drug abuse	Occurrences	Percent
Unk	7	6.4
No	100	91.7
Yes	2	1.8
Total	109	100.0



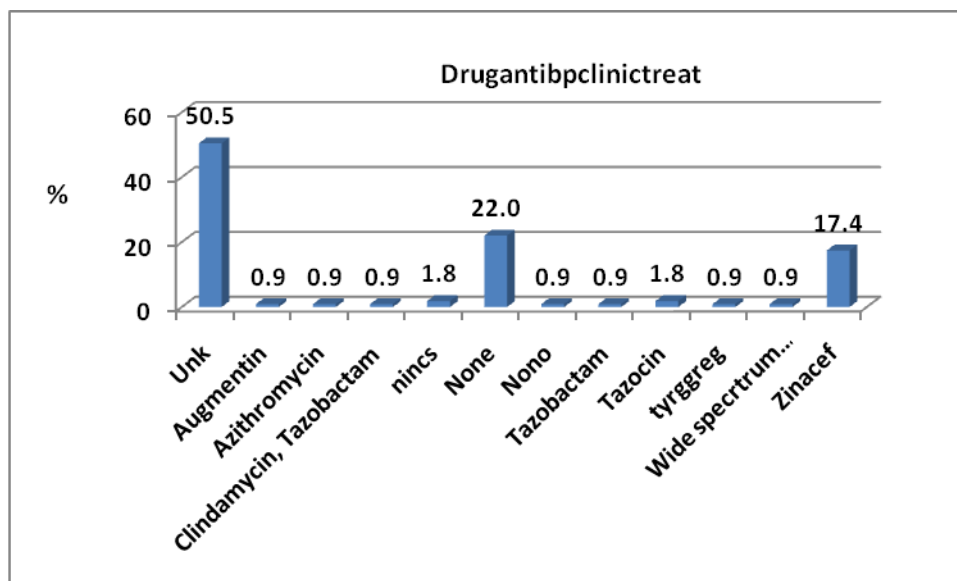
Diagnosis TISI

Diagnosis TISI	Occurrences	Percent
Unk	3	2.8
Hidatic Cyst	1	0.9
NTM	2	1.8
ACTIVE TB	7	6.4
TB sequelae	45	41.3
Other Bronchiectasis	19	17.4
Lung Abscess	8	7.3
Necrotizing pneumonia	4	3.7
Aspergilosis	16	14.7
fungal diseases	4	3.7
Total number of patients	109	100



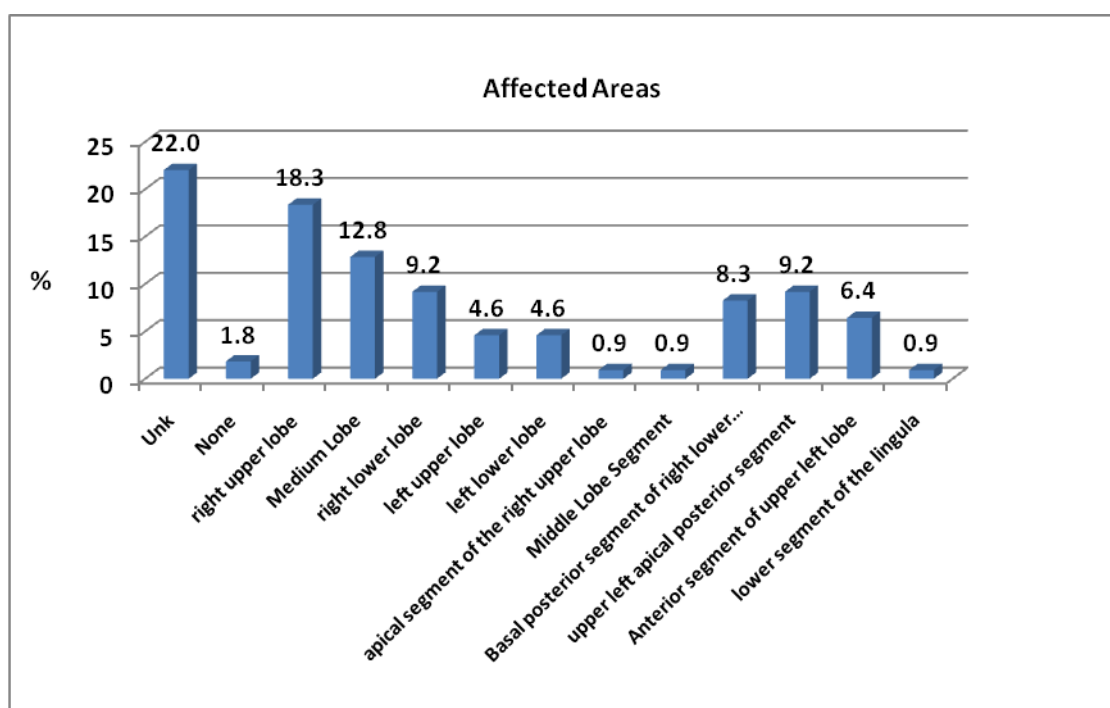
Drugantibpclinictr eat

Drugantibpclinictr eat	Occurrences	Percent
Unk	55	50.5
Augmentin	1	0.9
Azithromycin	1	0.9
Clindamycin, Tazobactam	1	0.9
nincs	2	1.8
None	24	22.0
Nono	1	0.9
Tazobactam	1	0.9
Tazocin	2	1.8
tyrggreg	1	0.9
Wide specrtrum antibiotics	1	0.9
Zinacef	19	17.4
Total	109	100.0



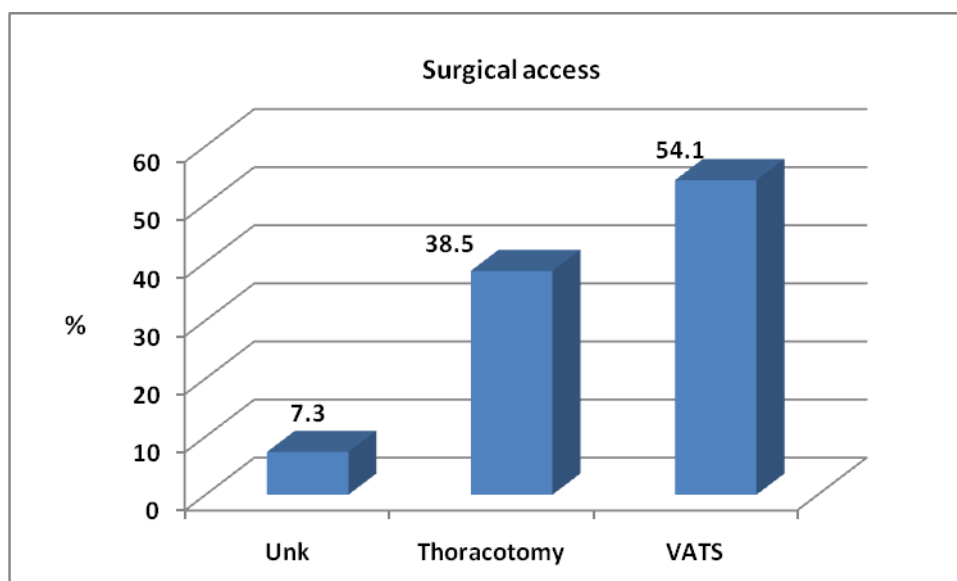
Affected Areas

Affected Areas	Occurrences	Percent
Unk	24	22.0
None	2	1.8
right upper lobe	20	18.3
Medium Lobe	14	12.8
right lower lobe	10	9.2
left upper lobe	5	4.6
left lower lobe	5	4.6
apical segment of the right upper lobe	1	0.9
Middle Lobe Segment	1	0.9
Basal posterior segment of right lower lobe	9	8.3
upper left apical posterior segment	10	9.2
Anterior segment of upper left lobe	7	6.4
lower segment of the lingula	1	0.9
Total	109	100.0

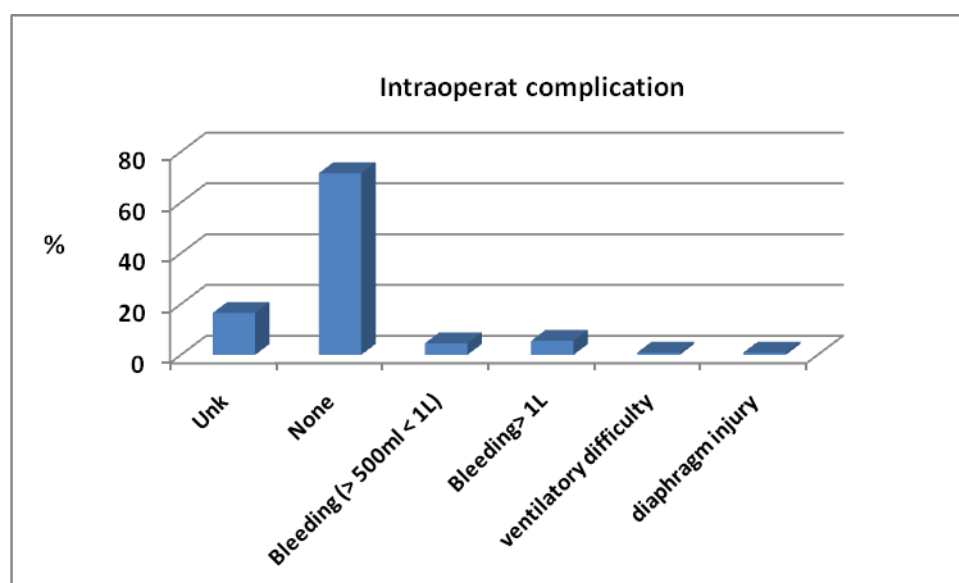


Surgical Access

Surgical Access	Occurrences	Percent
Unk	8	7.3
Thoracotomy	42	38.5
VATS	59	54.1
Total	109	100.0

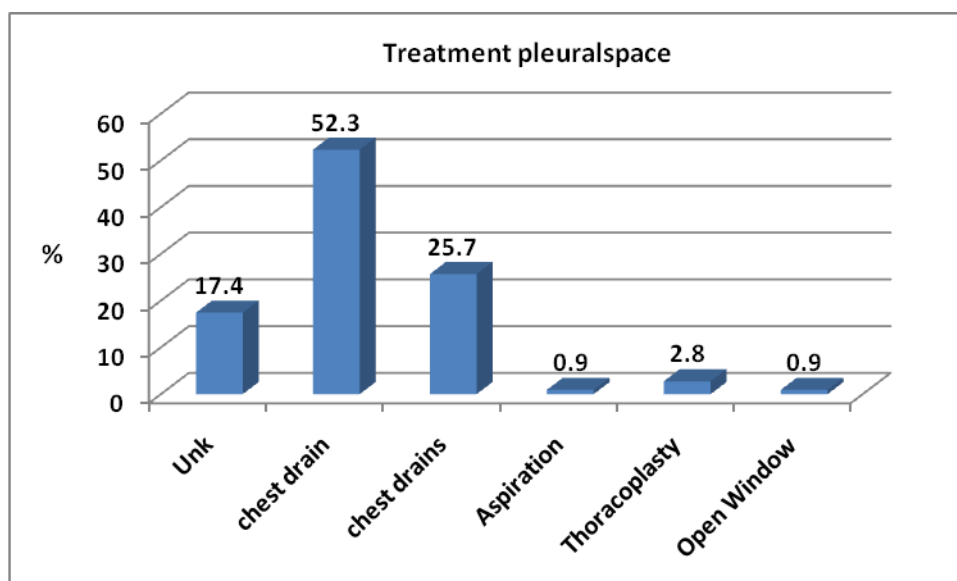


intraoperatcomp	Occurrences	Percent
Unk	18	16.5
None	78	71.6
Bleeding (> 500ml < 1L)	5	4.6
Bleeding> 1L	6	5.5
ventilatory difficulty	1	0.9
diaphragm injury	1	0.9
Total	109	100.0



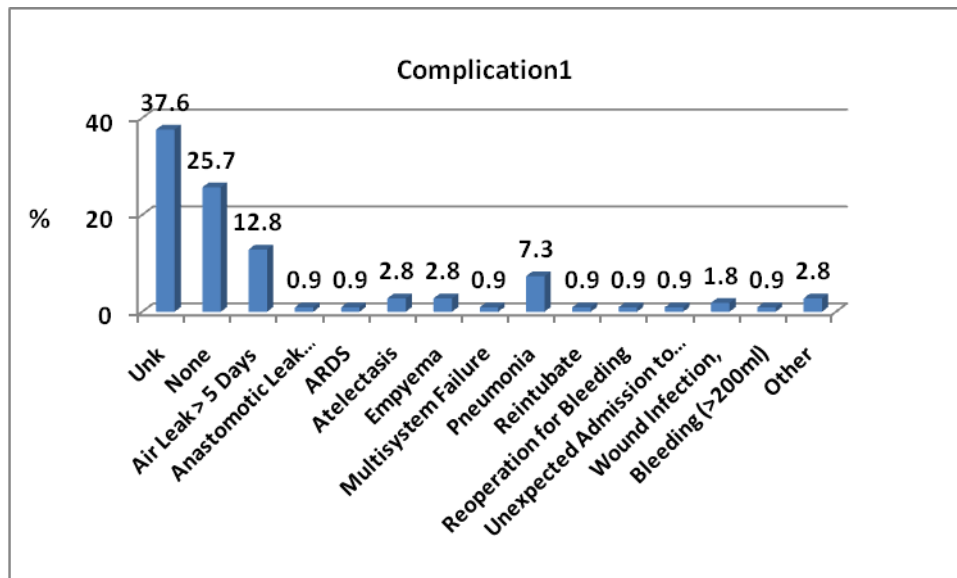
lungrestargetnwedge	Occurrences	Percent
Unk	10	9.2
None	68	62.4
right upper lobe	8	7.3
Medium Lobe	2	1.8
right lower lobe	2	1.8
-lower left lobe	1	0.9
apical segment of the right upper lobe	1	0.9
lower right upper lobe segment	1	0.9
Medial Segment of Middle Lobe	1	0.9
Lobe Middle Segment	1	0.9
upper right lower lobe segment,	2	1.8
Basal anterior segment of right lower lobe	2	1.8
Basal posterior segment of right lower lobe	2	1.8
upper left apical posterior segment	3	2.8
lower segment of the lingula	1	0.9
Upper left lower lobe segment,	3	2.8
Left Pneumonectomy	1	0.9
Total	109	100.0

treatmentpleuralspace	Occurrences	Percent
Unk	19	17.4
chest drain	57	52.3
chest drains	28	25.7
Aspiration	1	0.9
Thoracoplasty	3	2.8
Open Window	1	0.9
Total	109	100.0

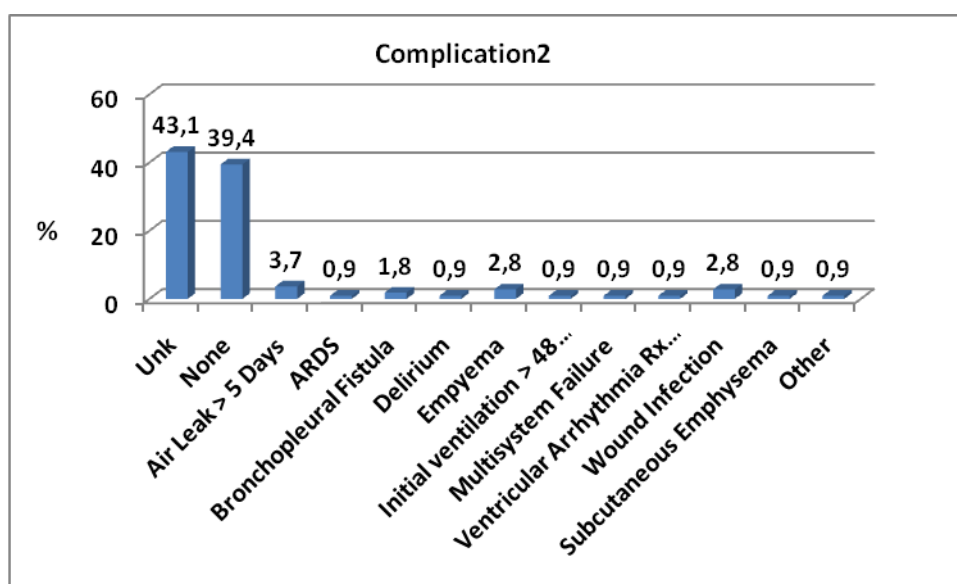


Complication1

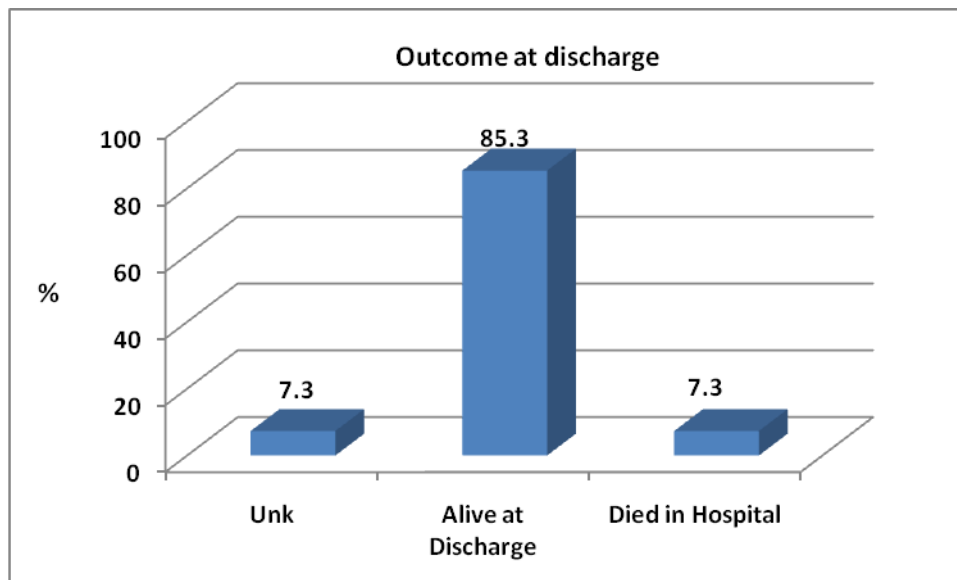
Complication1	Occurrences	Percent
Unk	41	37.6
None	28	25.7
Air Leak > 5 Days	14	12.8
Anastomotic Leak (Conservative)	1	0.9
ARDS	1	0.9
Atelectasis	3	2.8
Empyema	3	2.8
Multisystem Failure	1	0.9
Pneumonia	8	7.3
Reintubate	1	0.9
Reoperation for Bleeding	1	0.9
Unexpected Admission to ICU	1	0.9
Wound Infection, Bleeding (>200ml)	2	1.8
Other	3	2.8
Total	109	100.0



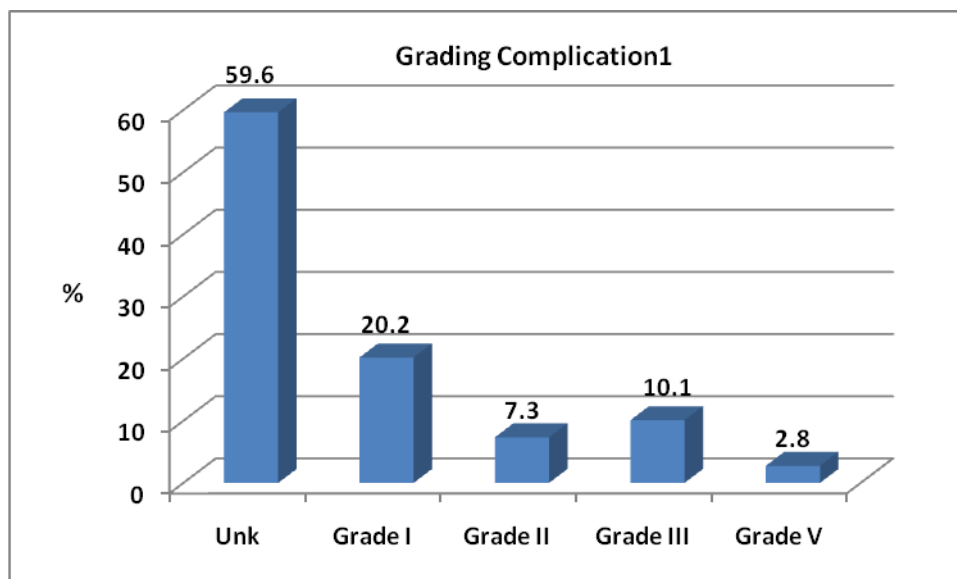
Complication2	Occurrences	Percent
Unk	47	43.1
None	43	39.4
Air Leak > 5 Days	4	3.7
ARDS	1	0.9
Bronchopleural Fistula	2	1.8
Delirium	1	0.9
Empyema	3	2.8
Initial ventilation > 48 hours	1	0.9
Multisystem Failure	1	0.9
Ventricular Arrhythmia Rx Postop	1	0.9
Wound Infection	3	2.8
Subcutaneous Emphysema	1	0.9
Other	1	0.9
Unk	47	43.1
Total	109	100.0



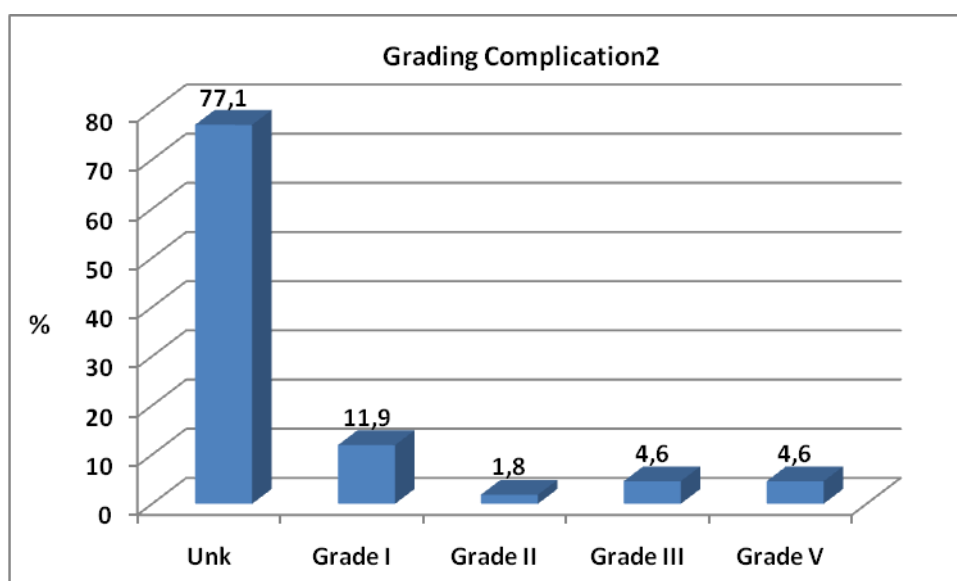
Outcome at discharge	Occurrences	Percent
Unk	8	7.3
Alive at Discharge	93	85.3
Died in Hospital	8	7.3
Total	109	100.0



Grading comp1	Occurrences	Percent
Unk	65	59.6
Grade I	22	20.2
Grade II	8	7.3
Grade III	11	10.1
Total	109	100.0

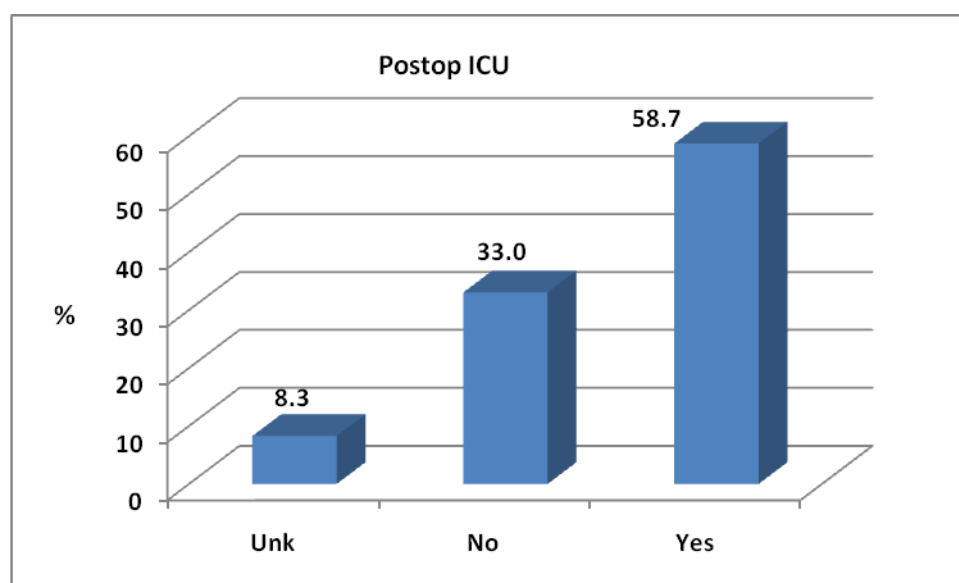


Grading comp2	Occurrences	Percent
Unk	84	77.1
Grade I	13	11.9
Grade II	2	1.8
Grade III	5	4.6
Total	109	100.0



Post Op ICU

Post OP ICU	Occurrences	Percent
Unk	9	8.3
No	36	33.0
Yes	64	58.7
Total	109	100.0



Name Unit	N
Thoracic Surgery - Medical University of Vienna - Waehringer Guertel	1
Instituto do Cancer do Estado de Sao Paulo	41
Thoraxchirurgin und Leitende rztin am USZ Zurich	1
Attikon University Hospital Athens	10
Medical University of Essen, Ruhrlandklinik, Dept. of Thoracic Surgery	1
University of Szeged, Department of Surgery	25
Ibn Rochd Casablanca	28
H. Clinico San Carlos, Madrid	1
Miguel Servet	1
Total	109

Appendix 1 : General Data Appendix 1: Database format and submission of data

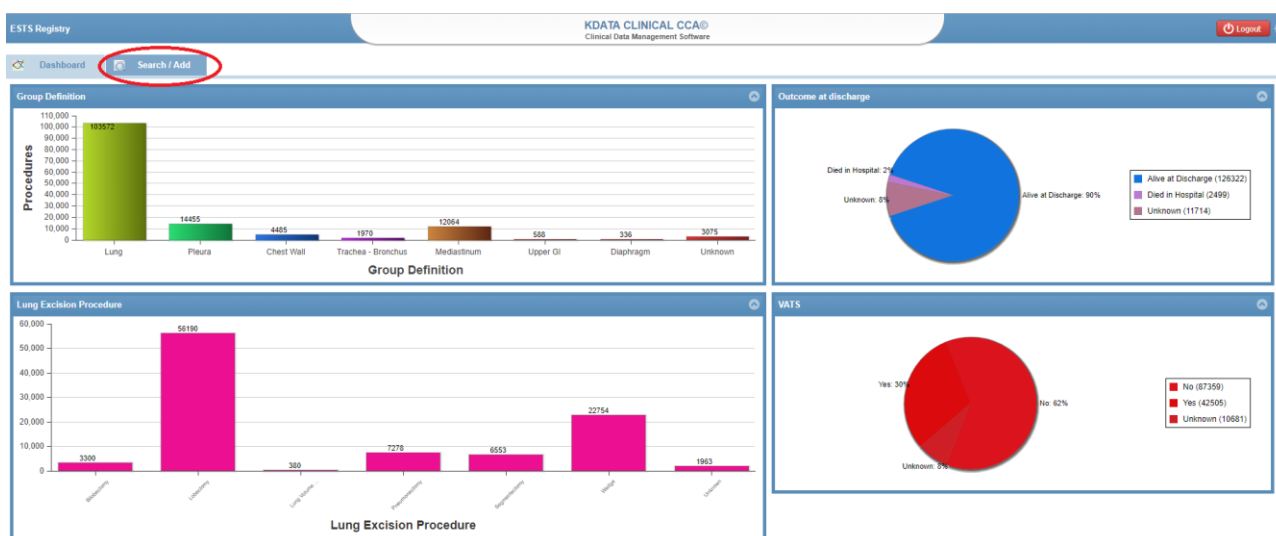
The first step is to request and obtain a login account through the relevant link found in the ESTS homepage (<http://www.ests.org>) or by directly sending an email to one of the members of the Database Committee. Once you have a valid login account you can proceed through the following data entry interface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

The screenshot shows the 'KDATA Clinical CCE' interface. At the top, there is a 'Search / Add' button labeled (1). Below it, the 'Search / Add patients' section contains input fields for 'Family name', 'First name', 'Sex', and 'Hospital Number', along with 'Search patients' and 'Add new patient' buttons. The 'Add new patient' button is labeled (2). A modal window titled 'Add new patient' is open, showing a form to 'Insert patient data' with fields for 'Last name', 'First name', 'Gender', 'Date of birth', and 'Hospital Number'. The 'Add patient' button at the bottom of this modal is labeled (3). The background shows a table of patient records.

Last name	First name	Date of birth	Sex	Hospital Number
T			M	RTGRTGRGTR45454
Mesothelioma			M	rtgertgvc4445
TIMO			M	4345454F4F4FFF
patientests			M	trh5th4ger1
CHEST WALL			M	WRVRFREF243R3R
VERDI			M	PPPPPPPPPPPPPPPP
TESTINA			M	ERGRGFEGQF
Patient			M	PTNTST55S12D643B
carmelo			M	crmbnc90p22i235r
Rosso			M	BLLNDR80P22L219P
Paziente	Tizio	12/11/1933	M	TVGWECFWED333
Test55	PAtient55	12/11/1944	M	PLLDNL77C17D643Y

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.

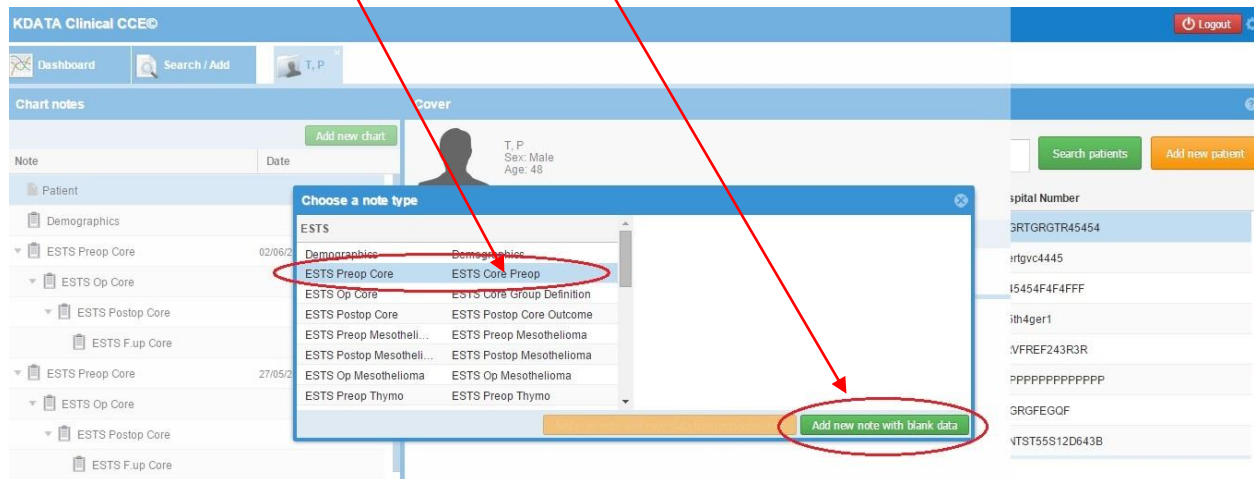
The screenshot shows the 'KDATA Clinical CCE' interface. At the top, there is a 'Search / Add' button. Below it, the 'Search / Add patients' section contains input fields for 'Family name', 'First name', 'Sex', and 'Hospital Number', along with 'Search patients' and 'Add new patient' buttons. The background shows a table of patient records.

Last name	First name	Date of birth	Sex	Hospital Number
T	P	12/12/1966	M	RTGRTGRGTR45454
Mesothelioma	patient	11/12/1933	M	rtgertgvc4445
TIMO	Patient	12/11/1966	M	4345454F4F4FFF
patientests	patientests	12/12/1944	M	trh5th4ger1
CHEST WALL	Patient	12/11/2033	M	WRVRFREF243R3R
VERDI	Giuseppe	15/05/1915	M	PPPPPPPPPPPPPPPP
TESTINA	Testino	12/12/2044	M	ERGRGFEGQF
Patient	Test	11/12/1955	M	PTNTST55S12D643B

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.

KDATA Clinical CCE® Logout

Dashboard Search / Add T, P

Chart notes Add new chart

Note	Date
Patient	
Demographics	
ESTS Preop Core	02/06/2015
ESTS Op Core	
ESTS Postop Core	
ESTS F.up Core	
ESTS Preop Core	27/05/2015
ESTS Op Core	
ESTS Postop Core	
ESTS F.up Core	
ESTS Preop Thymo	09/07/2015
ESTS Op Thymo	
ESTS Postop Thymo	
ESTS F.up Thymo	

Dettagli nota Print

Risk Factors **Diagnosis & Staging**

Date of ThorSurgProcs	02/06/2015	Age at surgery	48
Urgency	Elective		
Smoking History	Past smoker (stopped >1month prior to surgery)		
ASA	Mild systemic disease	ECOG	Light Work Only
Weight (Kg)	88	Height (m)	1.7
BMI	30.45	MRC Score	3
FEV1 (Litres)	2	FEV1 (%)	77
ppoFev1(%)	66	FVC (Litres)	
FVC(%)		FEV1(L)/FVC(L)	

Reset Save

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.

KDATA Clinical CCE® Logout

Dashboard Search / Add T, P

Chart notes Add new chart

Note	Date
Patient	
Demographics	
ESTS Preop Core	02/06/2015
ESTS Op Core	
ESTS Postop Core	
ESTS F.up Core	
ESTS Preop Core	27/05/2015
ESTS Op Core	
ESTS Postop Core	
ESTS F.up Core	
ESTS Preop Thymo	09/07/2015
ESTS Op Thymo	
ESTS Postop Thymo	
ESTS F.up Thymo	

Dettagli nota Print

Risk Factors **Diagnosis & Staging**

Choose note to link to

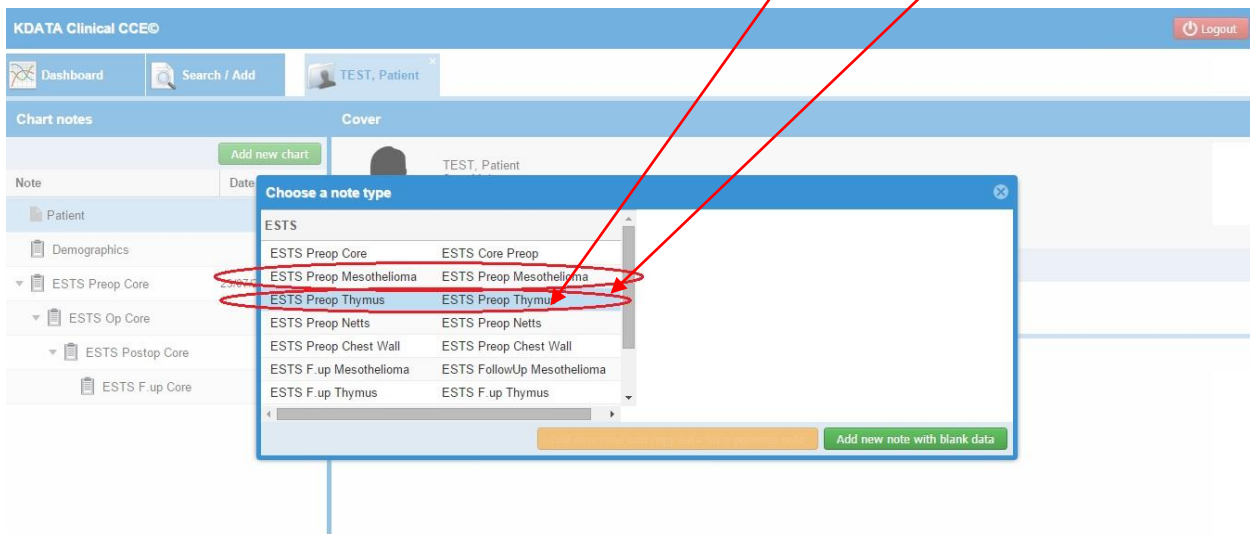
Name	Date	Last modified
ESTS Postop Core	02/06/2015	10/07/2015
ESTS Postop Core	27/05/2015	02/06/2015

Link to selected note

Age at surgery	48
Urgency	Elective
Smoking History	Past smoker (stopped >1month prior to surgery)
ASA	Mild systemic disease
ECOG	Light Work Only
Weight (Kg)	88
Height (m)	1.7
BMI	30.45
MRC Score	3
FEV1 (Litres)	2
FEV1 (%)	77
ppoFev1(%)	66
FVC (Litres)	
FVC(%)	
FEV1(L)/FVC(L)	

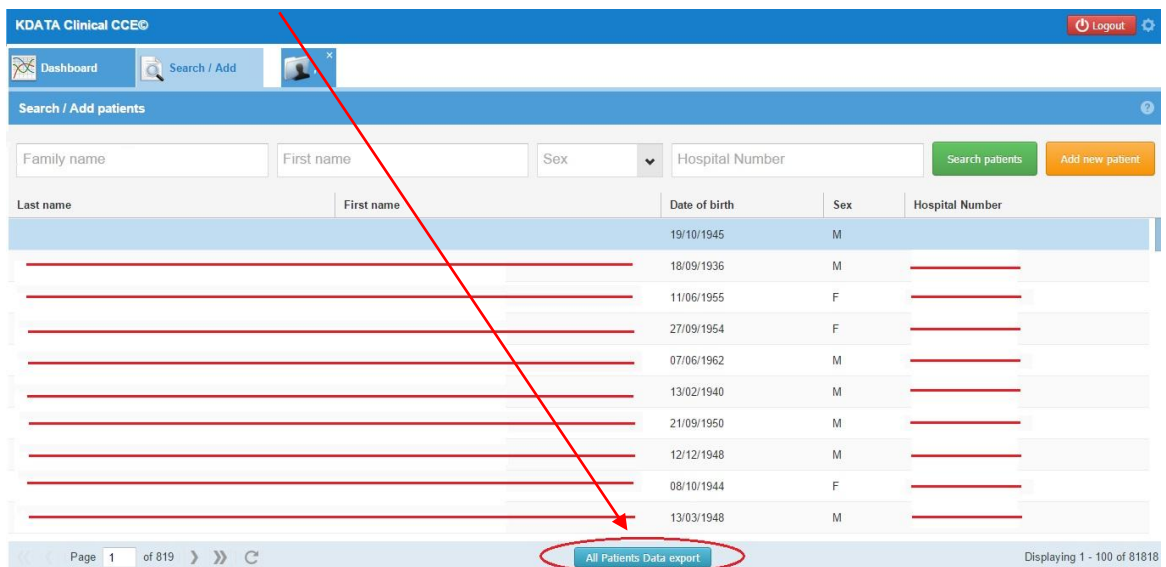
Reset Save

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.

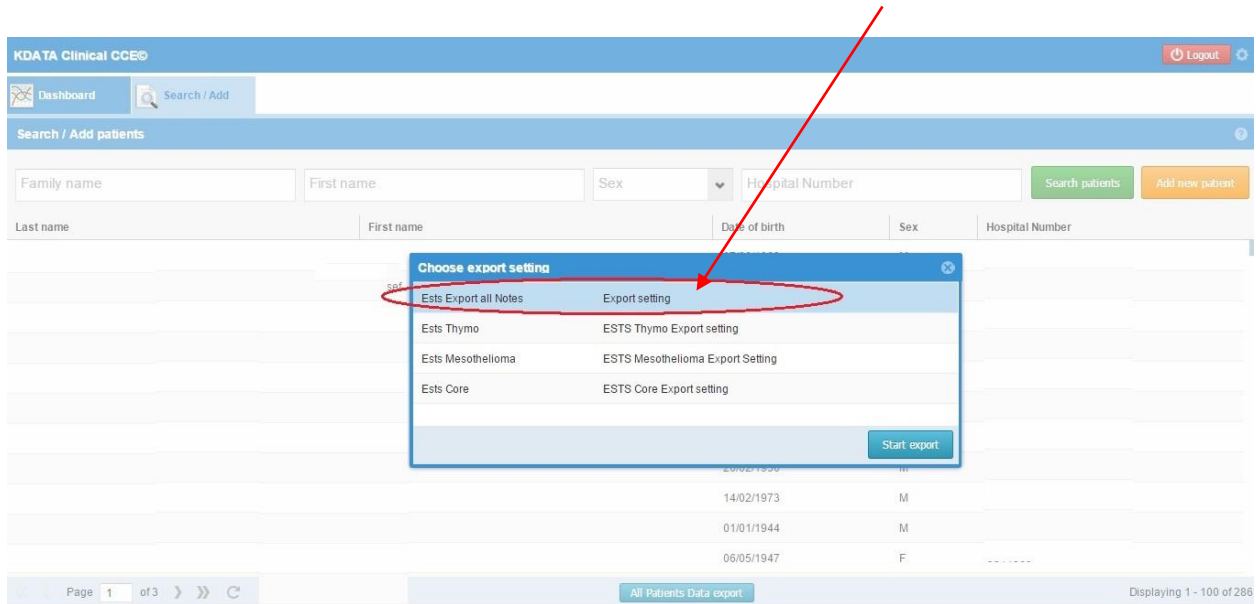


In summary the first step after put in the demographics data or search a patient just saved is to select the specific note and in case of thymo or MEsothelioma or NEtts or chest wall is necessary select the specific note.

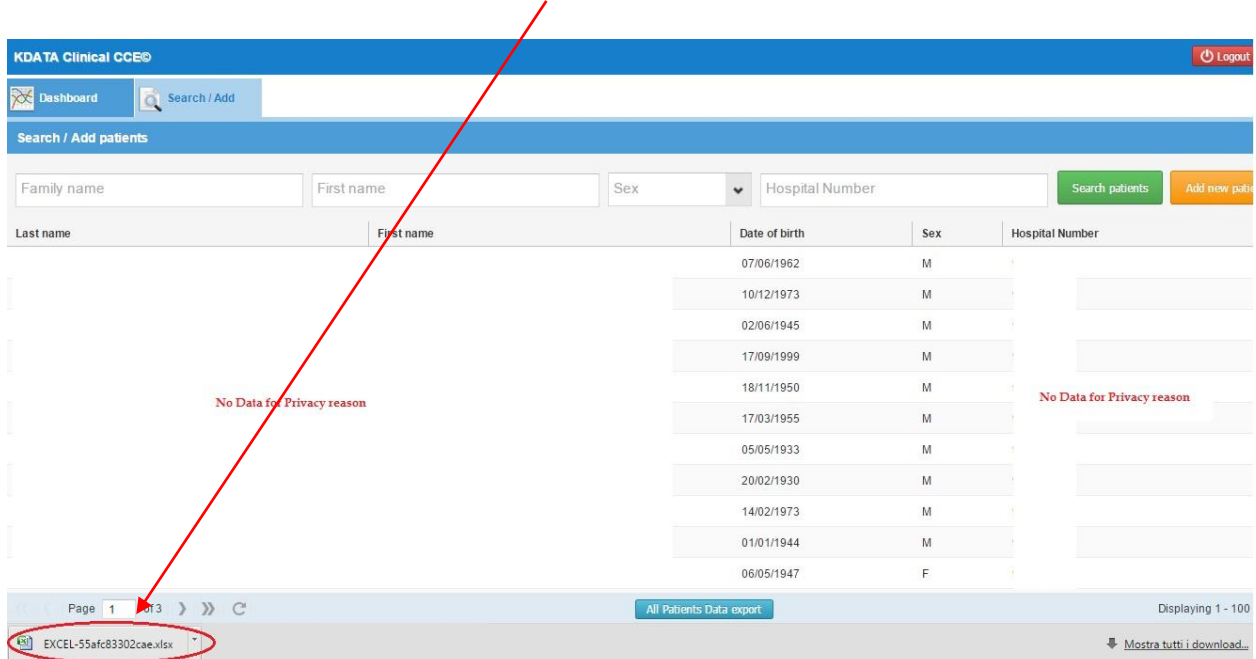
In any case the total export permit to have a cumulative file with all type of procedures



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

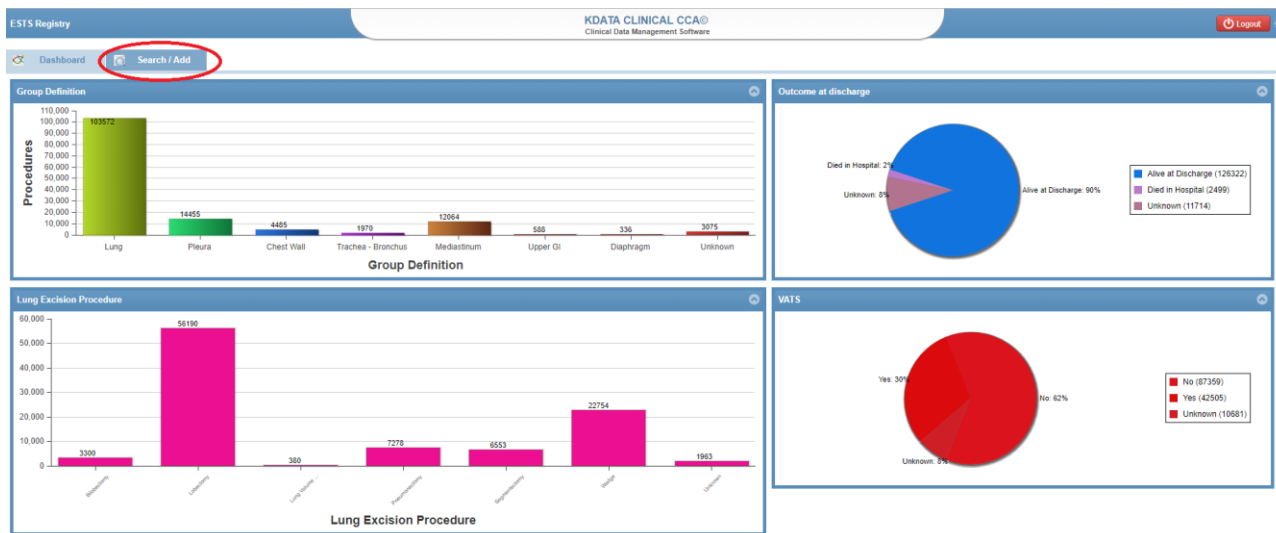


After you can open the file downloaded on the taskbar below



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 been developed for the satellite Registries.

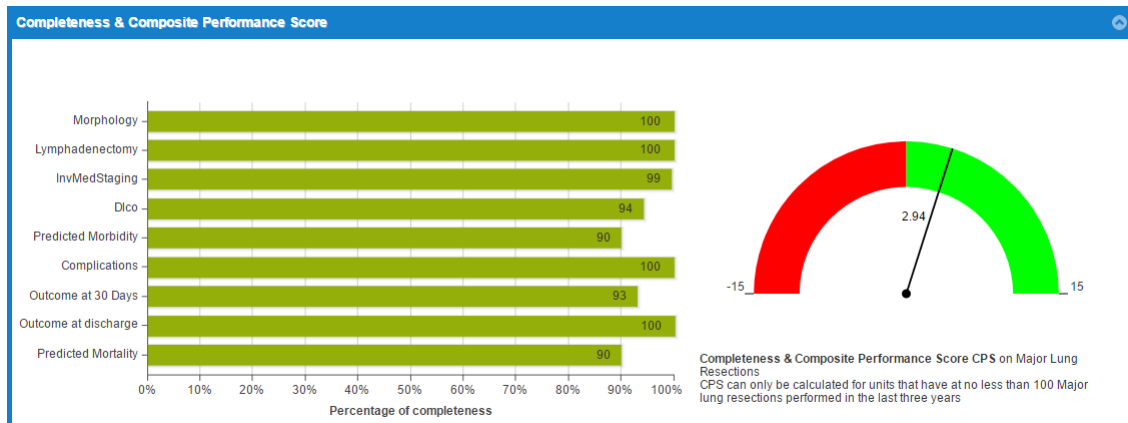
Completeness and Composite Performance Score.

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/mm³) or leukocytosis (≥12,000 WBC/mm³)
- For adults ≥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. O₂ desaturations (e.g., PaO₂/FiO₂ ≤ 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:

Eurlung 1 was used to adjust cardiopulmonary morbidity:

Logit= $-2.465 + 0.497 \times \text{sex male (coded 1 for male and 0 for female)} + 0.026 \times \text{Age} + 0.231 \times \text{CAD (coded 1 for presence of CAD)} + 0.371 \times \text{CVD (coded 1 for presence of CVD)} + 0.152 \times \text{CKD (coded 1 for presence of CKD)} - 0.015 \times \text{ppoFEV1} + 0.514 \times \text{extended resections (coded 1 for presence of extended resection)} + 0.497 \times \text{thoracotomy (coded 1 for thoracotomy and 0 for VATS)}.$

Eurlung 2 was used to adjust 30 day mortality:

Logit= $-5.82 + 0.903 \times \text{sex male (coded 1 for male and 0 for female)} + 0.044 \times \text{Age} + 0.264 \times \text{CAD (coded 1 for presence of CAD)} + 0.582 \times \text{CVD (coded 1 for presence of CVD)} - 0.064 \times \text{BMI} + 0.300 \times \text{extended resection (coded 1 for extended resection)} + 0.929 \times \text{pneumonectomy (coded 1 for pneumonectomy and 0 for lesser resection)} + 0.894 \times \text{thoracotomy (coded 1 for thoracotomy and 0 for VATS)} - 0.009 \times \text{ppoFEV1}.$

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 calculate and 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 need 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'Amico T, et al. European guidelines on structure and qualification of general thoracic surgery. Eur J Cardiothorac Surg. 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 ESTSmeeting
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 accept the 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 file KData 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

The “Hungarian Model” Experience

Dear Colleagues,

It is a great privilege to present the Hungarian Chapter of the ESTS Silver Book 2025, summarizing thoracic surgical activity in Hungary from 2017 to 2024. This chapter reflects the continued evolution of the ESTS’s “Hungarian Model”, a collaborative framework that integrates national-level data into the broader European Society of Thoracic Surgeons (ESTS) Database.

This model continues to serve as a benchmark for regional integration, enabling centers to contribute meaningfully and to achieve quality assurance and academic progress. In 2024 alone, 4,493 thoracic procedures were performed across 13 Hungarian centers, bringing the cumulative national dataset to over 40,000 cases.

Lung resections remain the cornerstone of our activity, comprising 63.4% of all procedures, with lobectomy (47.3%) and wedge resection (39.1%) as the leading techniques. Importantly, 64.4% of all lung resections and 58% of lobectomies were performed using video-assisted thoracic surgery (VATS)—significantly above the European average.

A noteworthy development in 2024 is the growing role of robotic-assisted thoracic surgery (RATS), which now represents a significant proportion of minimally invasive cases. With the launch of the revised robotic section of the ESTS database, I hope that both robotic-assisted surgery and VATS will be equally recognized as minimally invasive techniques, fostering a more comprehensive and integrated view of contemporary thoracic surgical practice.

The national in-hospital mortality for primary lung cancer resections remained low at 0.7%, with lobectomies (0.6%) and segmentectomies (0.4%) reflecting particularly favorable outcomes. These results are a testament to the experience and consistency of the participating Hungarian centers.

Institutional activity remains strong across the country. Encouragingly, there are promising signs of increased PET-CT and DLCO (diffusing capacity) utilization across several centers. This trend will likely support additional institutions in meeting ESTS accreditation criteria, expanding the network of officially recognized Hungarian thoracic surgery units in the near future.

I hope that future developments will be successful in enabling easier data import and synchronization between institutional electronic medical records and the ESTS platform. This will reduce administrative burden, improve data completeness, and enhance real-time quality monitoring.

The 2025 Hungarian Chapter is both a testament to our collective progress and a call for continued collaboration. I extend my sincere gratitude to all participating surgeons, administrators, and institutions for their invaluable contributions. Together, we remain committed to advancing thoracic surgery in Hungary and throughout Europe.

With my kindest regards,

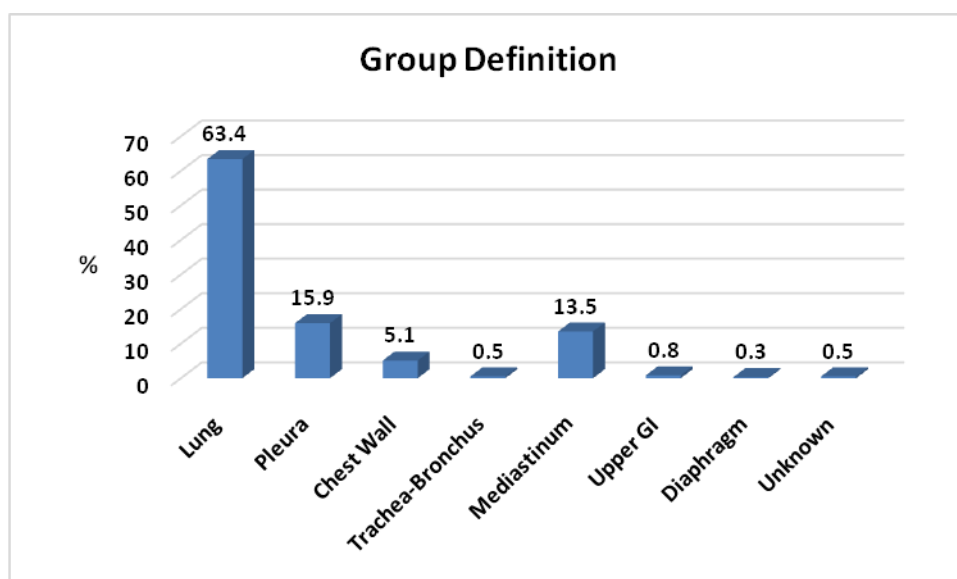
Áron Ghimesy MD. PhD.

ESTS Regent for Hungary

Hungarian Cumulative Data

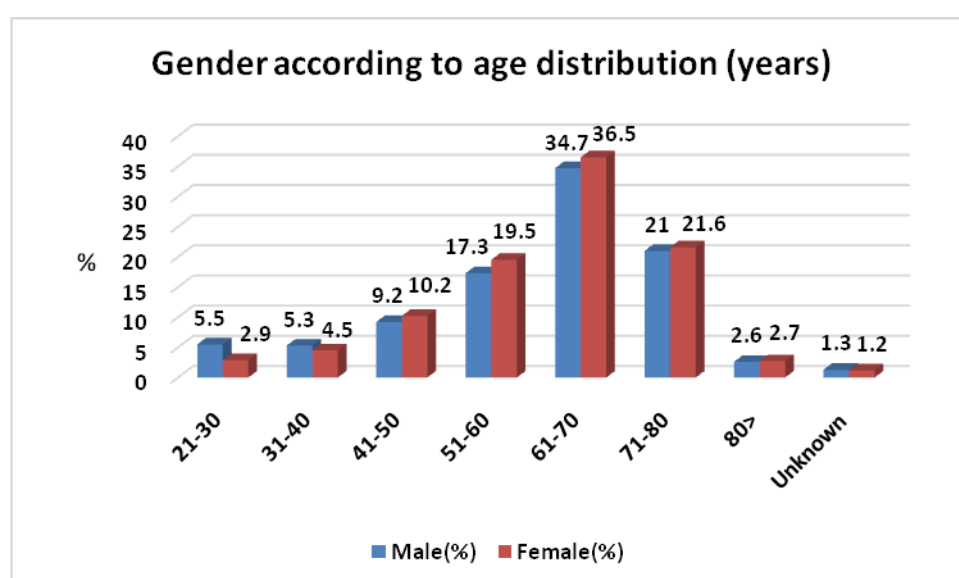
Group Definitions

Group Definition	Occurrences	Percent
Lung	25737	63.4
Pleura	6441	15.9
Chest Wall	2082	5.1
Trachea-Bronchus	182	0.5
Mediastinum	5490	13.5
Upper GI	318	0.8
Diaphragm	131	0.3
Unknown	212	0.5
Total	40593	100



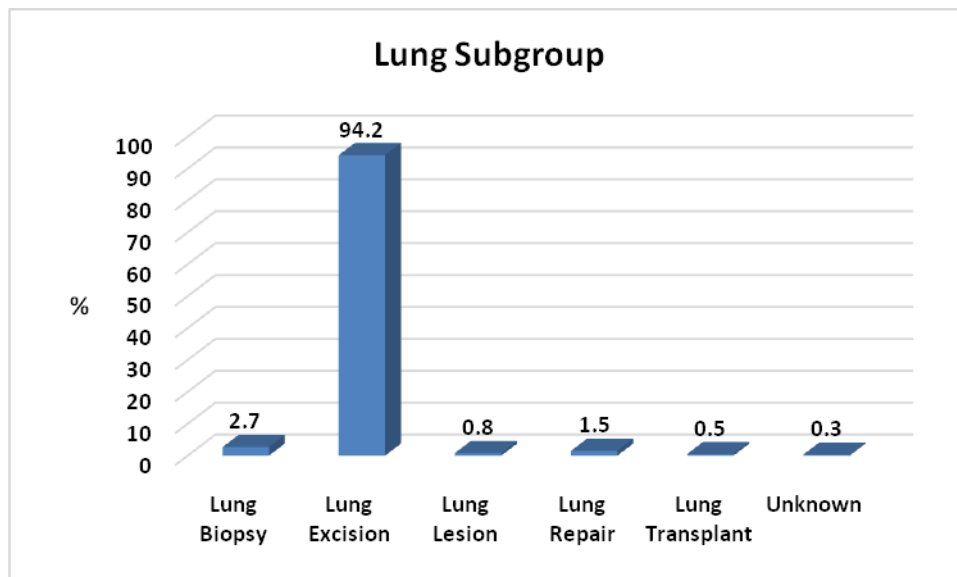
Gender according to age distribution (years)

Age (years)	Male (%)	Female (%)
<=20	3.1	0.9
21-30	5.5	2.9
31-40	5.3	4.5
41-50	9.2	10.2
51-60	17.3	19.5
61-70	34.7	36.5
71-80	21	21.6
80>	2.6	2.7
80>	2.6	2.7



Lung Subgroup

	Occurrences	Percent
Lung Biopsy	698	2.7
Lung Excision	24237	94.2
Lung Lesion	218	0.8
Lung Repair	382	1.5
Lung Transplant	126	0.5
Unk	76	0.3
Total	25737	100

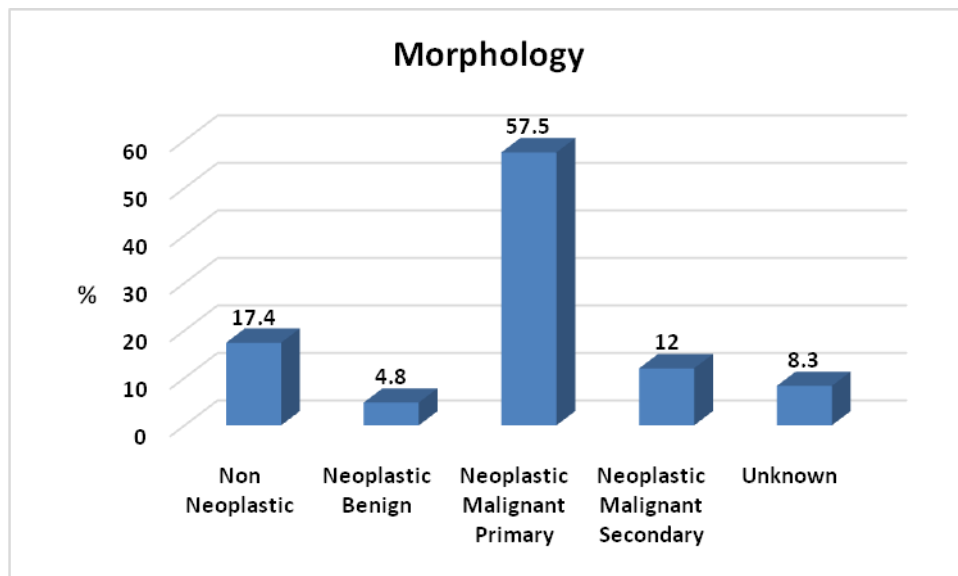


Lung Excision Procedure

	Occurrences	Percent
Bilobectomy	380	1.6
Lobectomy	11469	47.3
Lung Volume Reduction	43	0.2
Pneumonectomy	933	3.8
Segmentectomy	1768	7.3
Wedge	9475	39.1
Unk	169	0.7
Total	24237	100

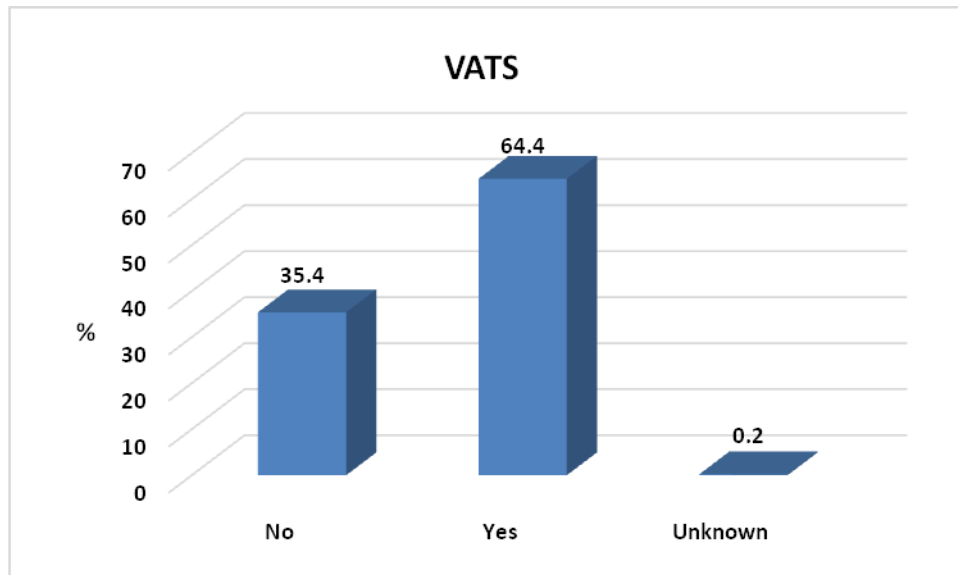
Lungresections pathology

Morphology	Occurrences	Percent (%)
Non Neoplastic	4207	17.4
Neoplastic Benign	1167	4.8
Neoplastic Malignant Primary	13939	57.5
Neoplastic Malignant Secondary	2901	12
Unknown	2023	8.3
Total	24237	100



Lungresections pathology (All lung resections)

VATS	Occurrences	Percent (%)
No	8577	35.4
Yes	15613	64.4
Unknown	47	0.2
Total	24237	100

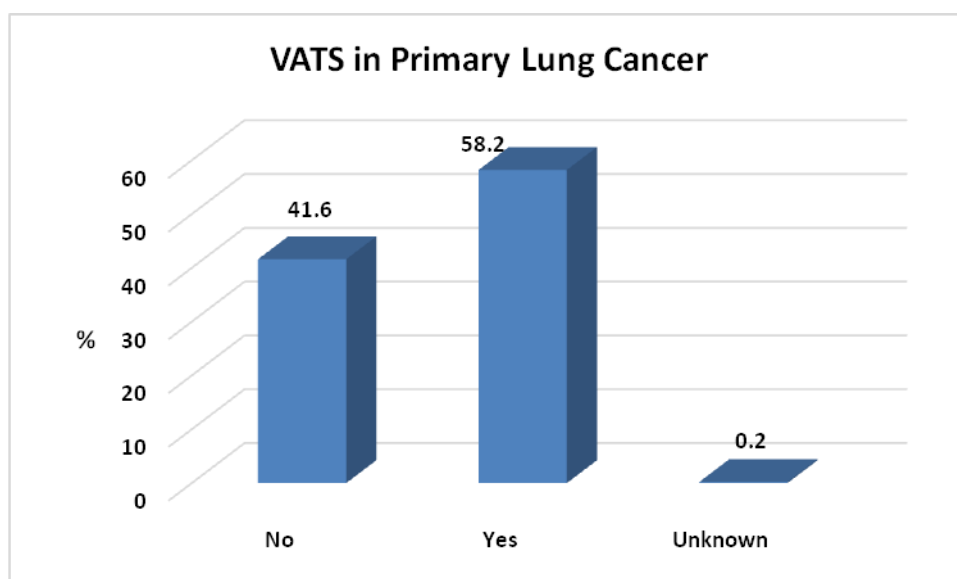


Lungresections pathology (Only Lobectomy)

VATS	Occurrences	Percent (%)
No	4808	41.9
Yes	6647	58
Unknown	14	0.1
Total	11469	100

Lungresections pathology (Primary malignant)

VATS	Occurrences	Percent (%)
No	5798	41.6
Yes	8108	58.2
Unknown	33	0.2
Total	13939	100

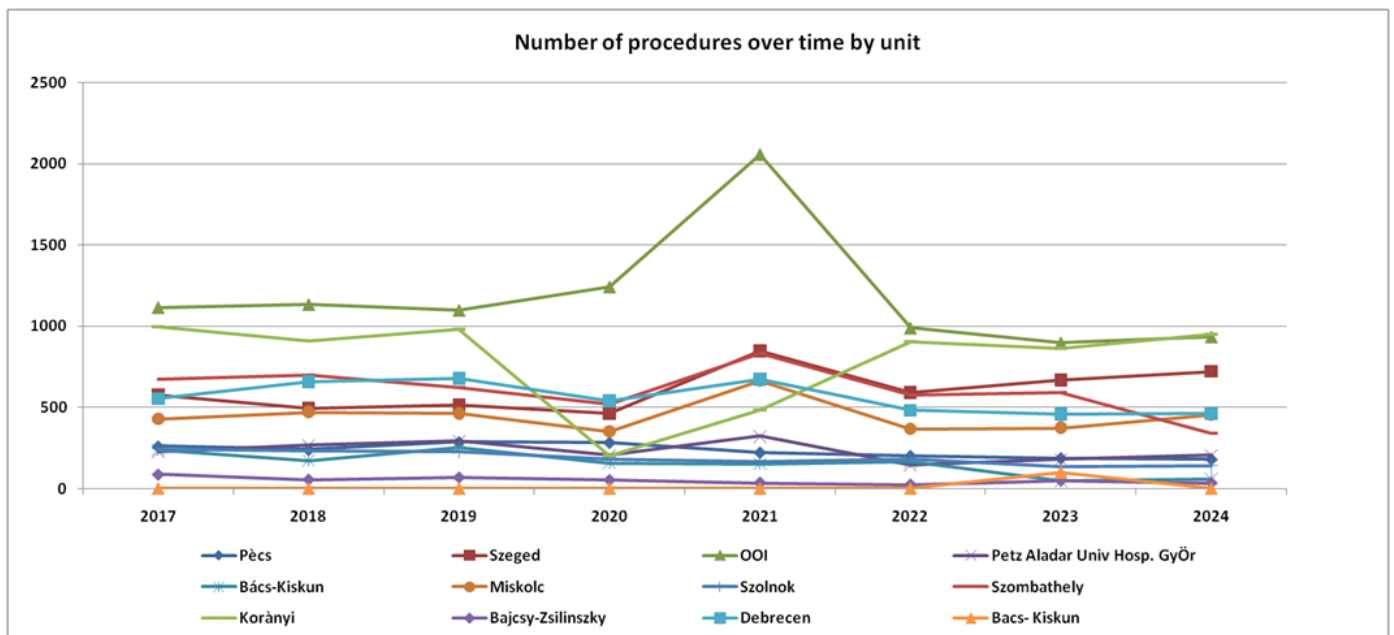


Unadjusted in-hospital mortality rates in lung excision procedures (Primary Lung Cancer)

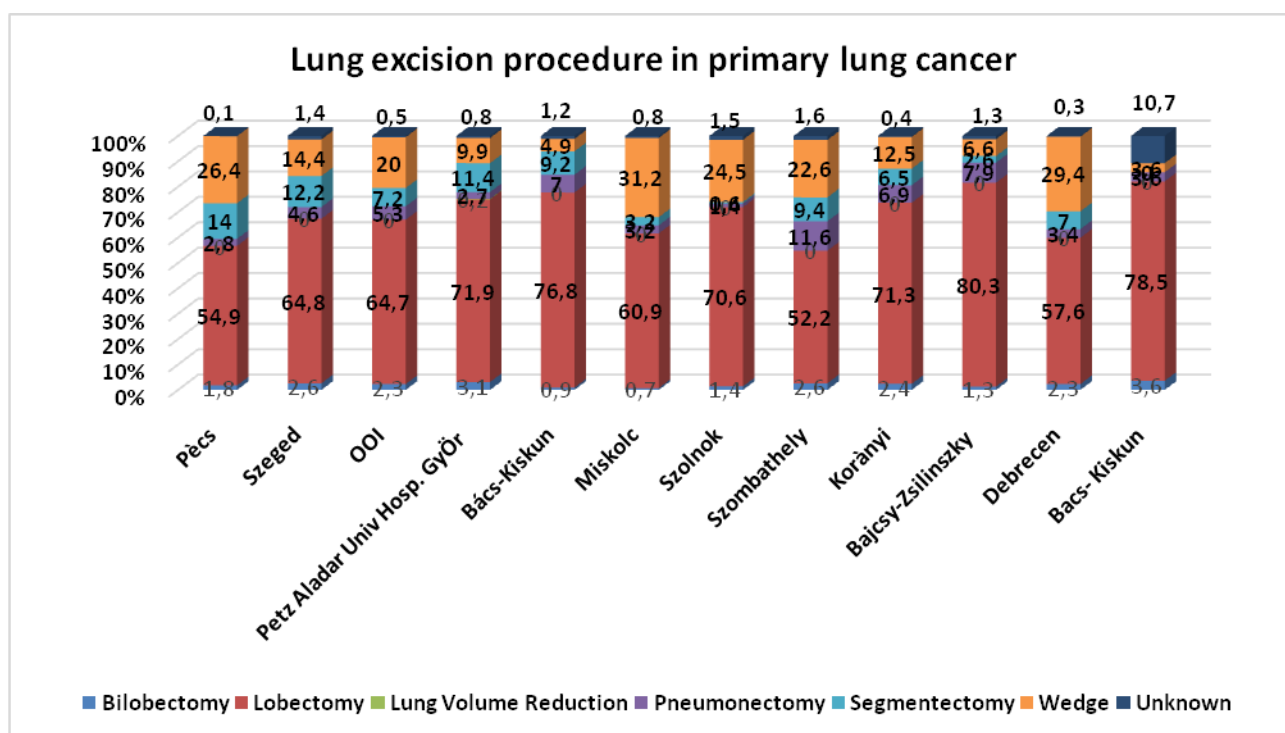
Outcome at Discharge - Died in Hospital	N	Died in Hospital	Percent(%)
Bilobectomy	298	7	2.3
Lobectomy	8600	49	0.6
Lung Volume Reduction	3	0	0
Pneumonectomy	719	26	3.6
Segmentectomy	1120	5	0.4
Wedge	2740	11	0.4
Total	13480	98	0.7

Units specific activity & Comparative Analysis between contributing units

Country	2017	2018	2019	2020	2021	2022	2023	2024	Total
Pécs	260	240	287	284	223	202	188	182	1866
Szeged	577	493	515	462	850	593	670	722	4882
OOI	1115	1134	1098	1242	2057	988	898	934	9466
Petz Aladar Univ Hosp. Győr	226	266	293	206	323	146	180	207	1847
Bács-Kiskun	240	174	254	159	154	165	49	59	1254
Miskolc	430	472	463	353	665	367	374	457	3581
Szolnok	243	233	229	182	166	181	136	142	1512
Szombathely	676	700	626	519	835	576	594	341	4867
Korányi	998	913	984	201	484	906	862	952	6300
Bajcsy-Zsilinszky	88	56	70	54	37	25	50	36	416
Debrecen	553	658	679	540	672	482	457	461	4502
Bacs- Kiskun	0	0	0	0	0	0	100	0	100
Total	5406	5339	5498	4202	6466	4631	4558	4493	40593

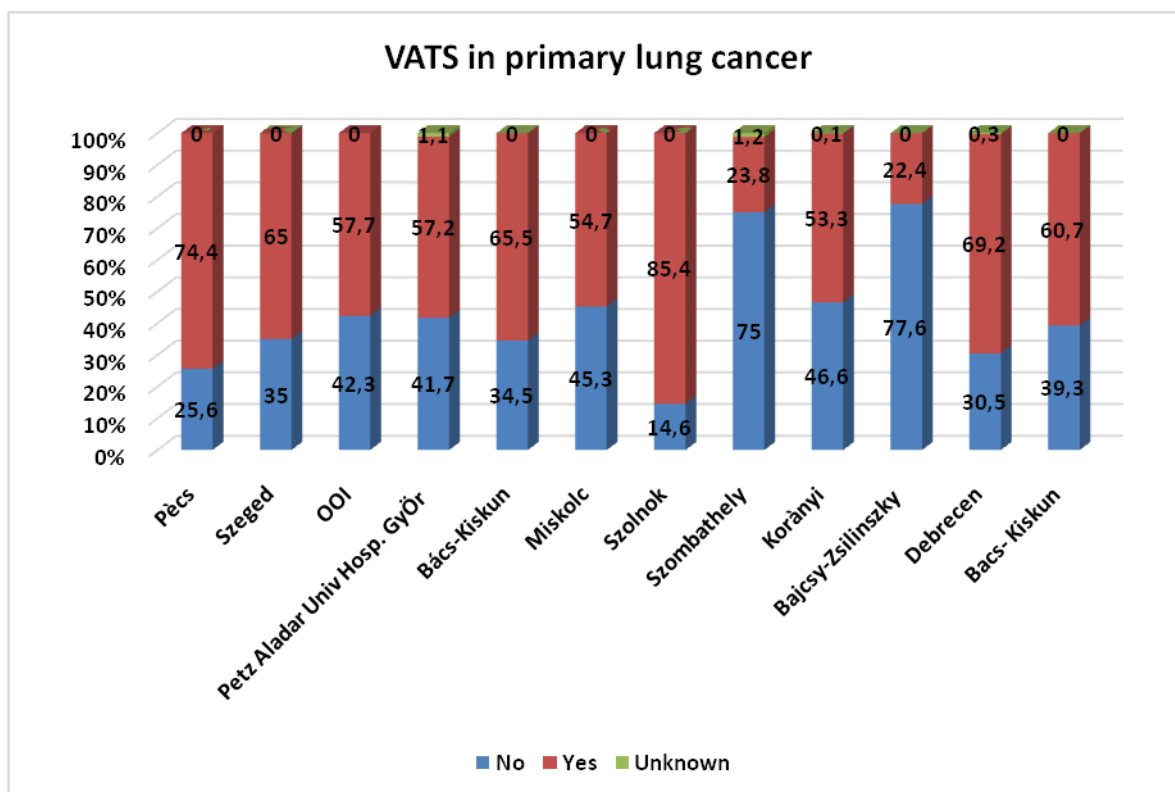


Unit	Total	Bilobectomy	Lobectomy	Lung Volume Reduction	Pneumonectomy	Segmentectomy	Wedge	Unk
Pécs	932	1.8	54.9	0	2.8	14	26.4	0.1
Szeged	1934	2.6	64.8	0	4.6	12.2	14.4	1.4
OOI	4059	2.3	64.7	0	5.3	7.2	20	0.5
Petz Aladar Univ Hosp. Győr	516	3.1	71.9	0.2	2.7	11.4	9.9	0.8
Bács-Kiskun	426	0.9	76.8	0	7	9.2	4.9	1.2
Miskolc	695	0.7	60.9	0	3.2	3.2	31.2	0.8
Szolnok	514	1.4	70.6	0	1.4	0.6	24.5	1.5
Szombathely	1402	2.6	52.2	0	11.6	9.4	22.6	1.6
Korányi	1675	2.4	71.3	0	6.9	6.5	12.5	0.4
Bajcsy-Zsilinszky	76	1.3	80.3	0	7.9	2.6	6.6	1.3
Debrecen	1682	2.3	57.6	0	3.4	7	29.4	0.3
Bacs- Kiskun	28	3.6	78.5	0	3.6	0	3.6	10.7
Total	13939	2.2	63.5	0	5.4	8.2	19.9	0.8



Lungresections pathology (Only Lobectomy – Primary Lung Cancer)

Unit	VATS No (%)	VATS Yes (%)
Pécs	25.6	74.4
Szeged	35	65
OOI	42.3	57.7
Petz Aladar Univ Hosp. Győr	41.7	57.2
Bács-Kiskun	34.5	65.5
Miskolc	45.3	54.7
Szolnok	14.6	85.4
Szombathely	75	23.8
Korányi	46.6	53.3
Bajcsy-Zsilinszky	77.6	22.4
Debrecen	30.5	69.2
Bacs- Kiskun	39.3	60.7



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



STUDIO LEGALE MAGLIO & PARTNERS LUCERNA IURIS – INTERNATIONAL LEGAL NETWORK

In collaborazione con

*Siebert & Kollegen – Freiburg
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
Engstrom Advokats – Stockholm
Procopé & Hornborg Law Offices Ltd – Helsinki
Triple 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 advokátní kancelář s.r.o. – Praha
A&L Goodbody – Dublin
Alrud Law Firm – Moscow
Angela Wang & Co. Solicitors – Hong 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 Clinical

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

Piazza Sant'Agostino, 24 – 20123 Milano – tel. +39.02.43510840 – fax + 39.02.45075007
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).

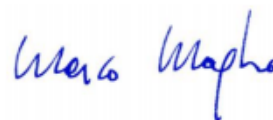
As a result of this verification I can acknowledge that the Holder, in order to prepare the documentation useful to certify the adoption of security measures suitable to prevent the illegal processing of personal data to be placed, has correctly carried out the adjustment activity to the EU Regulation 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

