



DATABASE ANNUAL REPORT

2024

PRODUCED BY THE ESTS DATABASE COMMITTEE



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EUROPEAN SOCIETY OF THORACIC SURGEONS DATABASE COMMITTEE

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Message from the President of ESTS - Jozsef Furak



Dear Colleagues!

It is a great honour for me to present the ESTS Database Silver book with our 2023 surgical results, which publication has very important clinical, practical and scientific value.

Above all, I would like to thank all the colleagues and departments who contribute data to the ESTS Database for their work and contribution.

This compilation of our results will allow us to assess year by year the changes and trends in our development and clinical practice at European level.

The Silver Book provides a good opportunity for everyone and every department to compare their own results with similar results in Europe and possibly make changes to their own daily patient care protocols.

If we look beyond the every day clinical practical use of the Silver Book, we can conclude that the publication can provide good guidelines and data for further clinical studies. We now have a dataset that will have a significant impact on clinical practice for decades to come.

I encourage everyone to read and study the data. I also urge those colleagues and departments who are not yet contributing data to the ESTS Database to join the contributors and to contribute to the European practice of thoracic surgery by presenting their results and to be proud of the work they have done.

Jozsef Furak
President of ESTS

Message from the Director of ESTS Database

Dear Colleagues and Friends,

I am pleased to introduce the 13th edition of the ESTS Silver Book, summarizing thoracic surgical activities from 2007 to 2023. Like previous editions, this version captures essential observations and experiences in thoracic surgery, bolstering the Society's initiatives in quality, research, and patient safety.

In 2023, 136 European units contributed at least 100 cases each to the ESTS Database, resulting in 16,590 new patient records. The increasing commitment from dedicated units and surgeons has expanded the Database to include over 250,000 procedures since its inception in 2007. This remarkable milestone is a testament to the collaborative efforts of participating institutions over the past 15 years, supported by the professional partnership with KdataClinical srl.

Engaging with this database significantly enhances the quality and safety of patient care. The comparative outcome measures have created a virtuous cycle, leading to a notable reduction in operative mortality, as highlighted in this report. Furthermore, participation in the ESTS Database is essential for eligibility for the esteemed ESTS institutional accreditation.

The report aims to provide an “epidemiologic” overview of thoracic surgery activity in Europe. The focus remains on lung resections, the most representative procedures in our specialty and currently under consideration for the European Accreditation program. This year, the Thymic Database experienced a major structural change led by Bernhard Moser, the Director of this Satellite Database. A new set of precisely structured data enhanced the interest of our members interested in this field, and surely will support the overall scientific value of the whole ESTS Database.

We also can welcome a new initiative of the Lung Infectious Database (LID) led by Alessandro Mariani from Brasil. This subdirectory summarizes the data of selected institutions highly experienced in the field of infectious lung diseases with difficult group of patients and surgeries. The alterations in the structure of the European population due to military or political conflicts will probably raise the importance of this kind of important knowledge.

Instead of a country-by-country analysis, we have opted for a more relevant comparison between contributing units. For a coherent analysis from a European accreditation perspective, we included only European units that have contributed data on more than 150 major lung resections performed in the last three years.

On behalf of the ESTS Database Committee, I extend our heartfelt thanks to all recent and future data contributors for their admirable efforts and valuable cooperation. We look forward to receiving your feedback and discussing new initiatives face-to-face. Don't forget to download the short version of the Silver Book from 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 buy-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 2023) in the registry are shown

Country	City	Institution
ALBANIA	TIRANA	University Hospital of Lung Diseases "Shefqet Ndreqi"
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

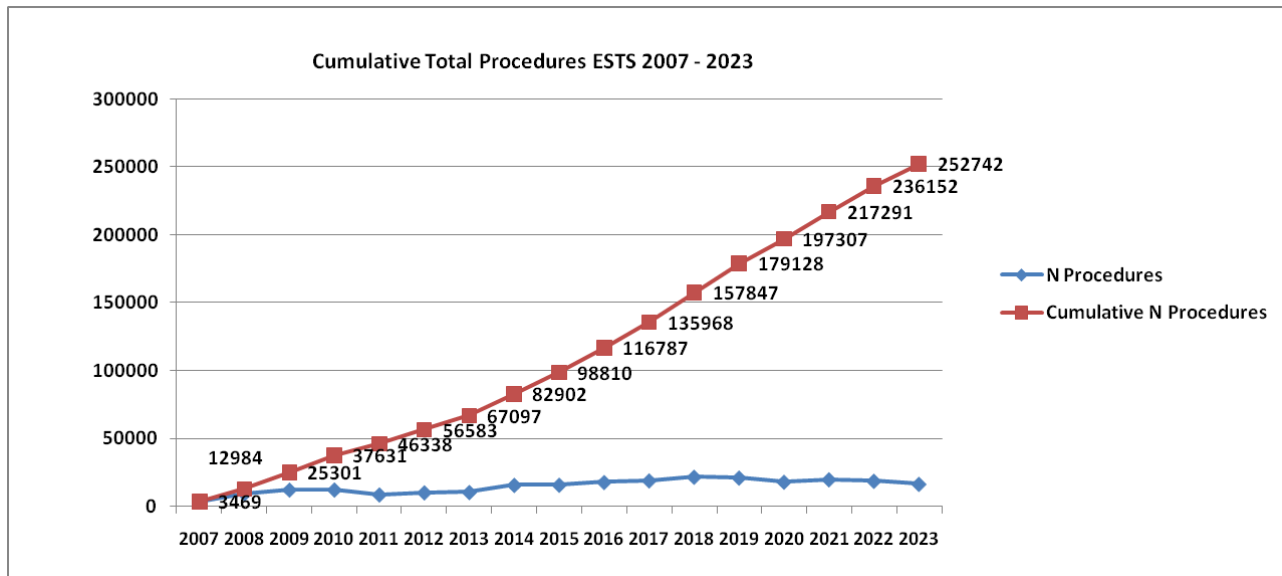
PORTUGAL	VILA NOVA DE GAIA	centro Hospitalar de Vila Nova de Gaia Espinho
ROMANIA	BUCHAREST	Institute of Oncology Bucharest
ROMANIA	BUCHAREST	Marius Nasta Institute of Pneumology
ROMANIA	DROBETA-TURNU SEVERIN	County Emergency Hospital
ROMANIA	TIMISOARA	Clinical Municipal Emergency Hospital
SLOVAKIA	BRATISLAVA	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 Marañon
SPAIN	MADRID	Ramon y Cajal University Hospital
SPAIN	NAVARRA	Clinica Universitaria De Navarra
SPAIN	SALAMANCA	University Hospital Salamanca
SPAIN	SEVILLA	HHUU Virgen del Rocío
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 (2007-2023) (European units Only)

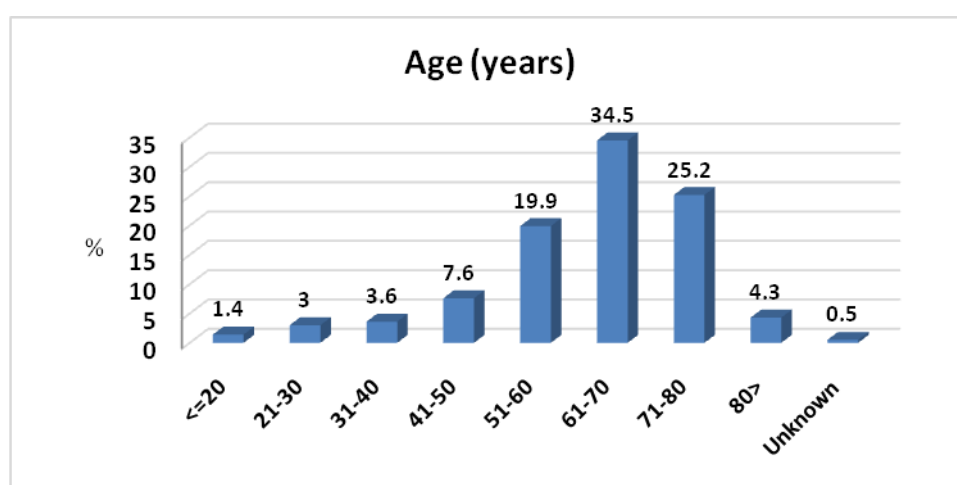
Growth of the ESTS Database 2007-23



Overall age and gender distributions

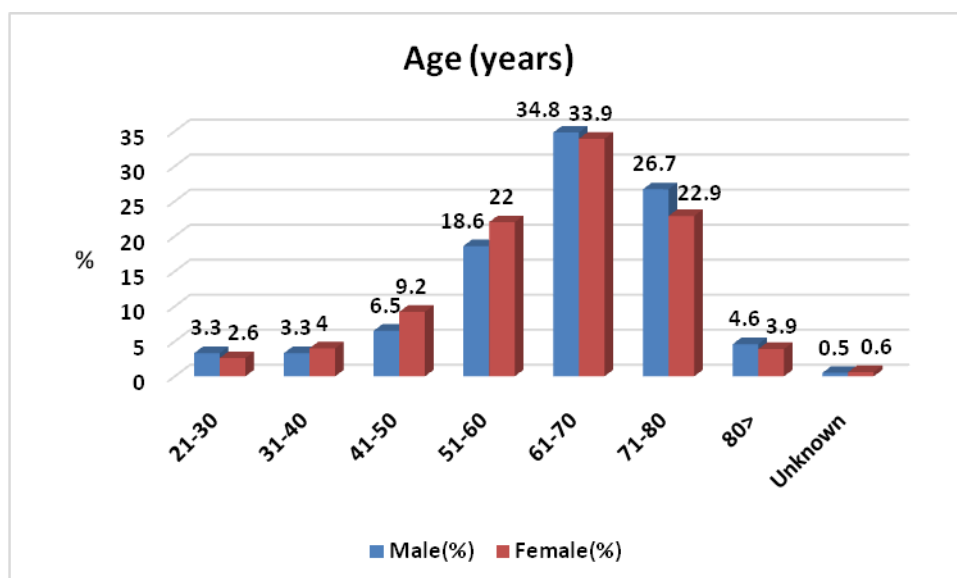
Age (years)

Age (years)	Occurrences	Percentages
<=20	3469	1.4
21-30	7652	3
31-40	8983	3.6
41-50	19185	7.6
51-60	50399	19.9
61-70	87070	34.5
71-80	63709	25.2
>80	10920	4.3
Unknown	1355	0.5
Total	252742	100



Gender according to age distribution (years)

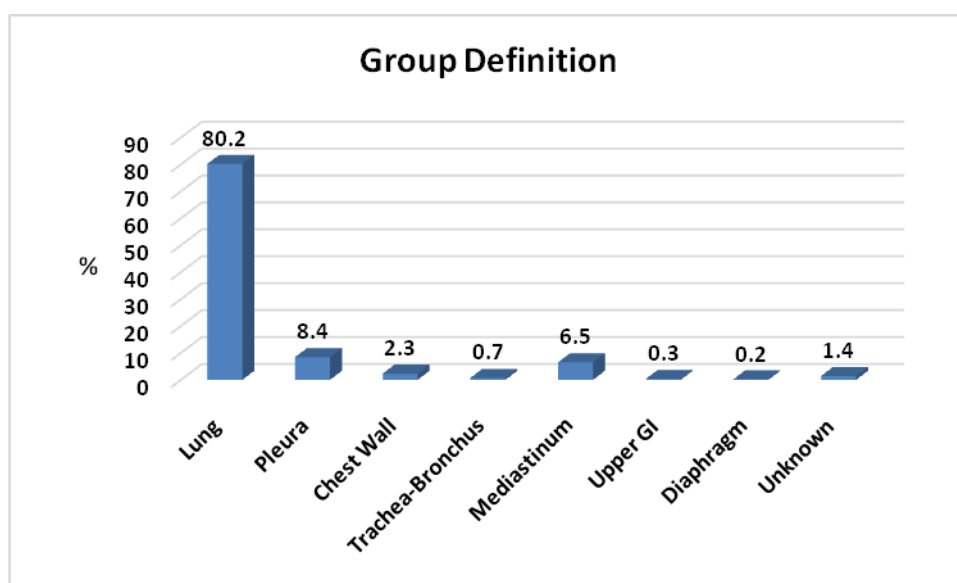
Age (years)	Male (%)	Female (%)
<=20	1.7	0.9
21-30	3.3	2.6
31-40	3.3	4
41-50	6.5	9.2
51-60	18.6	22
61-70	34.8	33.9
71-80	26.7	22.9
>80	4.6	3.9
Unknown	0.5	0.6



Total surgical activity within the entire dataset

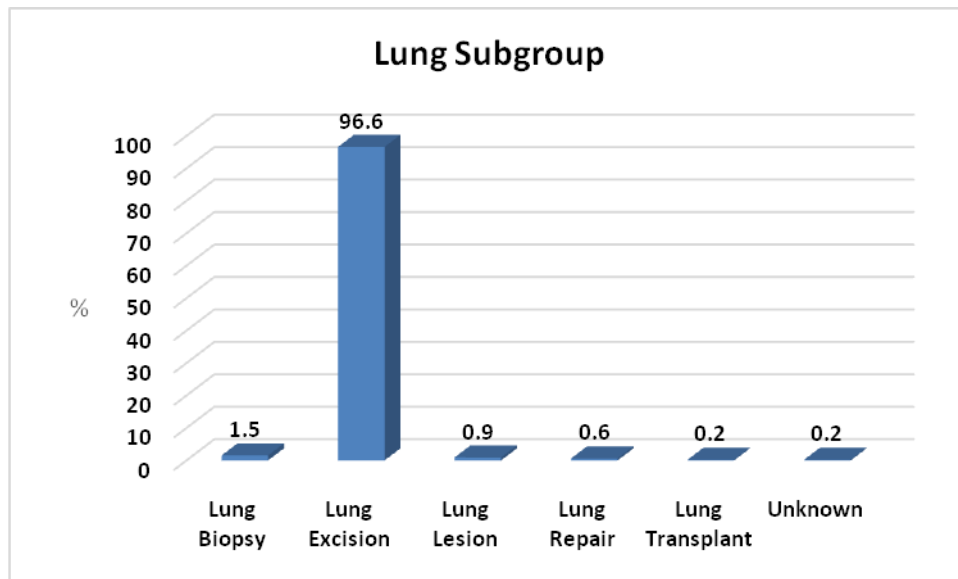
Group Definitions

Group Definition	Occurrences	Percent
Lung	202633	80.2
Pleura	21386	8.4
Chest Wall	5750	2.3
Trachea-Bronchus	1705	0.7
Mediastinum	16341	6.5
Upper GI	872	0.3
Diaphragm	481	0.2
Unknown	3574	1.4
Total	252742	100



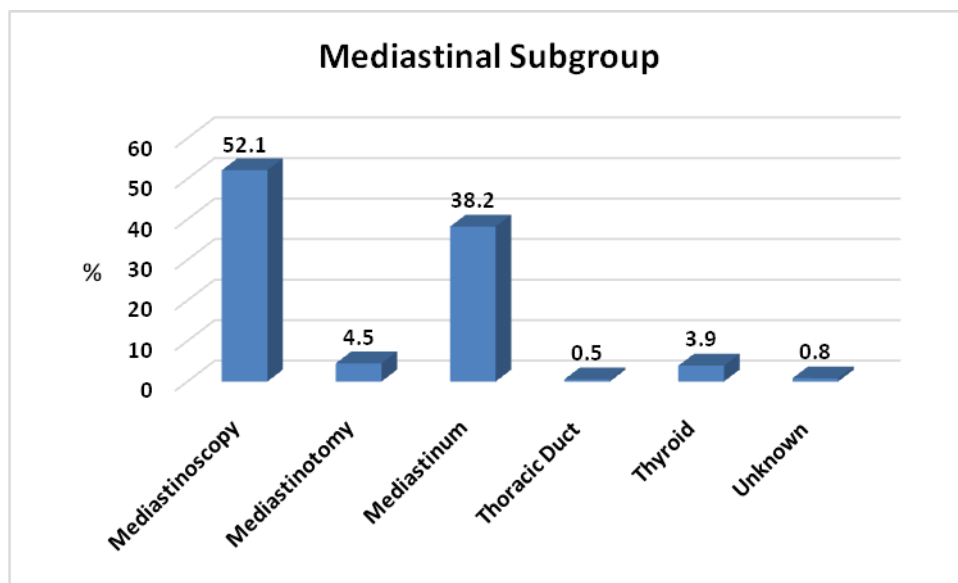
Lung Subgroup

	Occurrences	Percent
Lung Biopsy	3134	1.5
Lung Excision	195702	96.6
Lung Lesion	1799	0.9
Lung Repair	1169	0.6
Lung Transplant	462	0.2
Unknown	367	0.2
Total	202633	100



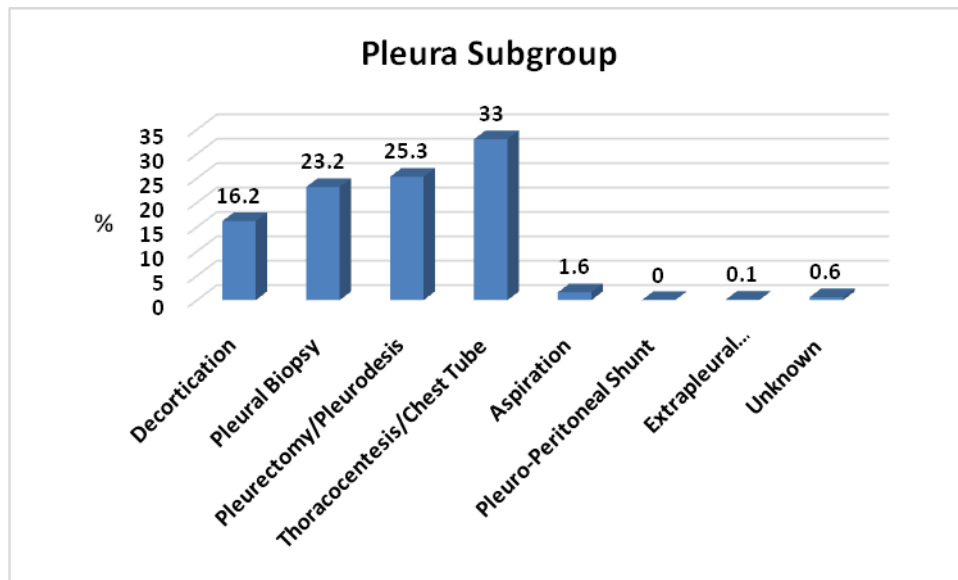
Mediastinum Subgroup

	Occurrences	Percent
Mediastinoscopy	8516	52.1
Mediastinotomy	727	4.5
Mediastinum	6235	38.2
Thoracic Duct	86	0.5
Thyroid	645	3.9
Unknown	132	0.8
Total	16341	100



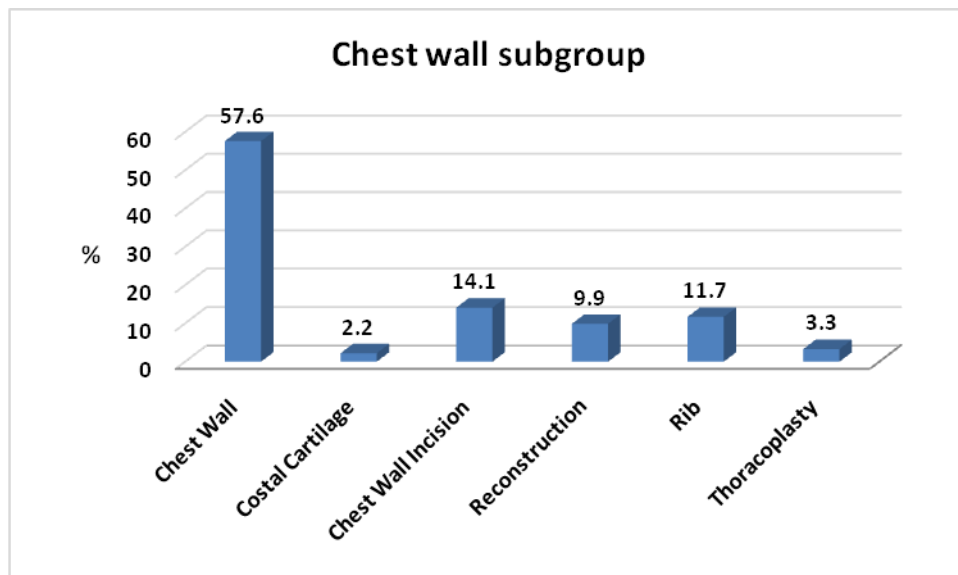
Pleura Subgroup

	Occurrences	Percent
Decortication	3469	16.2
Pleural Biopsy	4971	23.2
Pleurectomy/Pleurodesis	5405	25.3
Thoracocentesis/Chest Tube	7064	33
Aspiration	336	1.6
Pleuro-Peritoneal Shunt	9	0
Extrapleural Pneumonectomy	11	0.1
Unknown	121	0.6
Total	21386	100



Chest Wall Subgroup

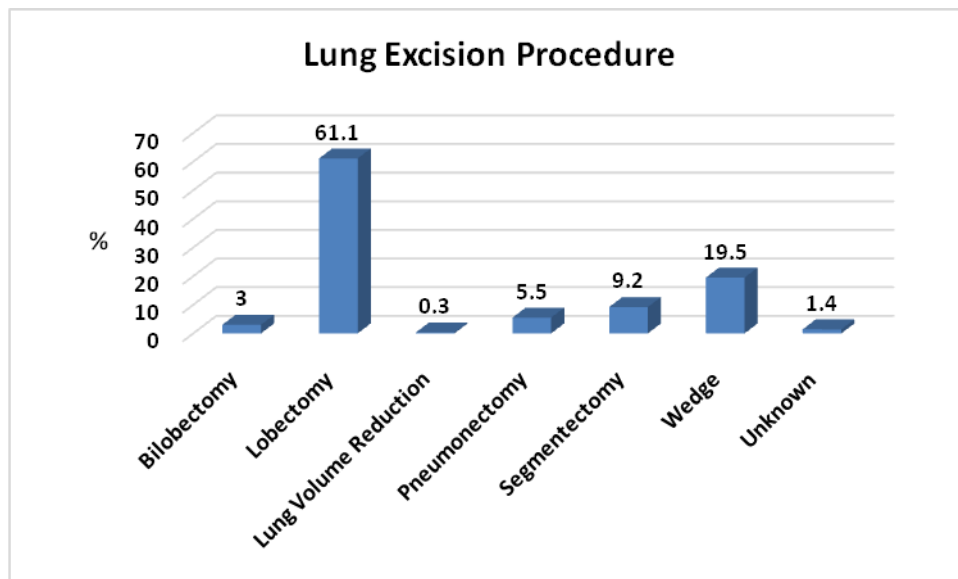
	Occurrences	Percent
Chest Wall	3290	57.2
Costal Cartilage	126	2.2
Chest Wall Incision	819	14.2
Reconstruction	562	9.8
Rib	693	12.1
Thoracoplasty	200	3.5
Unknown	60	1
Total	5750	100



Lung resections

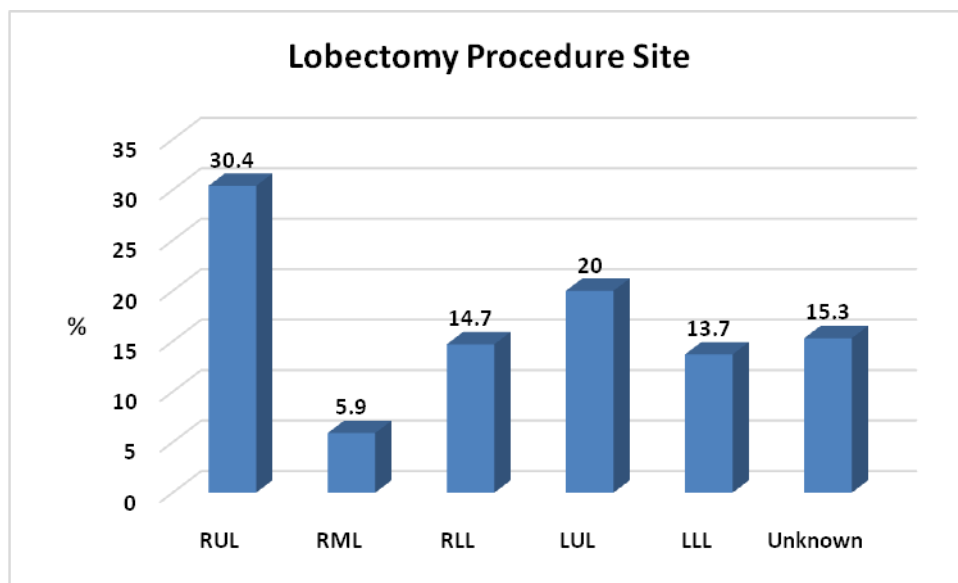
Types of lung resections performed, including all diagnoses

	Occurrences	Percent
Bilobectomy	5794	3
Lobectomy	119543	61.1
Lung Volume Reduction	647	0.3
Pneumonectomy	10666	5.5
Segmentectomy	17997	9.2
Wedge	38222	19.5
Unknown	2833	1.4
Total	195702	100



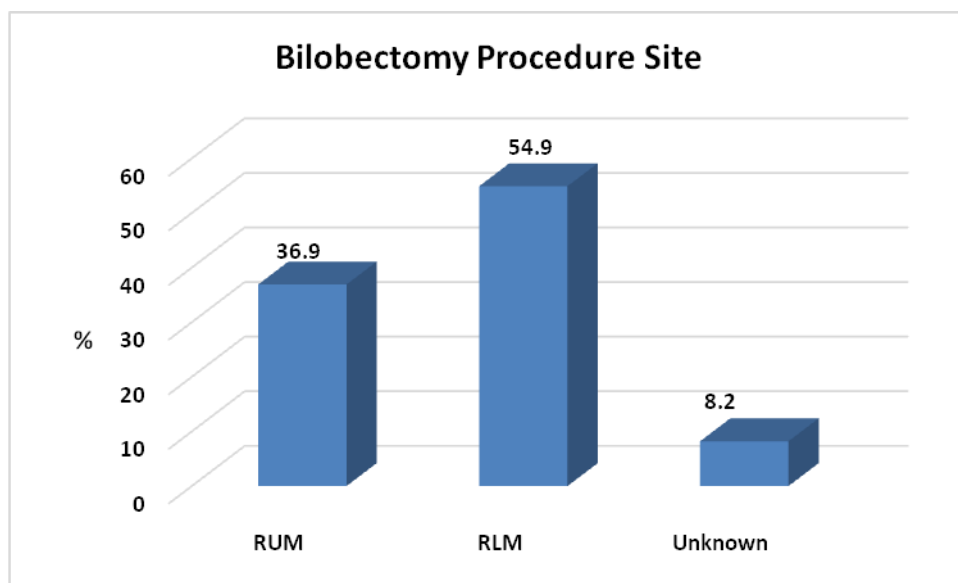
Distribution of lobectomy by site of resection

Lobectomy Procedure Site	Occurrences	Percent
RUL	36305	30.4
RML	7096	5.9
RLL	17593	14.7
LUL	23941	20
LLL	16388	13.7
Unknown	18220	15.3
Total	119543	100



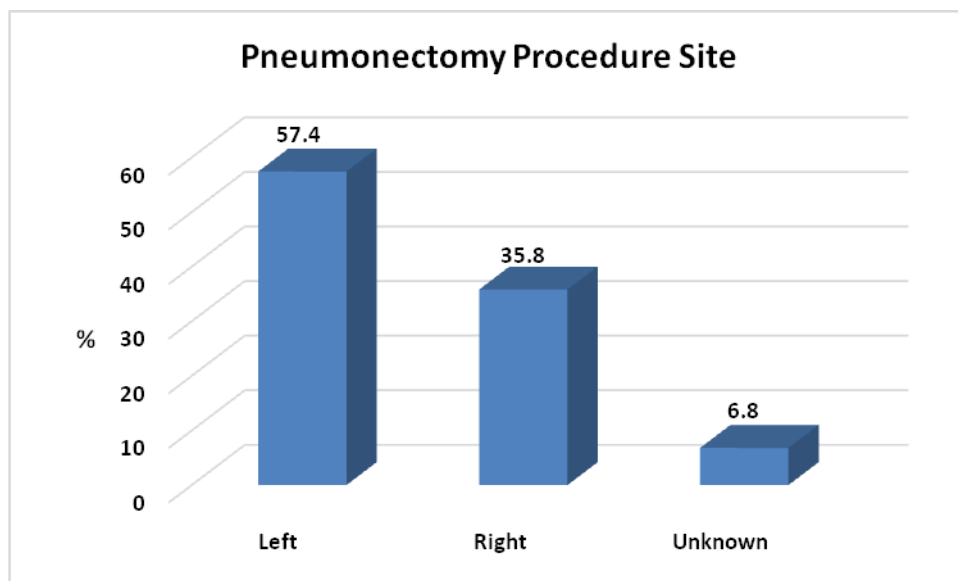
Distribution of bilobectomy by site of resection

Bilobectomy Procedure Site	Occurrences	Percent
RUM	2140	36.9
RLM	3181	54.9
Unknown	473	8.2
Total	5794	100



Distribution of pneumonectomy by side

Pneumonectomy Side	Occurrences	Percent
Left	6123	57.4
Right	3818	35.8
Unknown	725	6.8
Total	10666	100

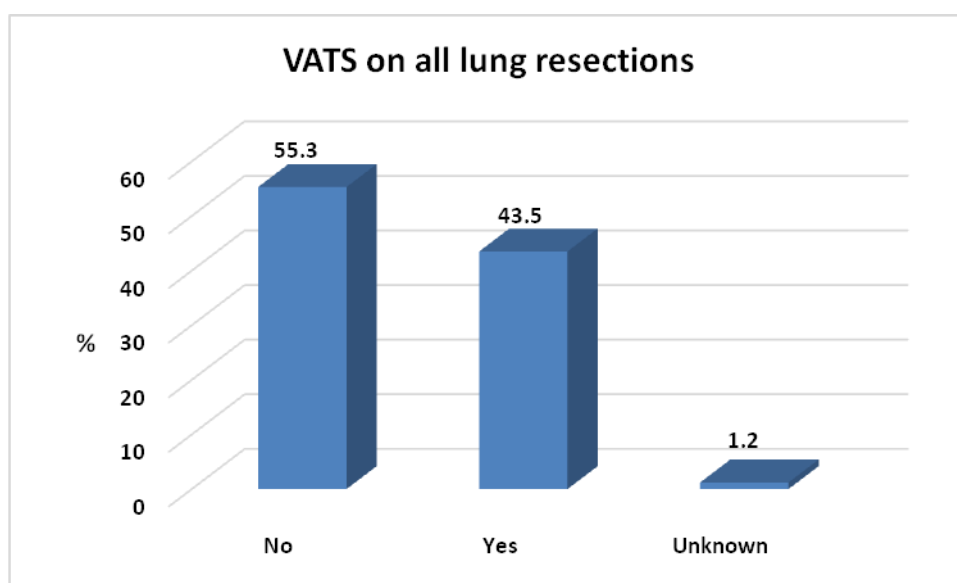


Pneumonectomy Qualifier	Occurrences	Percent
Alone	6366	59.7
Completion	508	4.8
Intrapericardial	919	8.6
Pleuropneumonectomy	245	2.3
Sleeve Resection	123	1.2
Diaphragm Resection	31	0.3
Atrial Resection	119	1.1
SVC Resection/Reconstruction	95	0.9
Vertebral Resection	165	1.5
Unknown	2095	19.6
Total	10666	100

VATS as a proportion of all lung resections

VATS	Occurrences	Percent (%)
No	108149	55.3
Yes	85196	43.5
Unknown	2357	1.2
Total	195702	100

Note the increase from 42.2 to 43.5!!!! Also a similar % of data completeness



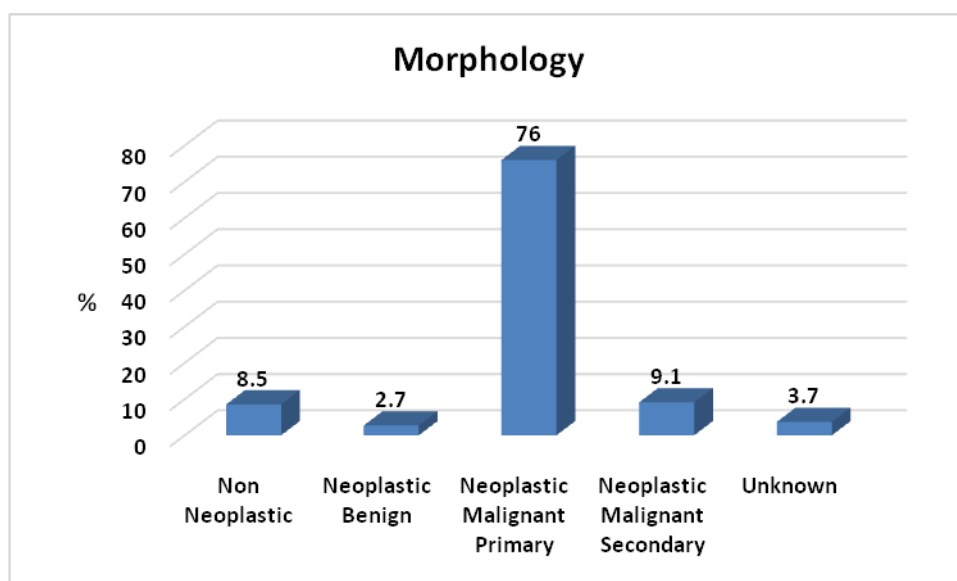
	No	Yes	Yes (%)
2007-2014	49729	13945	21.9
2015-2023	58420	71251	54.9
Total	108149	85196	44.1

VATS as a proportion of lobectomy

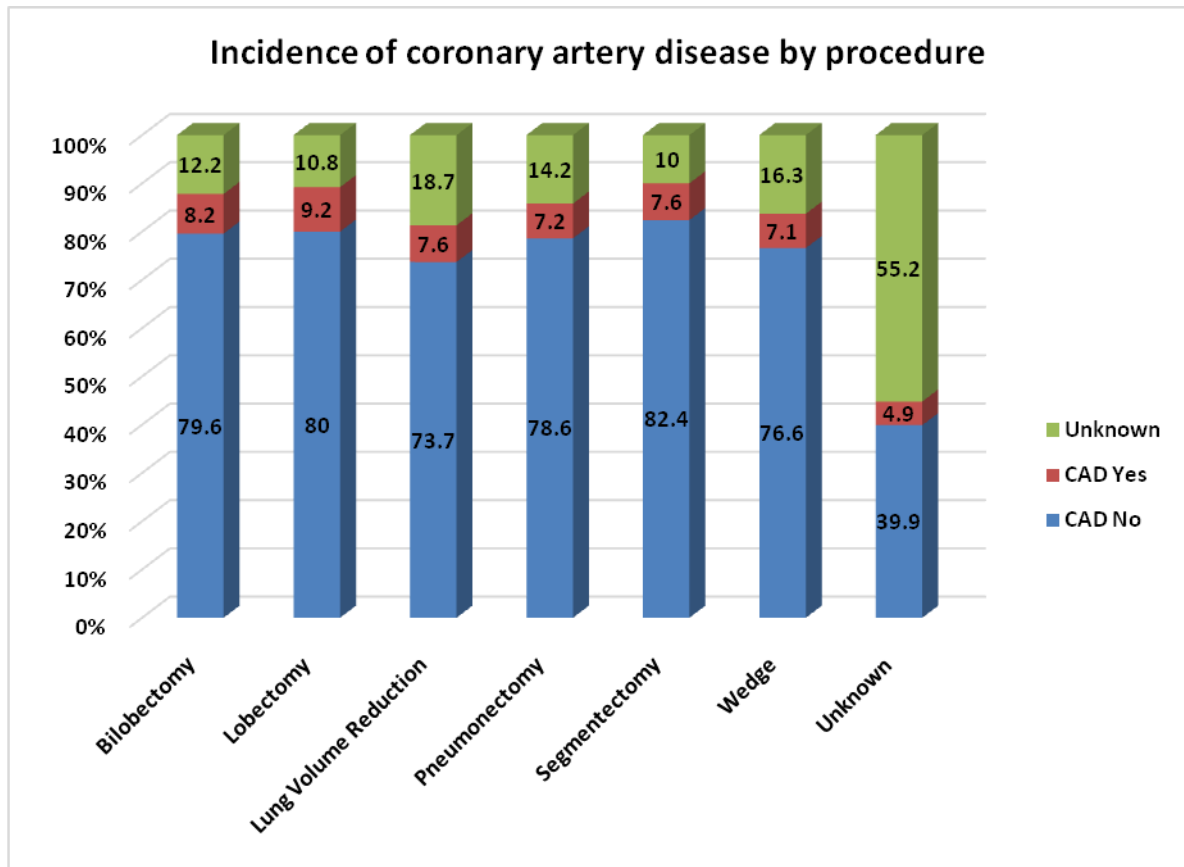
	No	Yes	Yes (%)
2007-2014	31270	5021	13.8
2015-2023	38343	43615	53.2
Total	69613	48636	41.1

Lung resections pathology

Morphology	Occurrences	Percent (%)
Non Neoplastic	16529	8.5
Neoplastic Benign	5357	2.7
Neoplastic Malignant Primary	148761	76
Neoplastic Malignant Secondary	17834	9.1
Unknown	7221	3.7
Total	195702	100

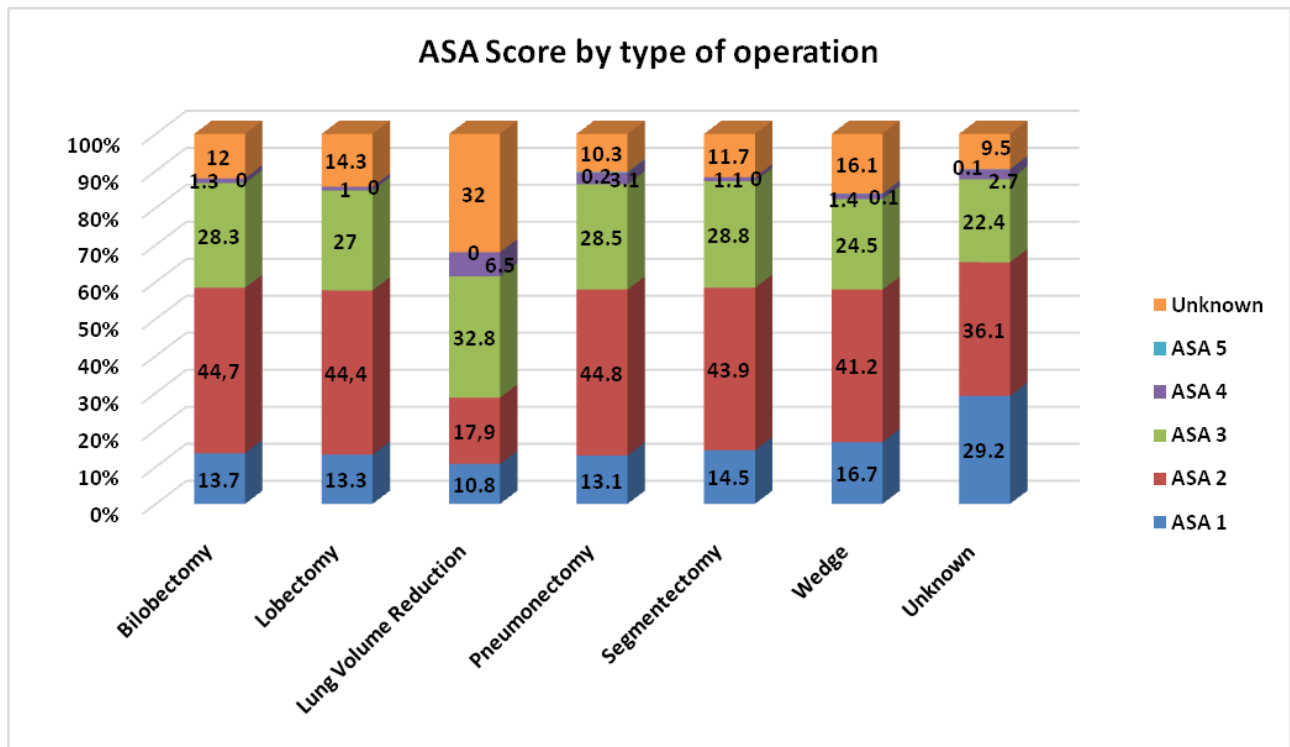


Incidence of coronary artery disease by procedure



Lung Excision Procedure	CAD NO	CAD YES	Unknown	Total
Bilobectomy	4611	475	708	5794
Lobectomy	95700	10971	12872	119543
Lung Volume Reduction	477	49	121	647
Pneumonectomy	8380	773	1513	10666
Segmentectomy	14832	1360	1805	17997
Wedge	29282	2728	6212	38222
Unknown	1130	140	1563	2833
Total	154412	16496	24794	195702

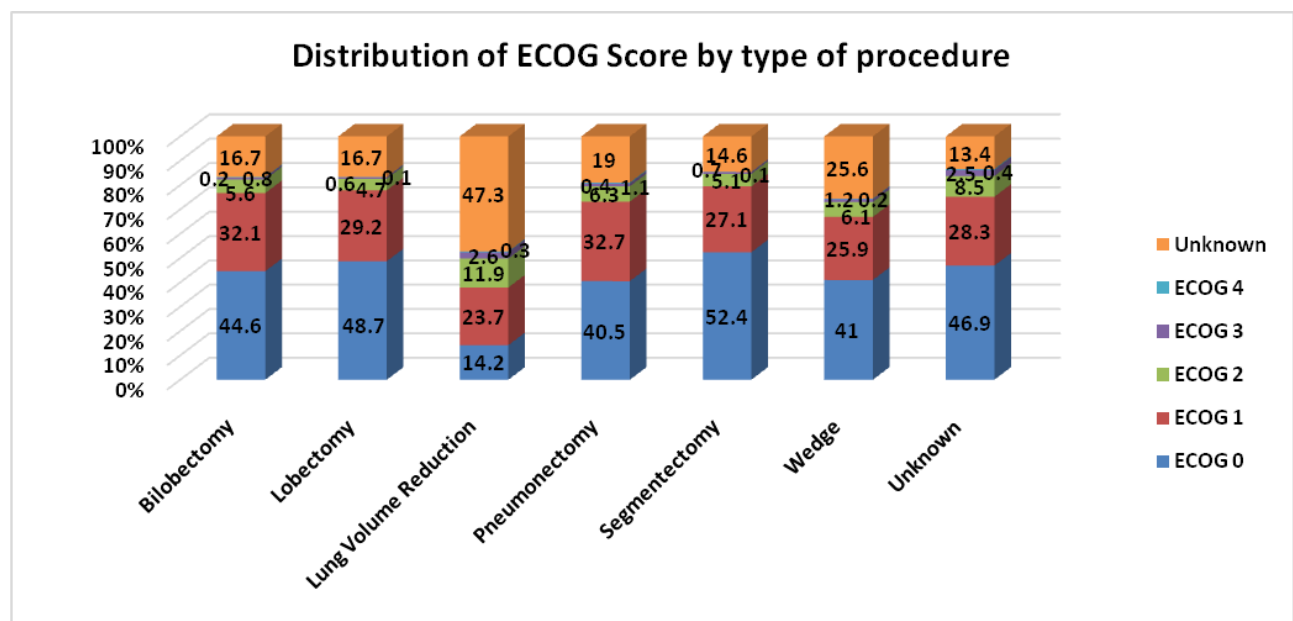
Distribution of ASA score by type of operation



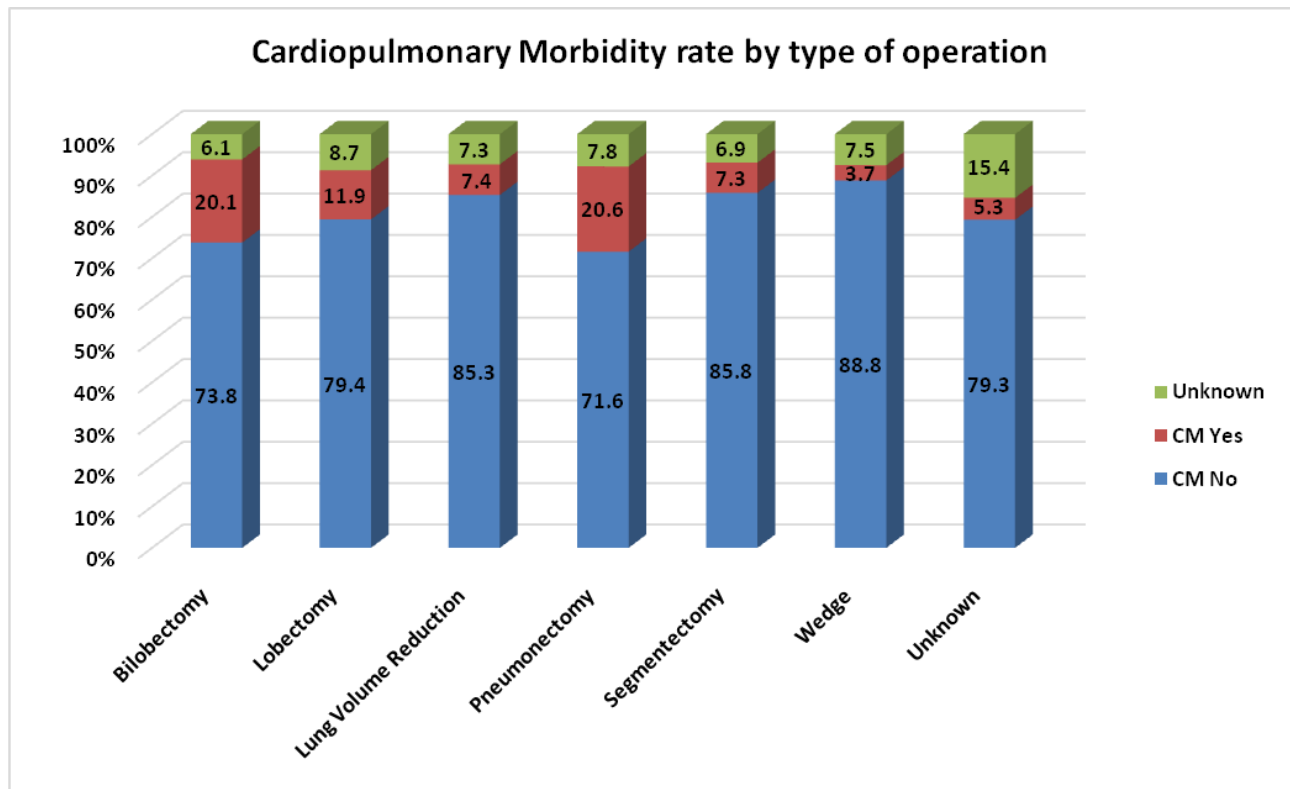
Lung Excision Procedure	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Unknown	Total
Bilobectomy	794	2588	1639	73	3	697	5794
Lobectomy	15929	53100	32277	1150	53	17034	119543
Lung Volume Reduction	70	116	212	42	0	207	647
Pneumonectomy	1399	4782	3035	328	24	1098	10666
Segmentectomy	2612	7892	5185	203	1	2104	17997
Wedge	6377	15768	9361	551	25	6140	38222
Unknown	829	1022	634	76	3	269	2833
Total	28010	85268	52343	2423	109	27549	195702

Distribution of ECOG score by type of operation

Lung Excision Procedure	ECOG 0	ECOG 1	ECOG 2	ECOG 3	ECOG 4	Unknown	Total
Bilobectomy	2586	1860	325	48	10	965	5794
Lobectomy	58230	34876	5654	679	115	19989	119543
Lung Volume Reduction	92	153	77	17	2	306	647
Pneumonectomy	4315	3488	672	123	45	2023	10666
Segmentectomy	9436	4869	923	125	19	2625	17997
Wedge	15685	9903	2319	458	82	9775	38222
Unknown	1330	801	241	71	11	379	2833
Total	91674	55950	10211	1521	284	36062	195702



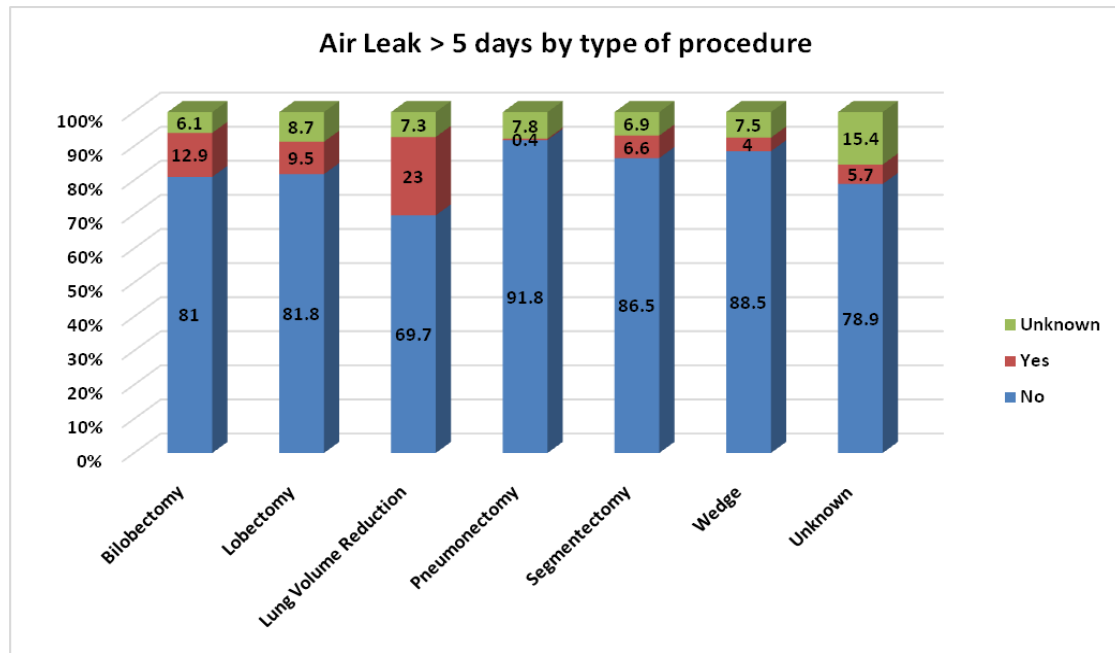
Cardiopulmonary morbidity rate in different types of lung resections



	CM No	CM No (%)	CM Yes	CM Yes(%)	Unknown	Unknown (%)	Total
Bilobectomy	4277	73.8	1162	20.1	355	6.1	5794
Lobectomy	94979	79.4	14181	11.9	10383	8.7	119543
Lung Volume Reduction	552	85.3	48	7.4	47	7.3	647
Pneumonectomy	7634	71.6	2196	20.6	836	7.8	10666
Segmentectomy	15440	85.8	1318	7.3	1239	6.9	17997
Wedge	33952	88.8	1398	3.7	2872	7.5	38222
Unknown	2247	79.3	149	5.3	437	15.4	2833
Total	159081		20452		16169		195702

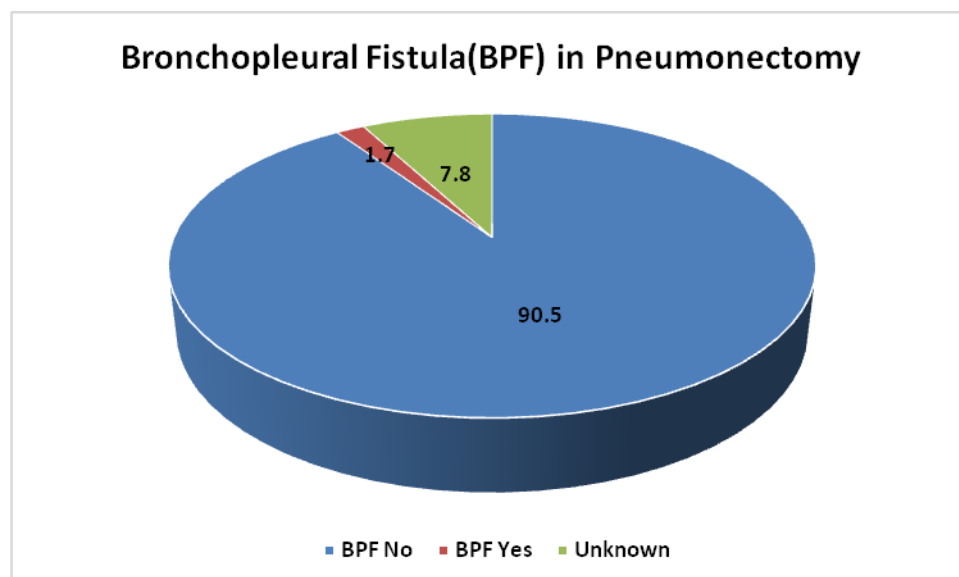
Incidence of prolonged air leak (> 5days) in different types of lung resections

Lung Excision - PROCEDURE	Air Leak > 5 days		
	No (%)	Yes (%)	Unknown (%)
Bilobectomy	81	12.9	6.1
Lobectomy	81.8	9.5	8.7
Lung Volume Reduction	69.7	23	7.3
Pneumonectomy	91.8	0.4	7.8
Segmentectomy	86.5	6.6	6.9
Wedge	88.5	4	7.5



Incidence of bronchopleural fistula (BPF) in pneumonectomy

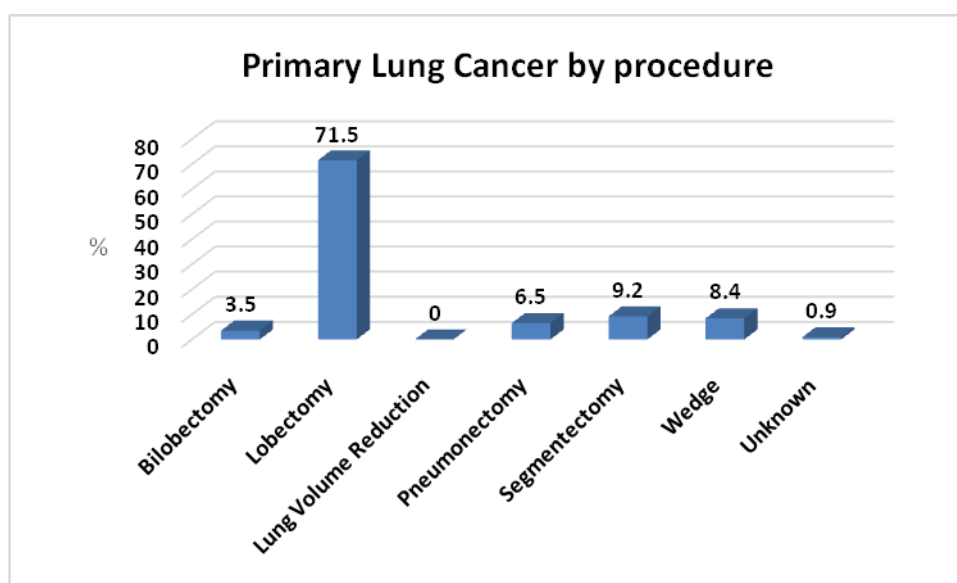
Bronchopleural fistula	BPF No	BPF Yes	Unknown	Total
Pneumonectomy (N)	9648	182	836	10666
Pneumonectomy (%)	90.5	1.7	7.8	100



Primary lung cancer

Lung resection for primary lung cancer: Types of procedures

	Occurrences	Percent
Bilobectomy	5262	3.5
Lobectomy	106418	71.5
Lung Volume Reduction	20	0
Pneumonectomy	9585	6.5
Segmentectomy	13747	9.2
Wedge	12475	8.4
Unknown	1254	0.9
Total	148761	100

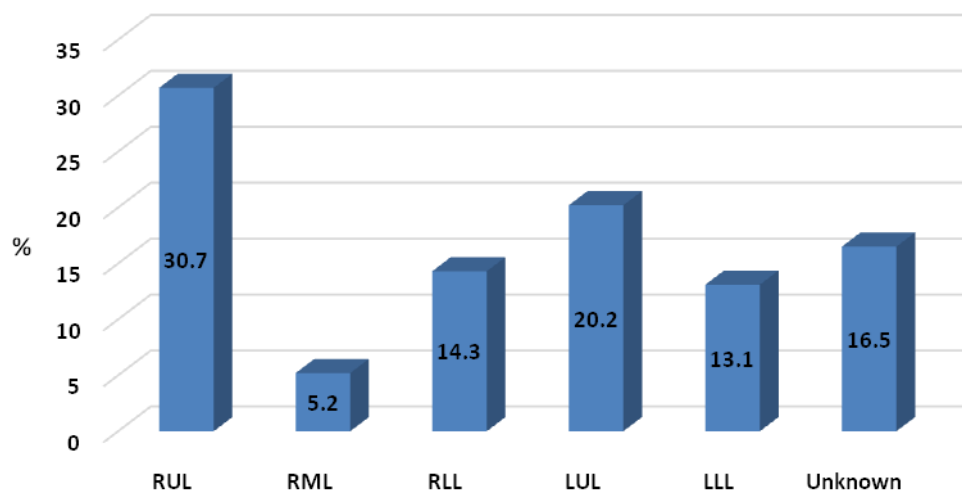


Bilobectomy – Lobectomy qualifier	Occurrences	Percent
Alone	97492	87.3
Chest Wall	3641	3.3
Superior Sulcus Tumor	527	0.5
Sleeve	3276	2.9
Diaphragm Resection	110	0.1
Atrial Resection	83	0.1
SVC Resection/Reconstruction	87	0.1
Vertebral Resection	376	0.3
Unknown	6088	5.4
Total	111680	100

Distribution of lobectomy/bilobectomy by site of resection

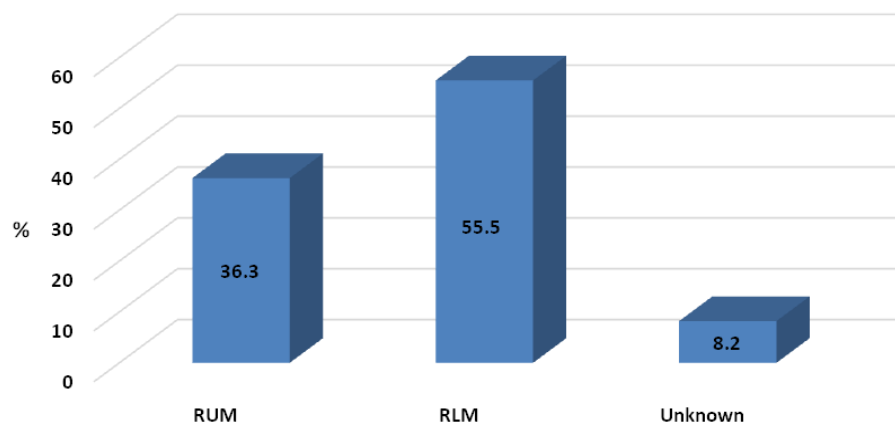
Lobectomy procedure site	Occurrences	Percent
RUL	32708	30.7
RML	5554	5.2
RLL	15181	14.3
LUL	21522	20.2
LLL	13893	13.1
Unknown	17560	16.5
Total	106418	100

Primary Lung Cancer by lobectomy procedure site



Bilobectomy procedure site	Occurrences	Percent
RUM	1911	36.3
RLM	2920	55.5
Unknown	431	8.2
Total	5262	100

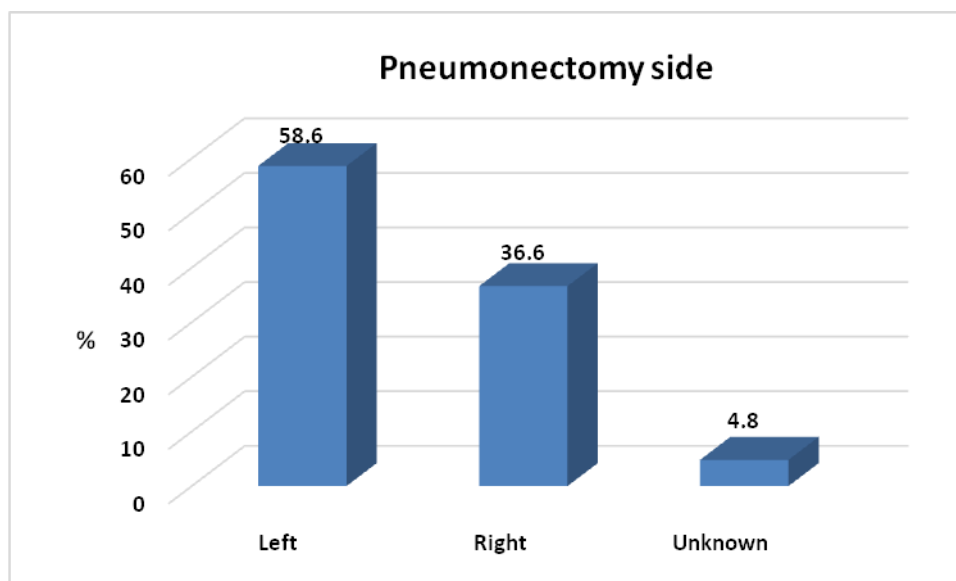
Bilobectomy procedure site for primary lung cancer



Distributions of pneumonectomy

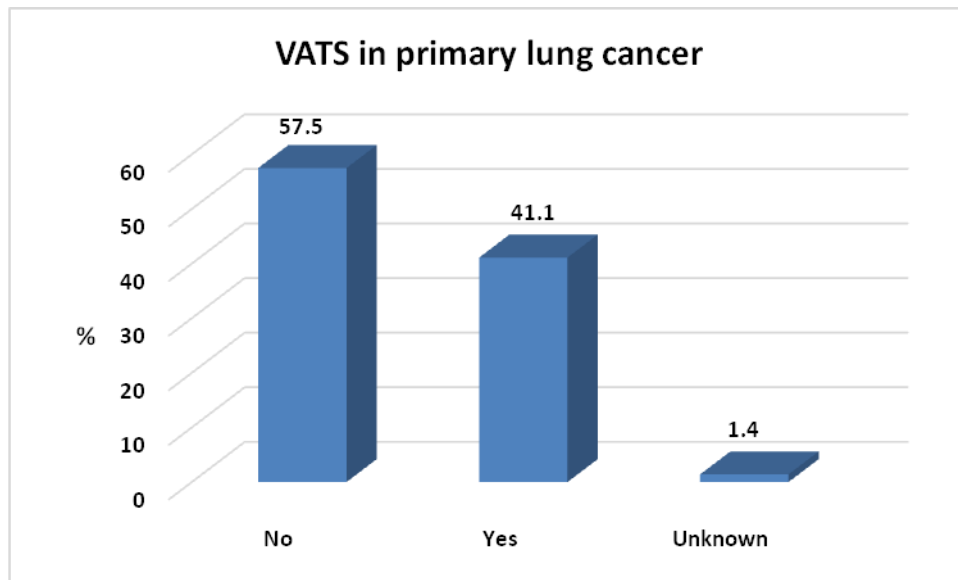
Pneumonectomy Qualifier	Occurrences	Percent
Alone	5790	60.4
Completion	407	4.3
Intrapericardial	814	8.5
Pleuropneumonectomy	193	2
Sleeve Resection	119	1.2
Diaphragm Resection	18	0.2
Atrial Resection	116	1.2
SVC Resection/Reconstruction	95	1
Vertebral Resection	161	1.7
Unknown	1872	19.5
Total	9585	100

Pneumonectomy side	Occurrences	Percent
Left	5622	58.6
Right	3506	36.6
Unknown	457	4.8
Total	9585	100



Distribution of VATS procedures in total lung resections

VATS	Occurrences	Percent
No	85547	57.5
Yes	61154	41.1
Unknown	2060	1.4
Total	148761	100



Distributions of VATS procedures in lobectomy/bilobectomy

VATS	Occurrences	Percent
No	65562	58.7
Yes	44933	40.2
Unknown	1185	1.1
Total	111680	100

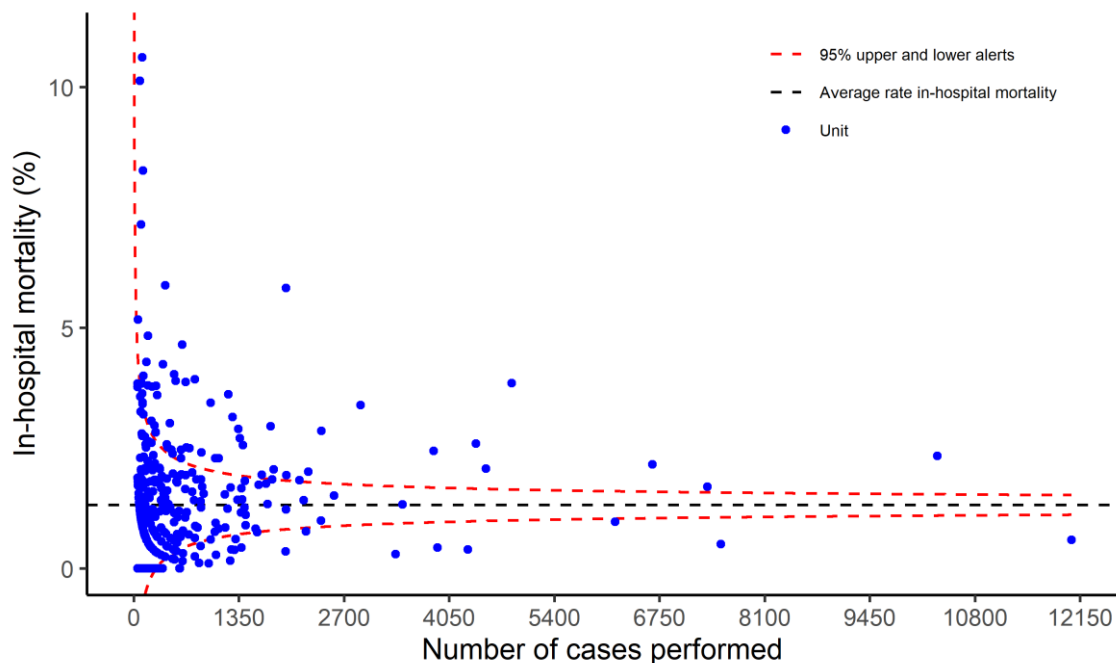
Unadjusted in-hospital mortality rates in primary lung cancer resections

Outcome at Discharge - Died in Hospital	N	Died in Hospital	Percent(%)
Bilobectomy	4945	169	3.4
Lobectomy	99384	1188	1.2
Lung Volume Reduction	14	0	0
Pneumonectomy	9050	483	5.3
Segmentectomy	12449	81	0.7
Wedge	11815	97	0.8
Total	137657	2018	1.5

Overall unadjusted in-hospital mortality calculated in the total dataset

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

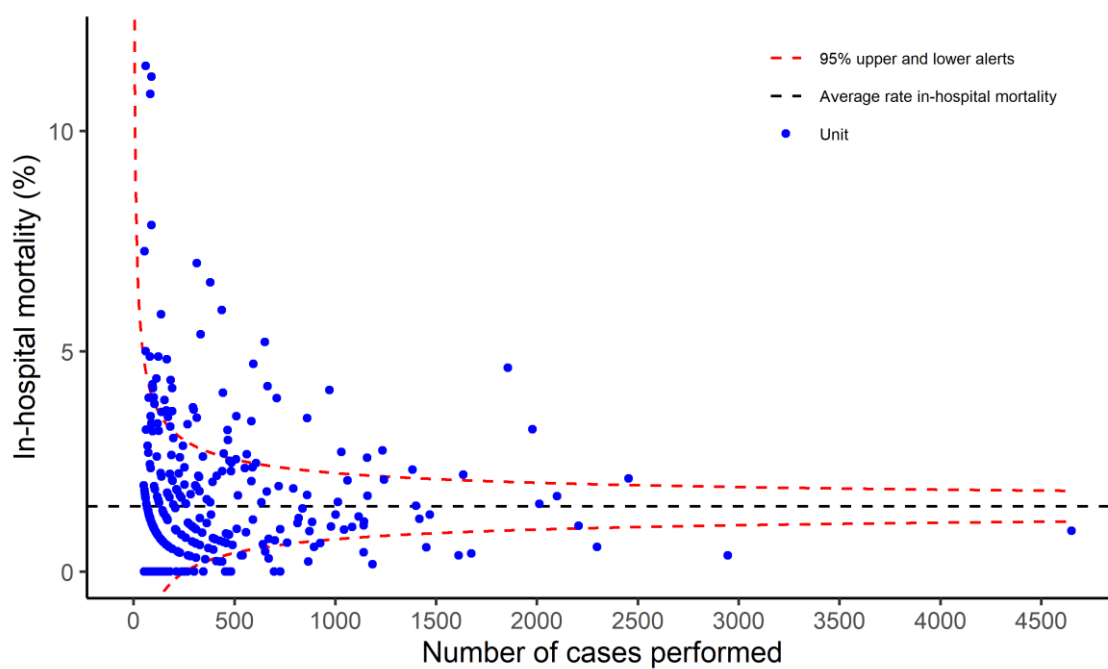
Please note that the majority of the units are within the limits. Around 14% of the Units are above the 95% upper limit whereas the 6% are below the 95% lower limit.



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

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

Please note that most of the units are within the limits. Around 14% of the Units are above the 95% upper limit whereas the 8% are below the 95% lower limit.

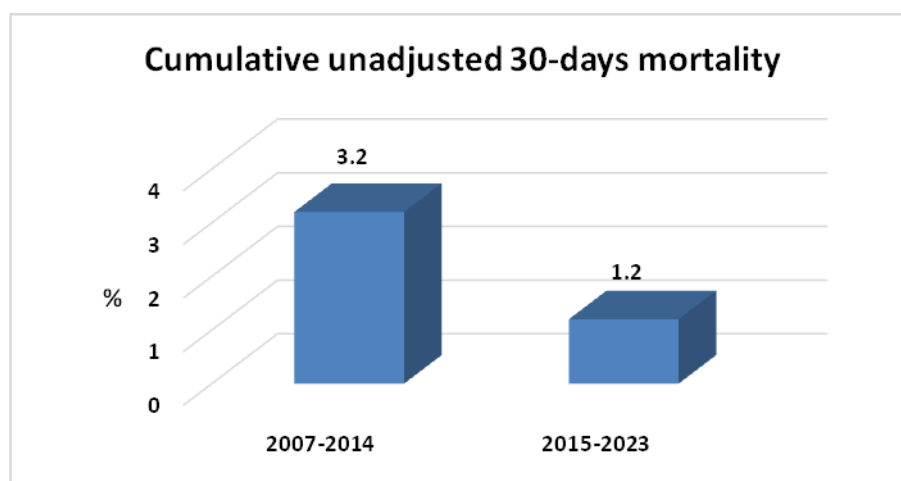


Comparisons of outcomes between 2007-2014 vs 2015-2023 in the total dataset

** Due to missing data, the 30-day mortality was only evaluated in 137517 patients, leaving 115225 patients out*

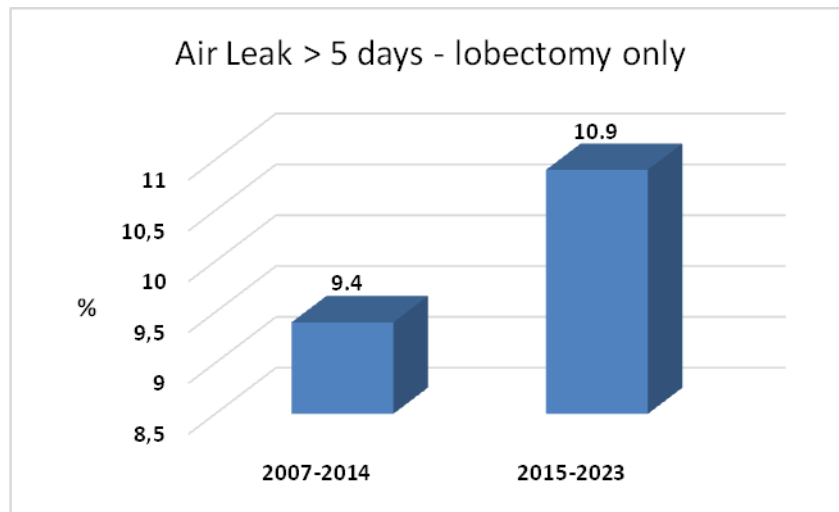
Cumulative non-adjusted 30-day mortality

Cumulative non-adjusted 30-day mortality	Alive	Died	Died Percent
2007-2014	36165	1204	3.2
2015-2023	98914	1234	1.2
Total	135079	2438	1.8



Prolonged air leak **(LOBECTOMY ONLY)**

Air leak > 5 Days	No	Yes	Yes(%)
2007-2014	30575	3184	9.4
2015-2023	67167	8234	10.9
Total	97742	11418	10.5



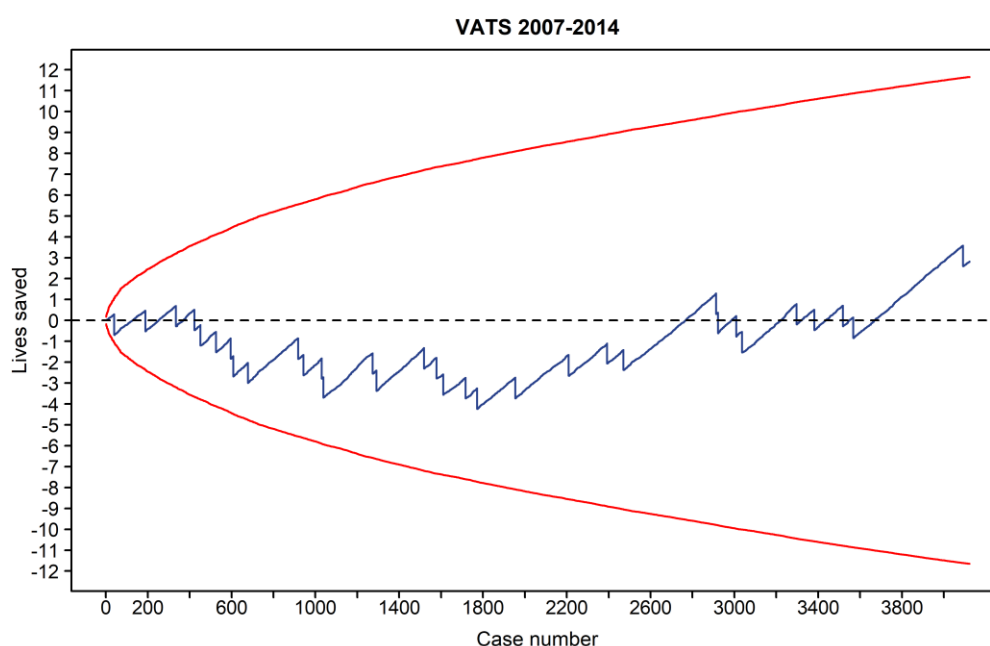
Hospital Mortality trending presented as CUSUM plots

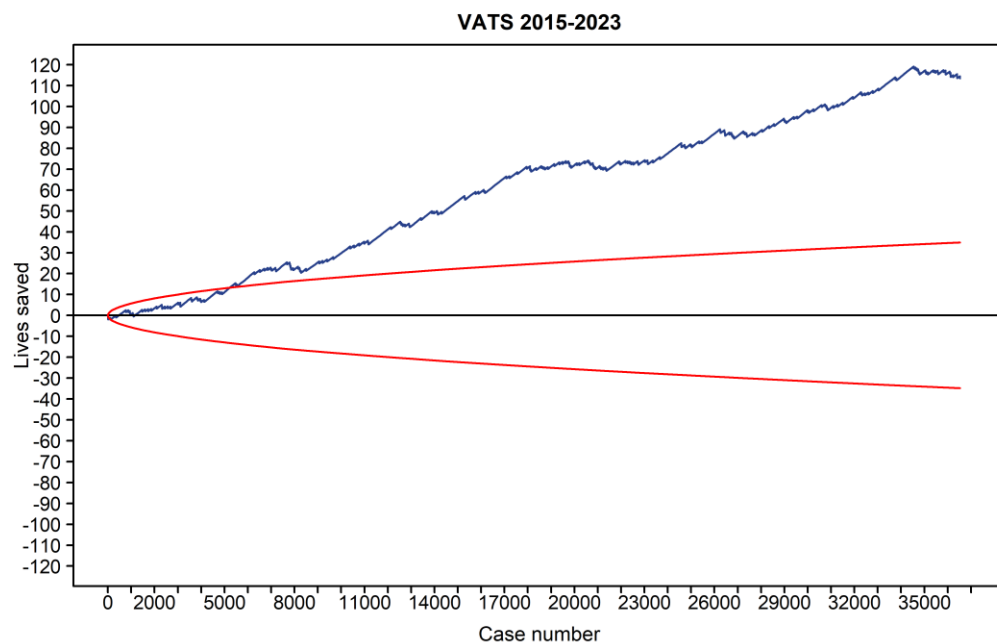
VATS CUSUM PLOTS

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.

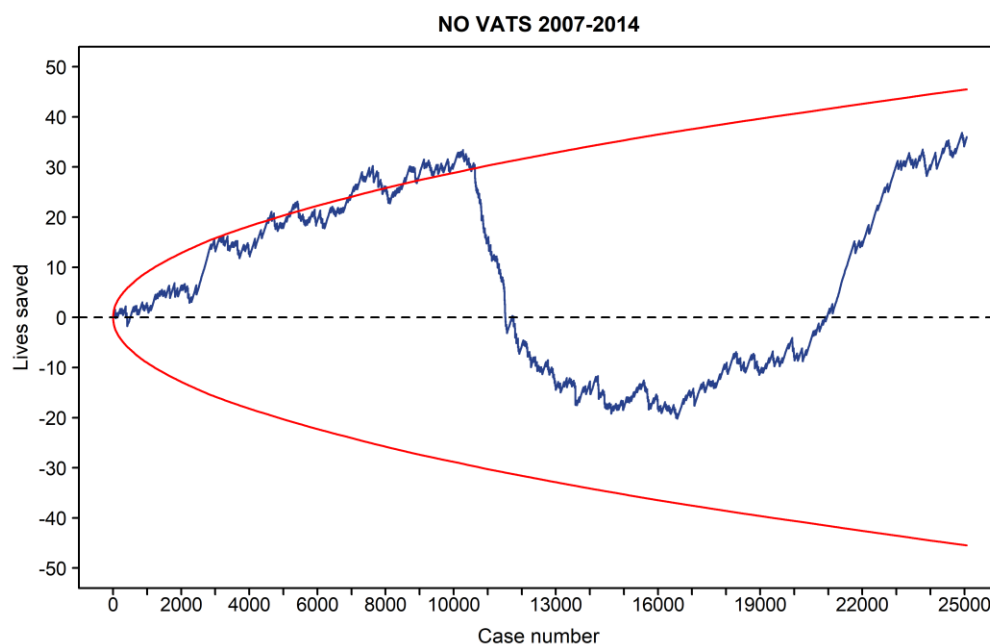
In the next figures, risk-adjusted CUSUM graphs for hospital mortality are presented for non-extended lobectomy performed through VATS or open approach in two different periods of time: 2007-2014 and 2015-2023

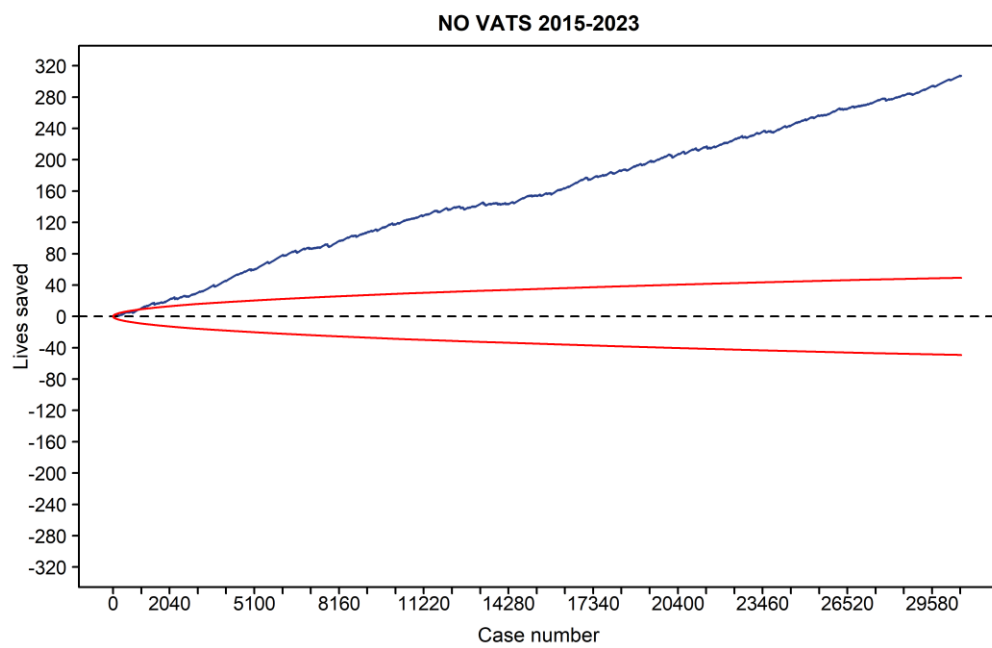
In the case of VATS, the first timeframe shows some variation around the zero for the first 400 cases followed by more than 2000 cases characterized by a slight mortality increase. After case 3000 the number of lives saved stabilized again around zero until it starts increasing after case 3600. In the period 2015-2023, 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 for the last few thousands observations.





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





PART 2

UNITS-SPECIFIC ACTIVITY

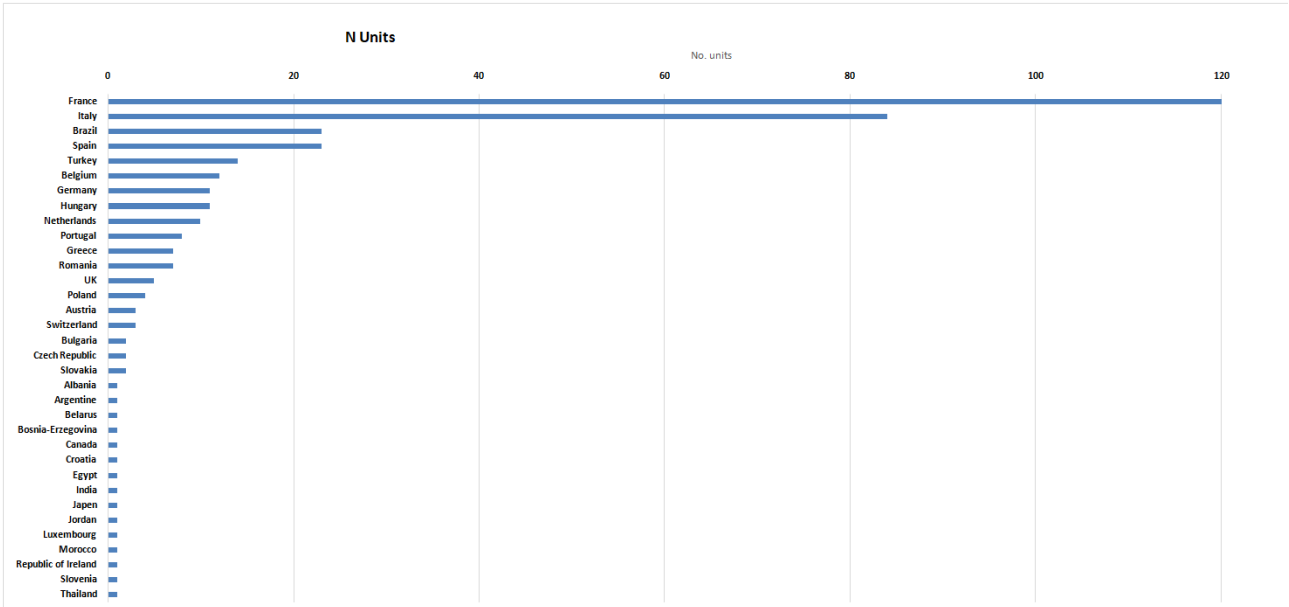
&

COMPARATIVE ANALYSIS

BETWEEN CONTRIBUTING UNITS (2007-2023) (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 2023, by Country



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

Unit	Percent
Bm02dl	29.2
Bm05dl	34.22
Ch10dl	30.06
Fr060785003_01°	45.5
Fr130780521	36.21
Fr130780521_01	40.26
Fr130785652_01°	44.92
Fr140000209	31.78
Fr140000209_01°	38.01
Fr210987558	36.65
Fr210987558_01	42.81
Fr300782117_01°	45.81
Fr310019351	30.45
Fr310019351_01	39.21
Fr330783648	29.75
Fr330783648_01°	36.88
Fr340796663_01°	41.03
Fr350000741	35.21
Fr350000741_01°	42.34
Fr370004467_01°	43.88
Fr380000067_01°	41.95
Fr440017598_01°	37.21
Fr540000486	36.41
Fr540000486_01°	40.59
Fr540001138_01°	41.07
Fr590784864	28.72
Fr590784864_01°	24.42
Fr630000479	35.55
Fr630000479_01°	41.12
Fr670000025	34.16
Fr670000025_01°	36.14
Fr690784186_01°	38.98
Fr750100232_01°	39.74
Fr750100273	32.88
Fr750100273_01°	38.27
Fr750150104	35.86
Fr750150104_01	41.39
Fr750712184	40.09
Fr750712184_01°	40.69
Fr750803447_01°	40
Fr760000158	29.69

Fr760000158_01	36.93
Fr800006124_01°	35.56
Fr830100574	46.87
Fr830100574_01°	52.58
Fr840001861_01°	46.35
Fr860000223	34.36
Fr860000223_01°	40.59
Fr870000064_01°	41.87
Fr920000650	37.63
Fr920000650_01	44.69
Fr920000684_01°	38.82
Fr930100037_01°	34.3
Gr02d0	44.39
Gy18dl	38
Gy23dl	29.03
Hu01dl	22.11
Hu02dl	25.79
Hu03dl	24.15
Hu04dl	22.94
Hu05dl	19.3
Hu06dl	21.62
Hu07dl	26.39
Hu08dl	24.37
Hu09dl	23.01
Hu12dl	18.34
Ie01dl	41.72
It03d0	37.9
It19d0	38.87
It32dl	37.42
NI19dl	39.43
PI06dl	41.68
PI08dl	26.89
Pt05dl°	31.86
Sk01dl	23.3
SI03dl°	37.7
Sp01dl	37.92
Sp06dl°	35.08
Sp17dl	37.36
Sp28dl	31.08
Sp31dl	40.82
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	90.24
Bm05dl	92.19
Ch10dl	84.08
Fr060785003_01°	52.81
Fr130780521	96.86
Fr130780521_01°	96.43
Fr130785652_01°	78.57
Fr140000209	92.44
Fr140000209_01°	91.47
Fr210987558	67.92
Fr210987558_01°	74.74
Fr300782117_01°	36
Fr310019351	64.1
Fr310019351_01°	61.38
Fr330783648	60.78
Fr330783648_01°	59.15
Fr340796663_01°	59.51
Fr350000741°	70.62
Fr350000741_01°	70.69
Fr370004467_01°	86.23
Fr380000067_01°	36.07
Fr440017598_01°	68.86
Fr540000486	27.88
Fr540000486_01°	25.11
Fr540001138_01°	56.67
Fr590784864°	87.25
Fr590784864_01°	64.57
Fr630000479	92.83
Fr630000479_01°	75
Fr670000025	46.19
Fr670000025_01°	96.45
Fr690784186_01°	79.87
Fr750100232_01°	51.38
Fr750100273	84.87
Fr750100273_01°	61.83
Fr750150104	73.97
Fr750150104_01°	87.29
Fr750712184	67.89
Fr750712184_01°	53.14
Fr750803447_01°	61.18
Fr760000158	74.28
Fr760000158_01°	58.84
Fr800006124_01°	63.46
Fr830100574°	95.4

Fr830100574_01°	86.38
Fr840001861_01°	60.93
Fr860000223	79.58
Fr860000223_01°	82.23
Fr870000064_01°	24.67
Fr920000650°	90.16
Fr920000650_01°	78.6
Fr920000684_01°	71.9
Fr930100037_01°	54.17
Gr02d0	6.15
Gy18dl°	66.14
Gy23dl	90.26
Hu01dl	17.8
Hu02dl	39.5
Hu03dl	4.71
Hu04dl	1.35
Hu05dl	0.75
Hu06dl	4.13
Hu07dl	11.74
Hu08dl	3.95
Hu09dl	4.85
Hu12dl	59.81
Ie01dl	98.54
It03d0	75
It19d0	86.56
It32dl	94.35
NI19dl	95.68
PI06dl	83.95
PI08dl	18.53
Pt05dl°	86.24
Sk01dl	90.5
SI03dl°	93.06
Sp01dl	90.94
Sp06dl°	78.35
Sp17dl	82.8
Sp28dl	88.65
Sp31dl	89.75
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°	85.31
Bm05dl°	89.5
Ch10dl°	75.65
Fr060785003_01°	70
Fr130780521°	80.15
Fr130780521_01°	76.19
Fr130785652_01°	88.89
Fr140000209°	67.57
Fr140000209_01°	62.07
Fr210987558°	34.19
Fr210987558_01°	20
Fr300782117_01°	100
Fr310019351°	59.2
Fr310019351_01°	59.09
Fr330783648°	30.58
Fr330783648_01°	17.39
Fr340796663_01°	20.59
Fr350000741°	53.85
Fr350000741_01°	40
Fr370004467_01°	50
Fr380000067_01°	76.92
Fr440017598_01°	20
Fr540000486°	10.67
Fr540000486_01°	8.33
Fr540001138_01°	0
Fr590784864°	43.64
Fr590784864_01°	54.55
Fr630000479°	48.21
Fr630000479_01°	68.18
Fr670000025°	24.93
Fr670000025_01°	24.39
Fr690784186_01°	28.21
Fr750100232_01°	100
Fr750100273°	35.25
Fr750100273_01°	56
Fr750150104°	67.19
Fr750150104_01°	71.43
Fr750712184°	31.94
Fr750712184_01°	46.67
Fr750803447_01°	35.29
Fr760000158°	36.59

Fr760000158_01°	48.78
Fr800006124_01°	73.33
Fr830100574°	82.69
Fr830100574_01°	78.95
Fr840001861_01°	72
Fr860000223°	15.58
Fr860000223_01°	54.17
Fr870000064_01°	57.14
Fr920000650°	27.78
Fr920000650_01°	47.06
Fr920000684_01°	31.71
Fr930100037_01°	63.64
Gr02d0°	2.33
Gy18dl°	53.49
Gy23dl°	66.34
Hu01dl°	9.02
Hu02dl°	6.78
Hu03dl	8.1
Hu04dl°	7.32
Hu05dl°	3.28
Hu06dl°	7.11
Hu07dl°	17.14
Hu08dl°	26.42
Hu09dl°	61.04
Hu12dl°	75.86
Ie01dl°	65.47
It03d0°	30.67
It19d0°	10.99
It32dl°	9.01
NI19dl°	82.67
PI06dl°	79.78
PI08dl°	54.55
Pt05dl°	40
Sk01dl°	30.65
SI03dl°	29.41
Sp01dl°	77.88
Sp06dl°	80.95
Sp17dl°	46.54
Sp28dl°	72
Sp31dl°	68.42
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	91.76
Bm05dl	95.29
Ch10dl	96.15
Fr060785003_01°	98.81
Fr130780521	95.96
Fr130780521_01°	97.96
Fr130785652_01°	91.67
Fr140000209	94.7
Fr140000209_01°	91.99
Fr210987558	99.3
Fr210987558_01°	99.58
Fr300782117_01°	100
Fr310019351	98.16
Fr310019351_01°	99.39
Fr330783648	98.51
Fr330783648_01°	97.55
Fr340796663_01°	97.93
Fr350000741°	82.07
Fr350000741_01°	82.56
Fr370004467_01°	92.06
Fr380000067_01°	77.78
Fr440017598_01°	97.2
Fr540000486	98.08
Fr540000486_01°	97.83
Fr540001138_01°	98.08
Fr590784864°	86.89
Fr590784864_01°	96.41
Fr630000479	97.19
Fr630000479_01°	98.07
Fr670000025	96.83
Fr670000025_01°	98.39
Fr690784186_01°	98.19
Fr750100232_01°	73
Fr750100273	98.89
Fr750100273_01°	97.78
Fr750150104	93.26
Fr750150104_01°	93.03
Fr750712184	94.61
Fr750712184_01°	83.4
Fr750803447_01°	98.68
Fr760000158	80.61

Fr760000158_01°	86.67
Fr800006124_01°	98.71
Fr830100574°	91.83
Fr830100574_01°	93.75
Fr840001861_01°	99.34
Fr860000223	97.43
Fr860000223_01°	97.97
Fr870000064_01°	97.33
Fr920000650	86.44
Fr920000650_01°	84.17
Fr920000684_01°	96.52
Fr930100037_01°	100
Gr02d0°	84.89
Gy18dl°	100
Gy23dl	97
Hu01dl	95.77
Hu02dl	87.7
Hu03dl	63.77
Hu04dl°	97.45
Hu05dl°	58.66
Hu06dl	96.58
Hu07dl	99.22
Hu08dl	58.92
Hu09dl	94.39
Hu12dl	97.52
Ie01dl	93.81
It03d0	88.73
It19d0°	75.05
It32dl	88.13
NI19dl	94.61
PI06dl	99.75
PI08dl	100
Pt05dl°	96.15
Sk01dl	66.82
SI03dl°	99.29
Sp01dl	93.24
Sp06dl°	49.69
Sp17dl	96.99
Sp28dl	14.45
Sp31dl	91.27
Uk05dl	84.02

Primary lung cancer per contributing Units

Percentage of lung excision procedures

Unit	Lung Volume						Unknown
	Bilobectomy	Lobectomy	Reduction	Pneumonectomy	Segmentectomy	Wedge	
Bm02dl	3.8	62.6	0	11.3	6.1	15.9	0.3
Bm05dl	6.5	70.9	0	10.5	6.5	5.6	0
Ch10dl	3.1	73.6	0.2	8.8	7.7	5.3	1.3
Fr060785003_01°	1	39.8	0	1.4	41.7	15.6	0.5
Fr130780521	2.2	66.3	0	4.5	16.9	8.6	1.5
Fr130780521_01	3.3	66.5	0	1.6	20.4	7.3	0.9
Fr130785652_01°	1.5	63.3	0	0	32.1	3.1	0
Fr140000209	4.3	75.9	0	3.9	3.2	11.3	1.4
Fr140000209_01°	5.3	75.3	0	1.7	11.9	5.6	0.2
Fr210987558	3.3	70.2	0	5.9	17.5	2.1	1
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	2.9	82.4	0.1	5.4	4.7	2.3	2.2
Fr310019351_01	2.7	83.8	0	1.8	9.7	1.6	0.4
Fr330783648	3.2	77.4	0	2.5	12.8	3.1	1
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	2.2	62.2	0	2.9	9.6	21.6	1.5
Fr350000741_01°	2.6	60.2	0.4	0.7	20.1	15.3	0.7
Fr370004467_01°	2.5	55.1	0.4	0.4	34.5	6.3	0.8
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	2.9	76.3	0	9.1	3.8	6.7	1.2
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	3	69.9	0.2	3.9	13.7	8.1	1.2
Fr590784864_01°	1.6	69.1	0	2.6	21.1	5.6	0
Fr630000479	2.9	73.6	0	5.2	9.7	7.2	1.4
Fr630000479_01°	4.3	73.2	0	4	14.3	4	0.2
Fr670000025	2.8	72.2	0	7.7	11.2	4.5	1.6
Fr670000025_01°	2.6	66.3	0	5.8	21.4	2.7	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	2.6	66.4	0.1	6.3	20.5	2.9	1.2
Fr750100273_01°	2.4	60.1	0	2.1	31.1	4	0.3
Fr750150104	2.4	61.7	0.1	2.7	29.1	2.9	1.1
Fr750150104_01	2.5	53.2	0	0.6	41.8	1.9	0
Fr750712184	2.5	53.3	0.1	6	28.4	8.6	1.1
Fr750712184_01°	2.7	52	0	3.9	33.6	6.6	1.2
Fr750803447_01°	2.7	74.3	0.3	3.1	12.2	7.4	0
Fr760000158	2.2	61.3	0	6.3	19	10.8	0.4

Fr760000158_01	1.3	57.8	0	3.6	30.5	6.8	0
Fr800006124_01°	1.8	65	0	2.2	19.5	11.1	0.4
Fr830100574	2.8	67.3	0	3.6	7	18.6	0.7
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	3.8	72.4	0	5.5	9	7.7	1.6
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	2.7	72	0	2.4	16.1	5.4	1.4
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	62.3	0	13.9	4.2	6.6	8.7
Gy18dl°	4.9	60.3	0	7.5	21.4	4.4	1.5
Gy23dl	3.3	67.1	0	4.7	7.1	17	0.8
Hu01dl	2.5	57.9	0	4.3	11.5	23.7	0.1
Hu02dl	2.8	70.6	0	4.8	8.7	12	1.1
Hu03dl	2.5	65.4	0	7.5	5.8	17.9	0.9
Hu04dl	3.2	68.9	0.8	3.7	13.3	8.2	1.9
Hu05dl°	0.8	75.1	0	7.5	11.1	4.5	1
Hu06dl	1.1	67.4	0	4.6	2.2	23.9	0.8
Hu07dl	1.4	70.9	0	1.9	1.2	23.4	1.2
Hu08dl	2.3	53.2	0	12.3	10.5	20.3	1.4
Hu09dl	2.9	70.4	0	7.8	5.2	12.9	0.8
Hu12dl	2.2	66.1	0	5.8	7.4	18.3	0.2
Ie01dl	5.3	82.6	0	5.7	0.5	5.6	0.3
It03d0	3.5	74.7	0	4.6	8.1	9	0.1
It19d0	4.9	81.8	0	4.5	1.4	7.4	0
It32dl	3.3	74.7	0	6.3	5.5	9.8	0.4
NI19dl	2.9	69.8	0	3.9	10.8	12.6	0
PI06dl	3.1	81.1	0	3.2	9.7	1.9	1
PI08dl	5.3	77.6	0	9.3	4.2	3.6	0
Pt05dl°	4.1	63.5	0	0.7	13.1	18.6	0
Sk01dl	4.6	86.9	0	6.4	2.1	0	0
SI03dl°	2	86	0	2	5.3	4.7	0
Sp01dl	4.1	77.2	0	5.2	9.7	3.7	0.1
Sp06dl°	4.2	80.7	0	3.6	6.8	4.7	0
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	2.3	65.8	0	3.7	16.9	9.8	1.5
Uk05dl	3.1	74.3	0	5.7	11.8	4.7	0.4

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

Proportion and type of estended resections amongst lobectomy and bilobectomy

Unit	Alone	Chest Wall	Superior Sulcus Tumor	Sleeve	Diaphragm Resection	Atrial Resection	SVC Rese./Rec.	Vertebral Resection	Unknown
Bm02dl	91.3	1.5	1.2	5.2	0.2	0.2	0	0	0.4
Bm05dl	79.5	3.9	1.7	14.2	0.2	0.2	0.1	0.1	0.1
Ch10dl	59.7	6.8	0.2	12.6	0.5	1.5	0.1	0	18.6
Fr060785003_01°	89.5	4.7	0	5.8	0	0	0	0	0
Fr130780521	89.6	5.9	0.9	3.6	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	93.3	5.9	0	0.8	0	0	0	0	0
Fr140000209_01°	99.4	0.6	0	0	0	0	0	0	0
Fr210987558	91	6.4	0	2.3	0.2	0	0.1	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	91.4	6.7	0.2	1.6	0.1	0	0	0	0
Fr310019351_01°	97.7	0.4	0.2	1.7	0	0	0	0	0
Fr330783648	91.4	5.2	0.4	3	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°	92.7	5.1	0.5	1.7	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	97.1	1.8	0	1.1	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°	92.6	3.5	0.9	3	0	0	0	0	0
Fr590784864_01°	95.3	0.5	1.4	2.8	0	0	0	0	0
Fr630000479	94	2.7	0.3	2.7	0.3	0	0	0	0
Fr630000479_01°	97.4	0.9	0.3	1.4	0	0	0	0	0
Fr670000025	87.9	8	0.4	3.7	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	95.6	2.6	0.4	1.4	0	0	0	0	0
Fr750100273_01°	97.9	1.3	0.4	0.4	0	0	0	0	0
Fr750150104	95.2	3.3	0.4	1.1	0	0	0	0	0
Fr750150104_01°	98.3	0	0	1.7	0	0	0	0	0
Fr750712184	93.1	3.9	0.3	2.5	0.2	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	90	8.4	0	1.6	0	0	0	0	0
Fr760000158_01°	98.7	0.8	0	0.5	0	0	0	0	0

Fr800006124_01°	99.3	0	0.7	0	0	0	0	0	0
Fr830100574°	91.6	4.8	0	3.6	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	94	3.2	0.8	2	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	91.1	2.4	0.4	6.1	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	0.5	0.5	0.6	0	0	0	0	0
Gr02d0°	92.8	3.4	1.2	1.9	0	0.5	0	0	0.2
Gy18dl°	78.6	7.1	1.2	11.9	0	0.8	0.4	0	0
Gy23dl	84	3.3	1.3	10	0.4	0.3	0.5	0	0.2
Hu01dl	83.1	2.1	0	2.1	0	0.1	0	0	12.6
Hu02dl	16.2	1.5	0.1	7.6	0.2	0	0.2	0.2	74
Hu03dl	44.6	7.3	0	5.1	0.4	0.1	0.1	0	42.4
Hu04dl°	25.2	4.5	0.5	0.9	0.5	0	0.5	0	67.9
Hu05dl°	0.5	0	3.7	0	0	0	0	0	95.8
Hu06dl	97.2	0	0.2	0.3	0.2	0	0	0	2.1
Hu07dl°	97.7	0	0	2.1	0	0.2	0	0	0
Hu08dl	43.4	1.6	0.1	0.1	0.3	0.2	0	0.1	54.2
Hu09dl	66.6	1.1	0.1	1.5	0.2	0.1	0.1	0	30.3
Hu12dl	89.3	1.4	0	0.8	0.1	0	0	0	8.4
Ie01dl	89.6	1.8	0.1	5.8	0.4	0.2	0	0	2.1
It03d0	91.5	1.3	0.1	3.6	0.1	0.2	0	0	3.2
It19d0°	95.9	2.3	0	0.2	0.2	0	0	0.2	1.2
It32dl	84.9	2.3	0.2	0.9	0.1	0.1	0.1	0.1	11.3
NI19dl°	92	2.9	1.1	2.7	0.9	0.2	0.2	0	0
PI06dl	99.1	0.1	0	0.7	0	0	0	0	0.1
PI08dl	93.1	1.1	0	5.3	0.2	0.1	0.2	0	0
Pt05dl°	94.9	1	0	3.1	0	0	0	0	1
Sk01dl	93.9	1.4	0.3	4.2	0.1	0	0	0	0.1
SI03dl°	59.8	0.8	0	0	0	0	0	0	39.4
Sp01dl	80.9	4.5	0.8	3.3	0.1	0.2	0	0	10.2
Sp06dl°	93.9	1.8	0.6	0.6	0.6	0	0	0	2.5
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°	91.7	3.1	0.4	2.9	0	0.2	0	0.2	1.5
Uk05dl	91.9	1.6	0.1	1.5	0.3	0	0	0	4.6

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

Proportion of estended and type of resection amongts pneumonectomies

Unit	Alone	Completion	Intrap.	Pleuropneum	Sleeve Resection	Diap. Res.	Atrial Res.	SVC Res/Rec	Vertebral Resection	Unk
Bm02dl°	33.3	18.1	32.6	1.5	2.2	0	0	0	0.7	11.6
Bm05dl°	60.5	5.8	28	0.4	0.4	0	0	0.4	0.8	3.7
Ch10dl°	24.5	4.6	23.6	19.1	4.6	7.3	2.7	0.9	0	12.7
Fr060785003_01°	100	0	0	0	0	0	0	0	0	0
Fr130780521°	50.6	1.3	0	0	1.3	0	0	0	0	46.8
Fr130780521_01°	100	0	0	0	0	0	0	0	0	0
Fr140000209°	29.3	2.4	0	0	0	0	0	0	0	68.3
Fr140000209_01°	100	0	0	0	0	0	0	0	0	0
Fr210987558°	54.1	0	0	0	3.5	0	0	0	0	42.4
Fr210987558_01°	95.2	0	0	0	4.8	0	0	0	0	0
Fr310019351°	51.5	0	0	0	0	0	0	0	0	48.5
Fr310019351_01°	100	0	0	0	0	0	0	0	0	0
Fr330783648°	51.4	2.9	0	0	0	0	0	0	0	45.7
Fr330783648_01°	100	0	0	0	0	0	0	0	0	0
Fr340796663_01°	100	0	0	0	0	0	0	0	0	0
Fr350000741°	81.2	0	0	0	0	0	0	0	0	18.8
Fr350000741_01°	100	0	0	0	0	0	0	0	0	0
Fr370004467_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°	50.7	0	0	0	1.3	0	0	0	0	48
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°	78.3	4.4	0	0	13	0	0	0	0	4.3
Fr590784864_01°	100	0	0	0	0	0	0	0	0	0
Fr630000479°	63.4	7.3	0	0	4.9	0	0	0	0	24.4
Fr630000479_01°	94.4	0	0	0	5.6	0	0	0	0	0
Fr670000025°	46.2	0	0	0	1	0	0	0	0	52.8
Fr670000025_01°	100	0	0	0	0	0	0	0	0	0
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°	50.8	0	0	0	0	0	0	0	0	49.2
Fr750100273_01°	100	0	0	0	0	0	0	0	0	0
Fr750150104°	57.9	0	0	0	0	0	0	0	0	42.1
Fr750150104_01°	100	0	0	0	0	0	0	0	0	0
Fr750712184°	50	3.1	0	0	0	0	0	0	0	46.9
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°	56.4	0	0	0	1.3	0	0	0	0	42.3
Fr760000158_01°	100	0	0	0	0	0	0	0	0	0
Fr800006124_01°	100	0	0	0	0	0	0	0	0	0
Fr830100574°	50	0	0	0	0	0	0	0	0	50
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°	56.8	0	0	0	0	0	0	0	0	43.2
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°	45.8	0	0	0	4.2	0	0	0	0	50
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	12.6	33.3	3.4	1.1	0	1.2	1.2	1.2	20.7
Gy18dl°	20.7	0	58.6	17.2	0	0	3.5	0	0	0
Gy23dl°	38.8	1.5	35.7	6.2	8.5	1.5	6.2	1.6	0	0
Hu01dl°	75	4.2	12.5	2.1	0	0	0	0	0	6.2
Hu02dl°	11.2	21.6	3.4	0	0	0	0	0.9	0	62.9
Hu03dl°	38.4	25	9.1	2.2	1.9	0.3	0	0	0	23.1
Hu04dl°	31.8	40.9	4.6	0	0	4.5	0	0	0	18.2
Hu05dl°	8.1	35.1	2.7	0	0	0	0	0	0	54.1
Hu06dl°	36.6	0	14.6	0	0	0	0	0	0	48.8
Hu07dl°	66.7	0	33.3	0	0	0	0	0	0	0
Hu08dl°	35.6	11.1	10.7	0	0	0	0	0	0	42.6
Hu09dl°	55	9.3	15	0.7	0	0	1.4	0	0	18.6
Hu12dl°	84.1	4	7.9	0	0	0	0	0	0	4
Ie01dl°	54.2	10.2	25.4	1.7	1.7	5.1	0	0	1.7	0
It03d0°	47.2	8.3	22.2	0	4.2	0	1.4	0	0	16.7
It19d0°	47.8	4.4	34.8	0	0	0	0	0	0	13
It32dl°	64.9	5.2	24.7	0	1.3	0	1.3	0	0	2.6
NI19dl°	83.3	0	16.7	0	0	0	0	0	0	0
PI06dl°	69.6	0	26.8	0	1.8	0	0	0	1.8	0
PI08dl°	67.3	0	16.8	0	0.5	0.5	5	1.5	0	8.4
Pt05dl°	100	0	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
Sp01dl°	50	9	12.8	6.4	2.5	1.3	1.3	0	0	16.7
Sp06dl°	57.1	0	14.3	14.3	0	0	0	0	0	14.3
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



The ESTS Thymic epithelial tumor database is a successful project made possible through the meticulous data input from experts in thymic epithelial tumor treatment on several continents.

As with the previous editions, the thymic epithelial tumor section of the 2024 ESTS Silver Book includes the data of the ESTS prospective thymic database as of December 2023, coordinated by the ESTS database committee and managed by the official platform of the ESTS Registry (KData Clinical srl). The continued support of currently over 75 centers from around the globe has increased the number of registered cases from 3181 to 3817. The Thymic registry encompasses patients with thymic epithelial tumors of all stages with a balanced mix of minimally-invasive and open thoracic surgery cases: VATS and RATS already make up 49% of all reported surgical approaches compared to about 50% open surgical cases. As in previous years the centers reporting to our registry are in favor of total thymectomy (90% of the reported cases).

The ESTS Thymic Working Group will roll out a new ESTS Thymic Database at the annual 2024 ESTS meeting in Barcelona! The newly developed ESTS Thymic Database takes Surgical Research on patients with thymomas and thymic carcinomas to the next level! Several new features were incorporated for user friendly data input and to achieve a high level of data completeness. Compulsory fields and pre-compiled fields are colour-coded. In order to save your time during patient data input, many data fields were compiled by default. All you have to do is check the information or change the information for your particular patient. TNM stage is automatically determined according to your T, N and M inputs. WHO thymoma and

thymic carcinoma subtypes were updated to allow all histologies or the input of combined Thymic epithelial tumor types. Histopathology is recorded according to ICCR criteria – that is how your pathologist reports! As a thoracic surgical society we start to collect more detailed information on the surgical procedures, e.g. combined approaches (e.g. robotic plus VATS) can be easily recorded with the new database. Also, a separate tab will ease the collection of data on robotic thymic surgery.

Data contribution to the prospective database in the form of the minimum dataset will still be possible!

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

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

Dr. Bernhard Moser

Chair of the ESTS Thymic Working Group

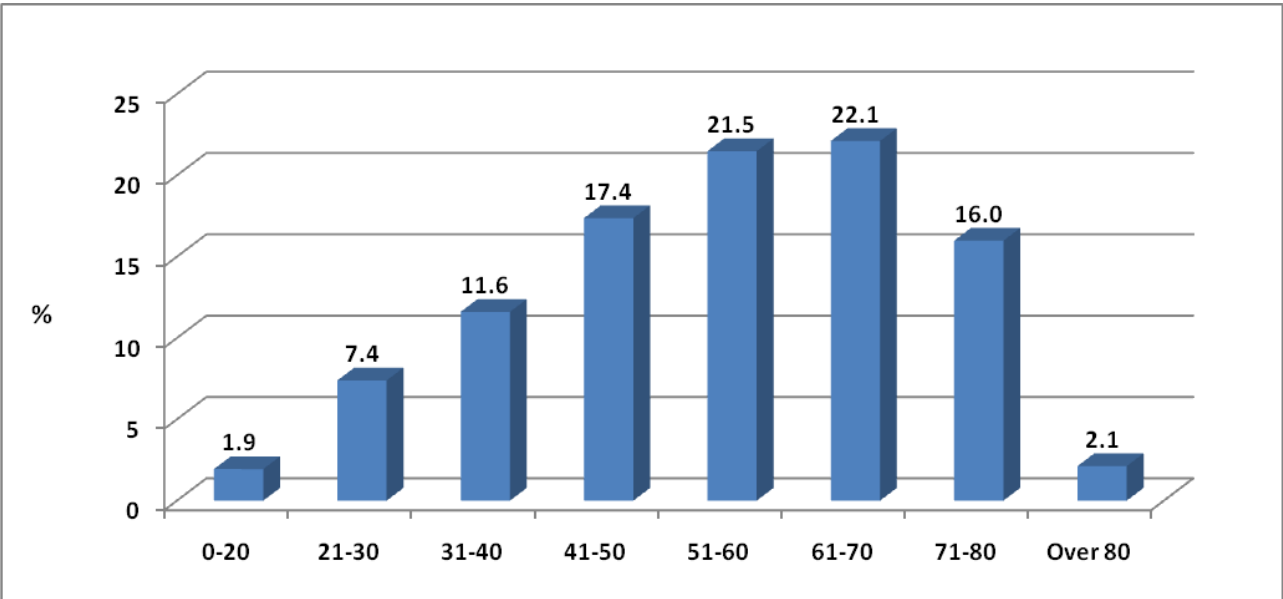
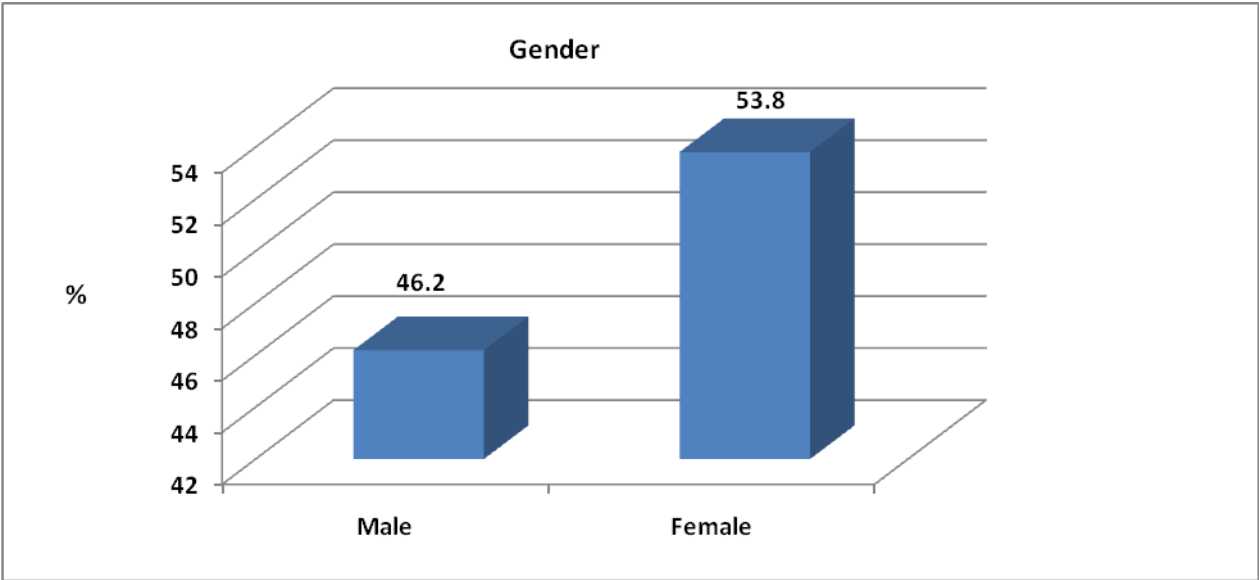
bernhard.moser@meduniwien.ac.at

Thymoma Section fields

Thymic Tumors: prospective cases
January 2007- December 2023
N=3817

Demographics: gender and age groups

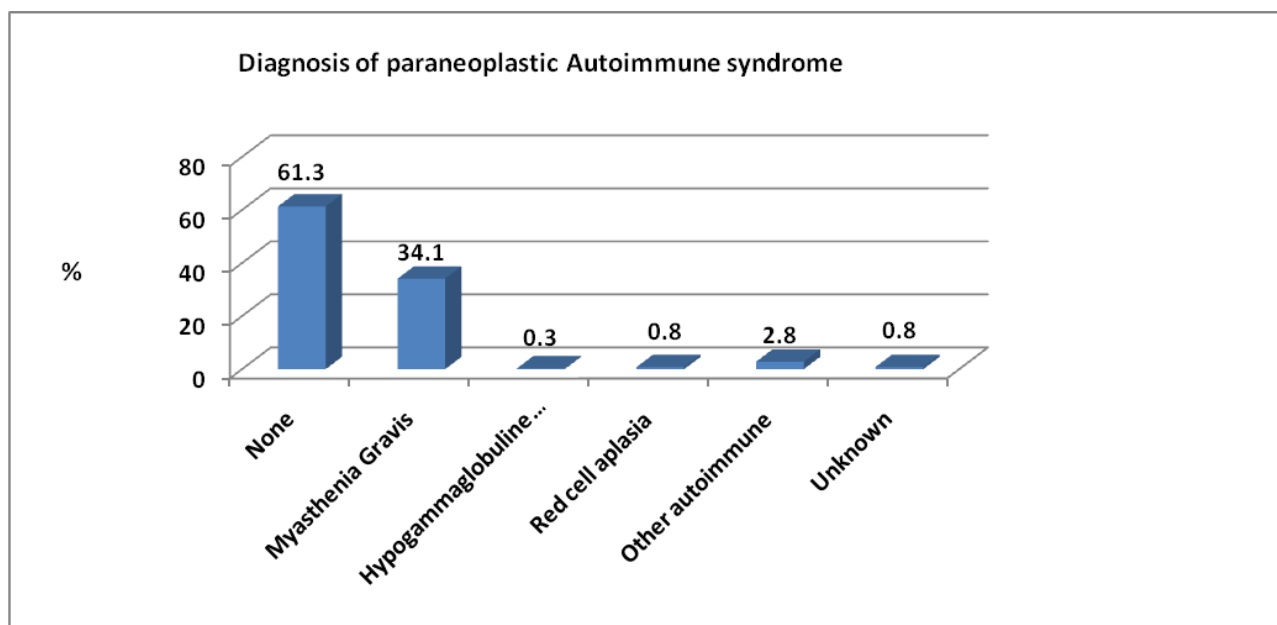
Gender	Occurrences	Percent
Male	1763	46.2
Female	2054	53.8
Total	3817	100.0



Associated paraneoplastic syndromes

Diagnosis of paraneoplastic -Autoimmune syndrome	Occurrences	Percent
None	1992	61.3
Myasthenia Gravis	1107	34.1
Hypogammaglobulinemia	9	0.3
Red cell aplasia	25	0.8
Other autoimmune	90	2.8
Unknown	26	0.8
Total number of patients	3249	100

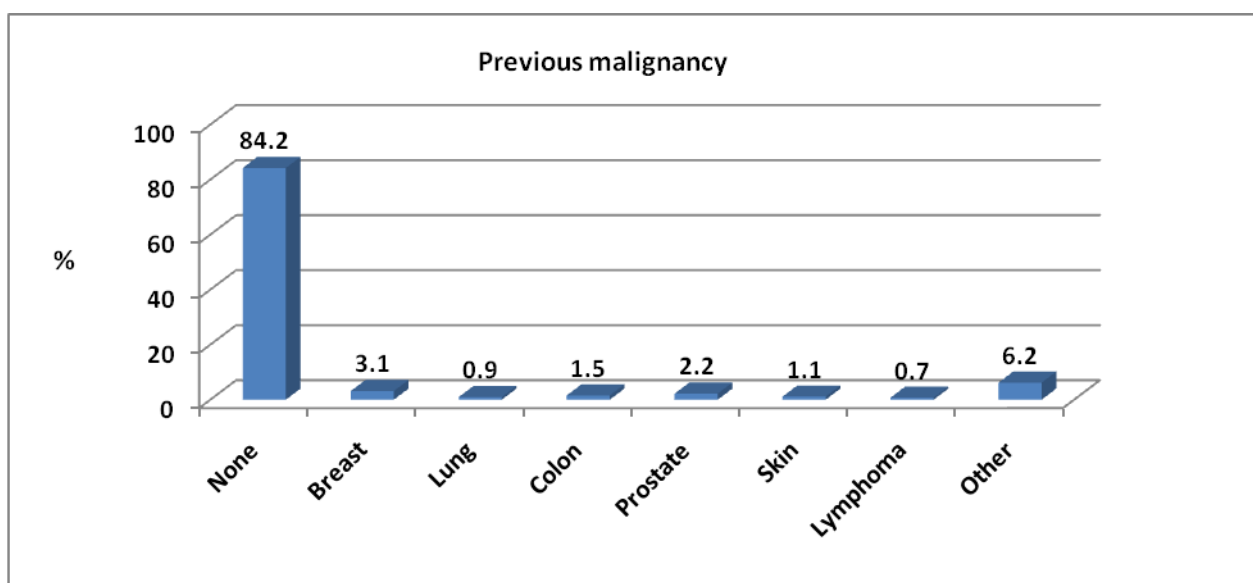
* Percentages calculated at the net of unknowns cases (N=603; 15.8%)



Previous malignancy

Previous malignancy	Occurrences	Percent
None	1731	84.2
Breast	64	3.1
Lung	19	0.9
Colon	31	1.5
Prostate	45	2.2
Skin	23	1.1
Lymphoma	15	0.7
Other	127	6.2
Total number of patients	2056	100

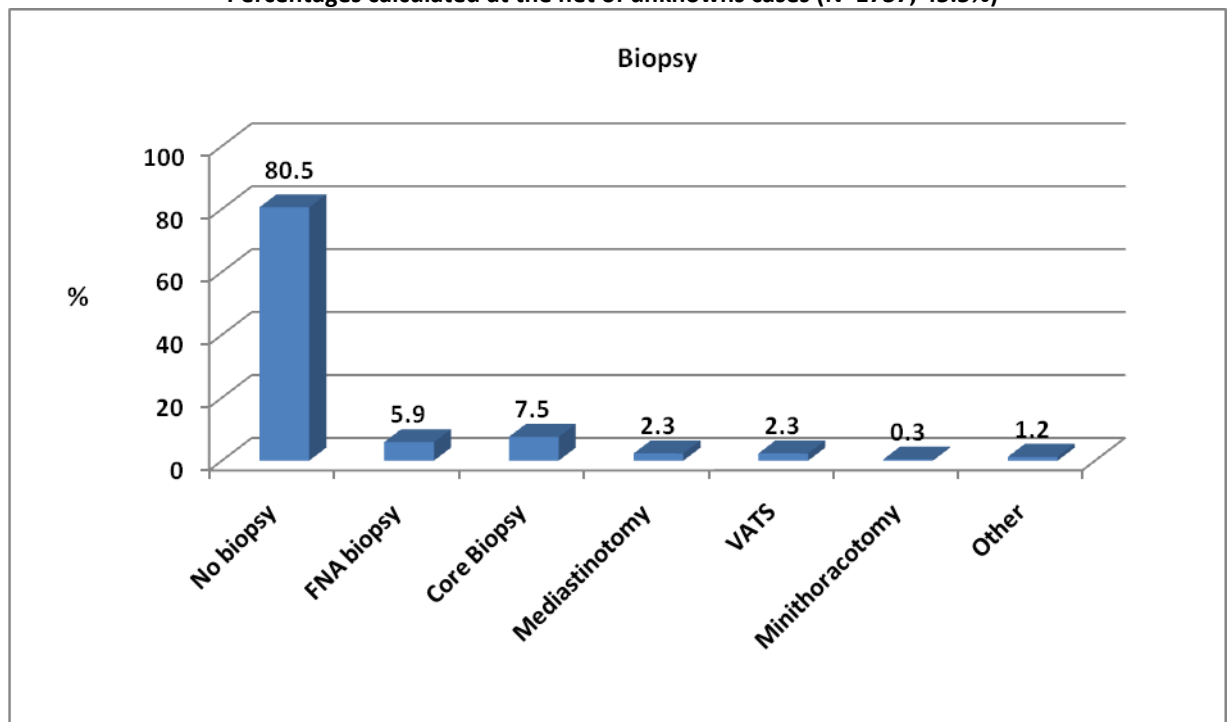
* Percentages calculated at the net of unknowns cases (N=1783; 46.7%)



Preoperative diagnosis

Biopsy	Occurrences	Percent
No biopsy	1675	80.5
FNA biopsy	122	5.9
Core Biopsy	157	7.5
Mediastinotomy	47	2.3
VATS	47	2.3
Minithoracotomy	7	0.3
Other	25	1.2
Total	2080	100.0

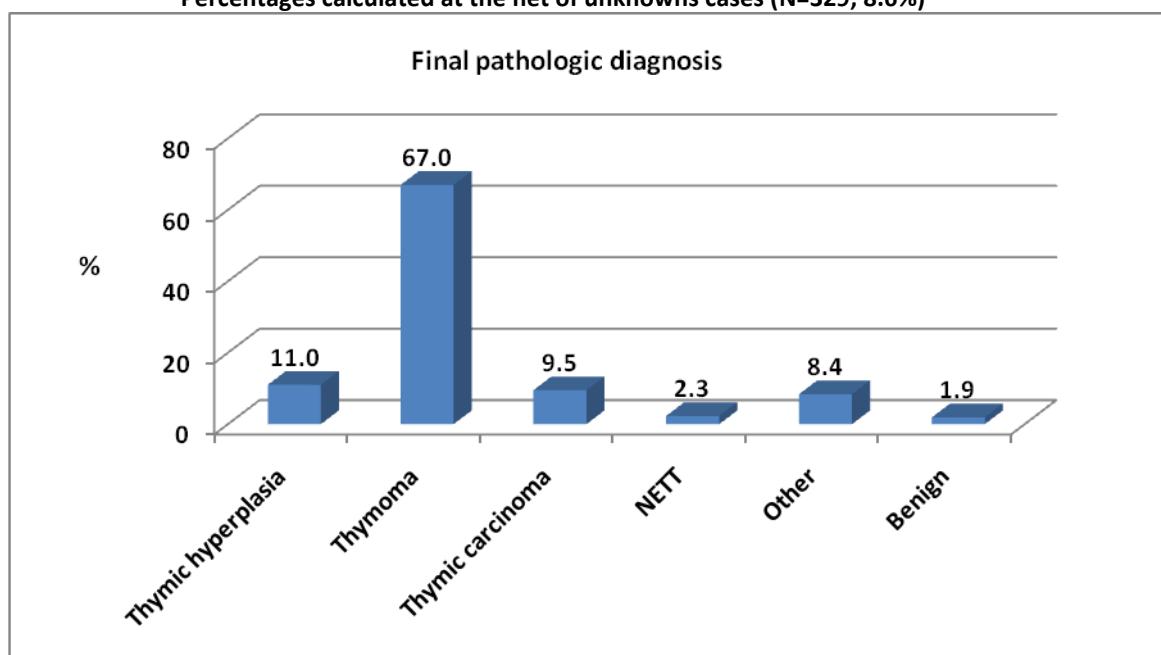
* Percentages calculated at the net of unknowns cases (N=1737; 45.5%)



Final pathologic diagnosis

Final pathologic diagnosis	Occurrences	Percent
Thymic hyperplasia	384	11.0
Thymoma	2336	67.0
Thymic carcinoma	331	9.5
NETT	80	2.3
Other	292	8.4
Benign	65	1.9
Total	3488	100.0

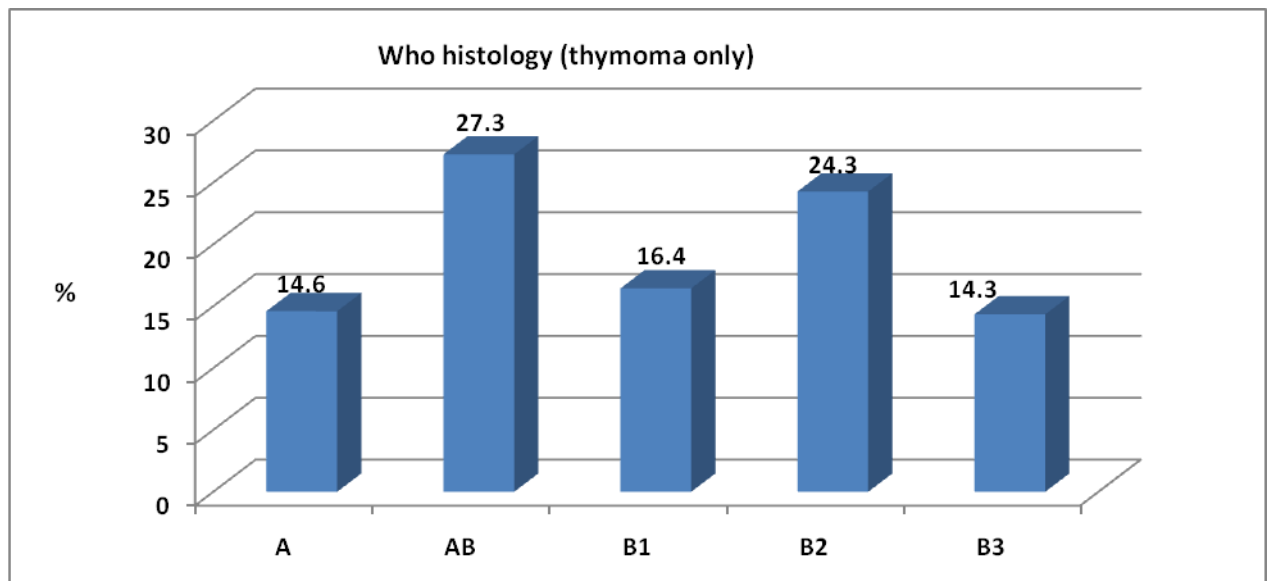
* Percentages calculated at the net of unknowns cases (N=329; 8.6%)



WHO histology (thymoma only)

WHO histology	Occurrences	Percent
A	341	14.6
AB	637	27.3
B1	384	16.4
B2	567	24.3
B3	335	14.3
Total	2336	100.0

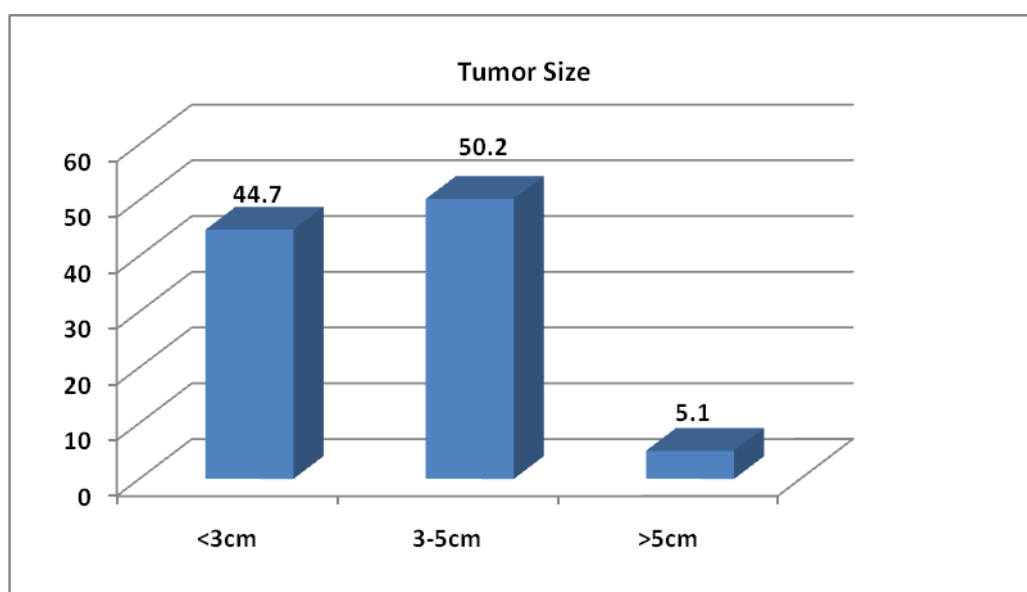
* Percentages calculated at the net of unknowns cases (N=72;3%)



Tumor size

Tumor size	Occurrences	Percent
<3cm	964	44.7
3-5cm	1083	50.2
>5cm	109	5.1
Total	2156	100.0

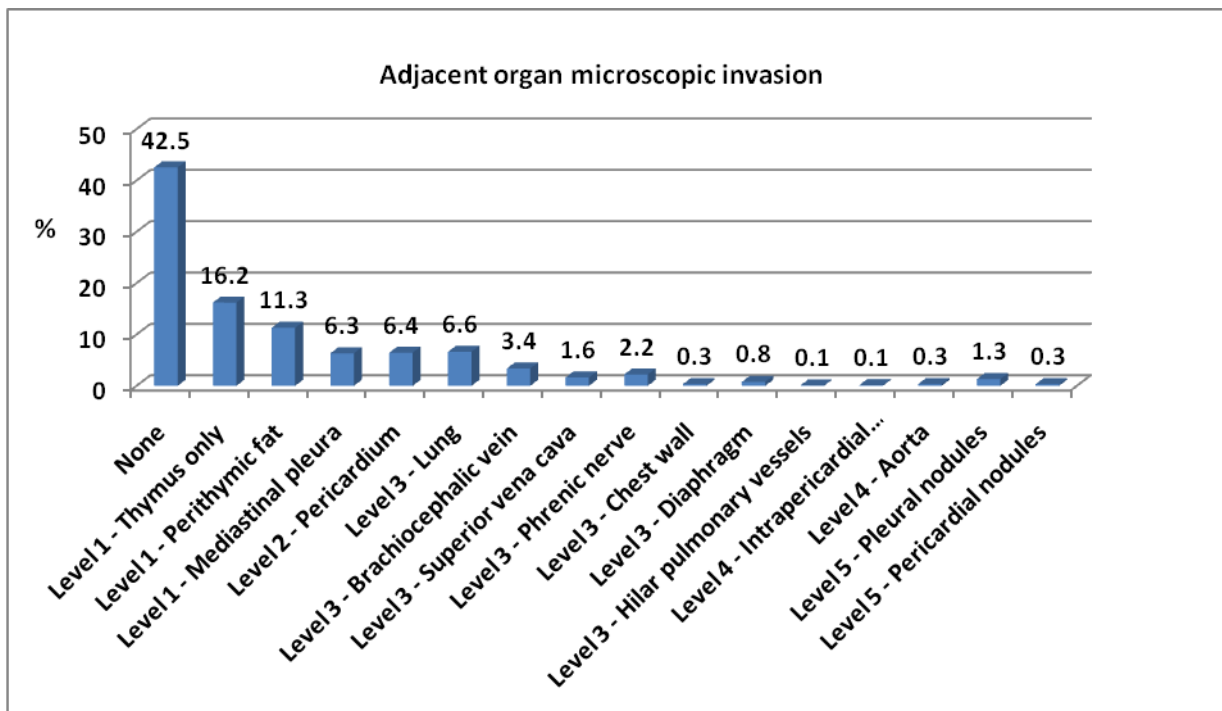
* Percentages calculated at the net of unknowns cases (N=1661; 43.5%)



Invasion to surrounding organs

Adjacent organ microscopic invasion	Occurrences	Percent
None	1227	42.5
Level 1 - Thymus only	468	16.2
Level 1 - Perithymic fat	326	11.3
Level 1 - Mediastinal pleura	183	6.3
Level 2 - Pericardium	186	6.4
Level 3 - Lung	191	6.6
Level 3 - Brachiocephalic vein	97	3.4
Level 3 - Superior vena cava	47	1.6
Level 3 - Phrenic nerve	64	2.2
Level 3 - Chest wall	10	0.3
Level 3 - Diaphragm	22	0.8
Level 3 - Hilar pulmonary vessels	3	0.1
Level 4 - Intrapericardial pulmonary artery	4	0.1
Level 4 - Aorta	10	0.3
Level 5 - Pleural nodules	38	1.3
Level 5 - Pericardial nodules	9	0.3
Total number of patients	2885	100

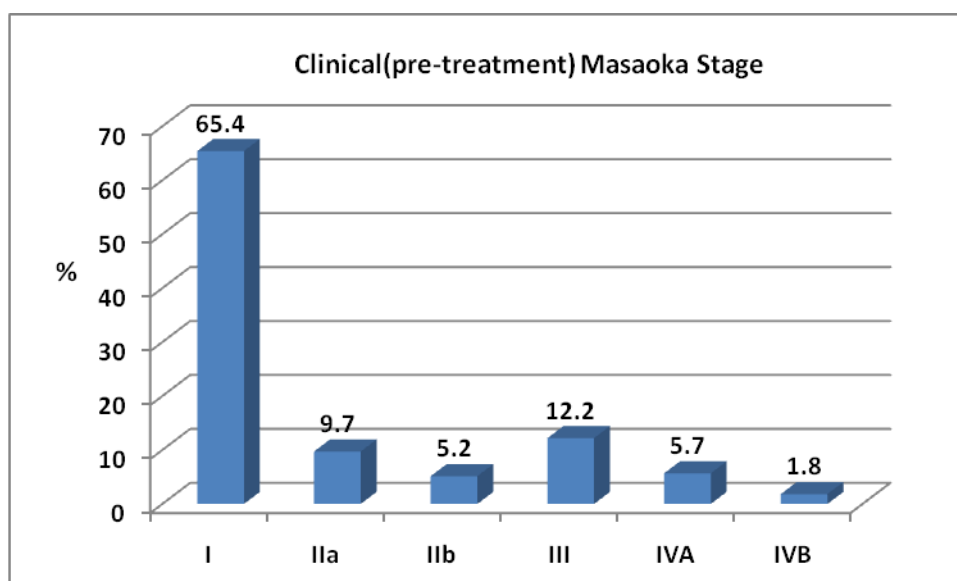
* Percentages calculated at the net of unknowns cases (N=1429;37.4%)



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

Clinical (pre-treatment) Masaoka Stage	Occurrences	Percent
I	1003	65.4
IIa	149	9.7
IIb	79	5.2
III	187	12.2
IVA	87	5.7
IVB	28	1.8
Total	1533	100.0

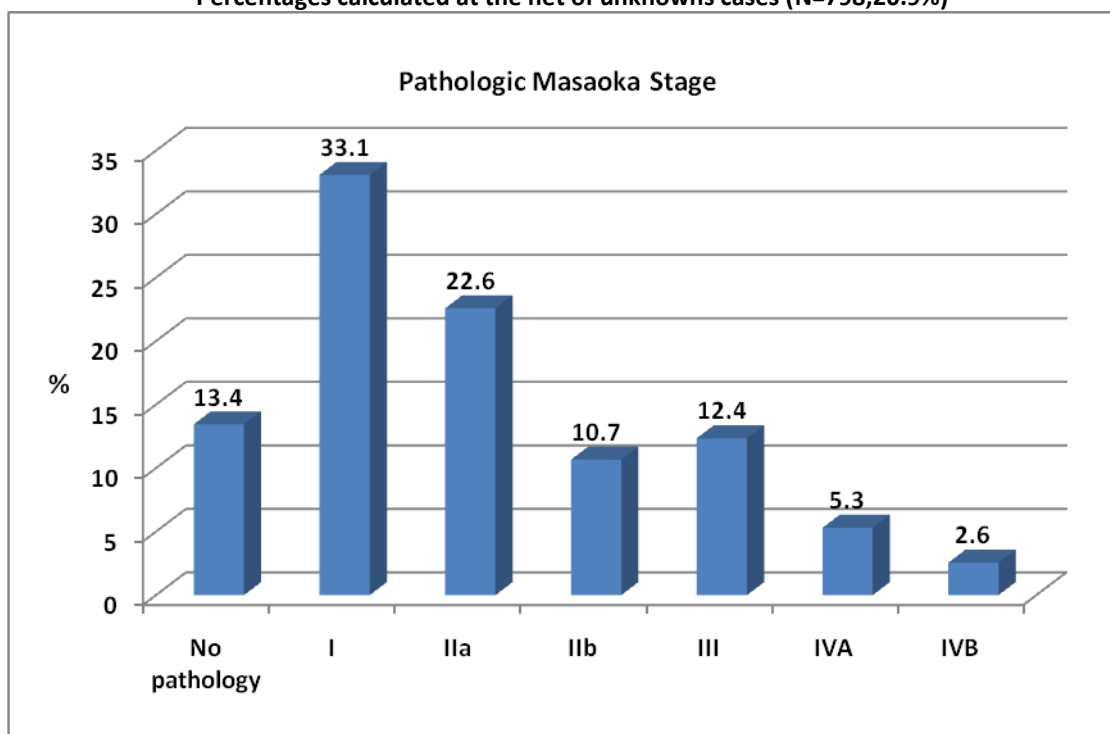
* Percentages calculated at the net of unknowns cases (N=2284;59.8%)



Pathologic Masaoka-Koga stage

Pathologic Masaoka Stage	Occurrences	Percent
No pathology	406	13.4
I	999	33.1
Ila	682	22.6
Ilb	322	10.7
III	373	12.4
IVA	160	5.3
IVB	77	2.6
Total	3019	100.0

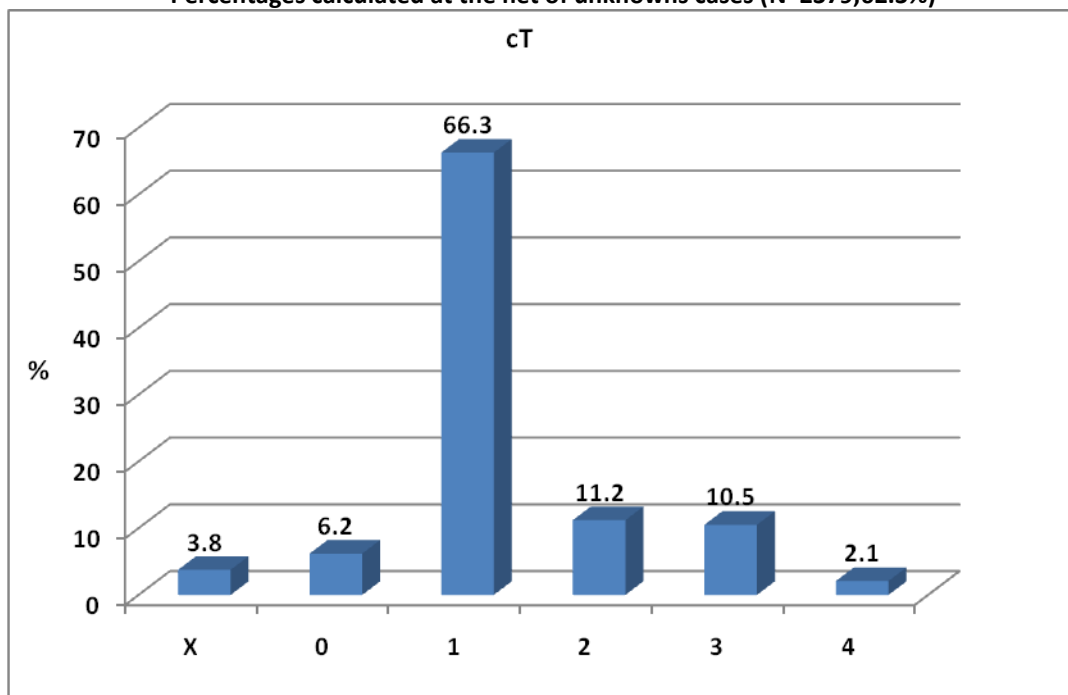
* Percentages calculated at the net of unknowns cases (N=798;20.9%)



Clinical TNM Staging

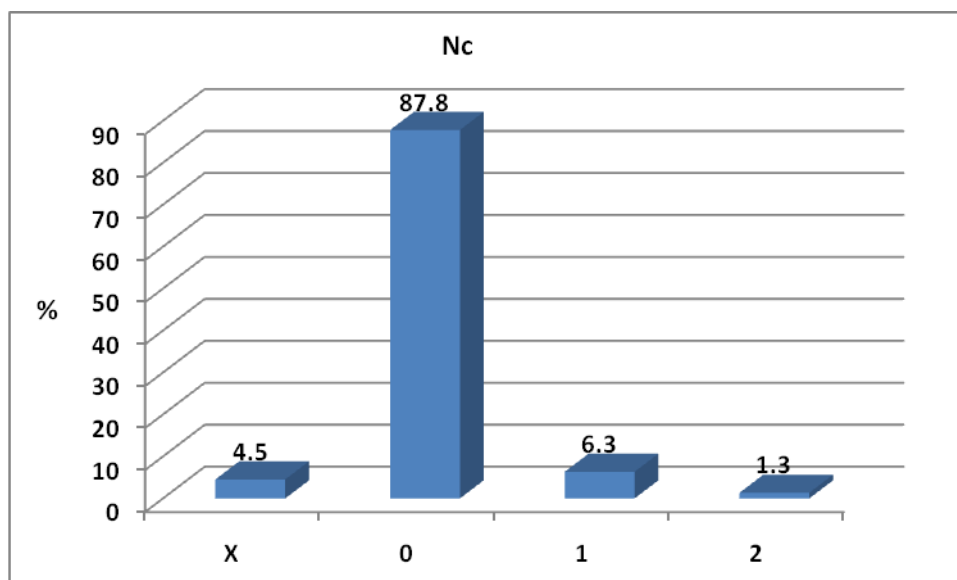
T Clinical	Occurrences	Percent
X	54	3.8
0	89	6.2
1	953	66.3
2	161	11.2
3	151	10.5
4	30	2.1
Total	1438	100.0

* Percentages calculated at the net of unknowns cases (N=2379;62.3%)



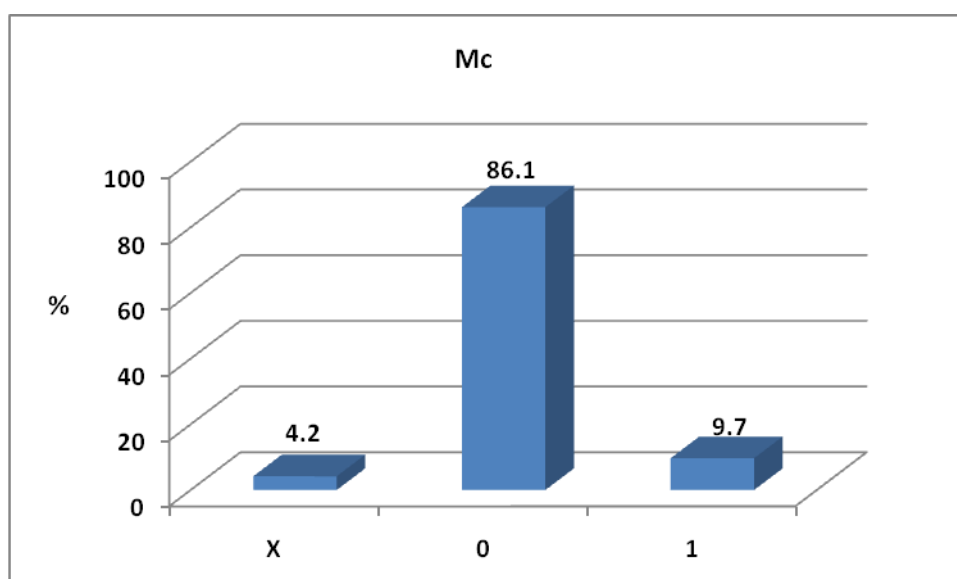
N Clinical	Occurrences	Percent
X	65	4.5
0	1260	87.8
1	91	6.3
2	19	1.3
Total	1435	100.0

* Percentages calculated at the net of unknowns cases (N=2382;62.4%)



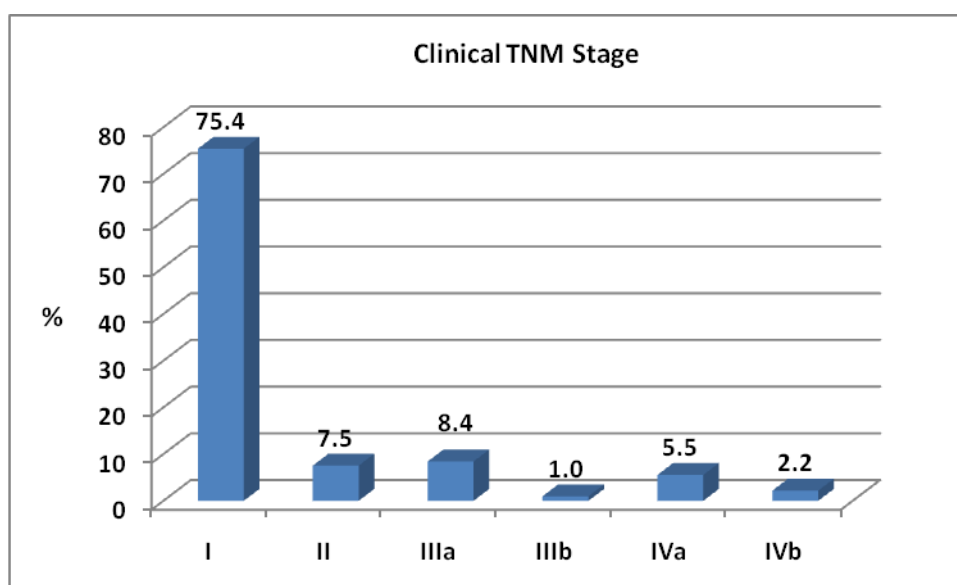
M Clinical	Occurrences	Percent
X	60	4.2
0	1237	86.1
1	139	9.7
Total	1436	100.0

* Percentages calculated at the net of unknowns cases (N=2381;62.4%)



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

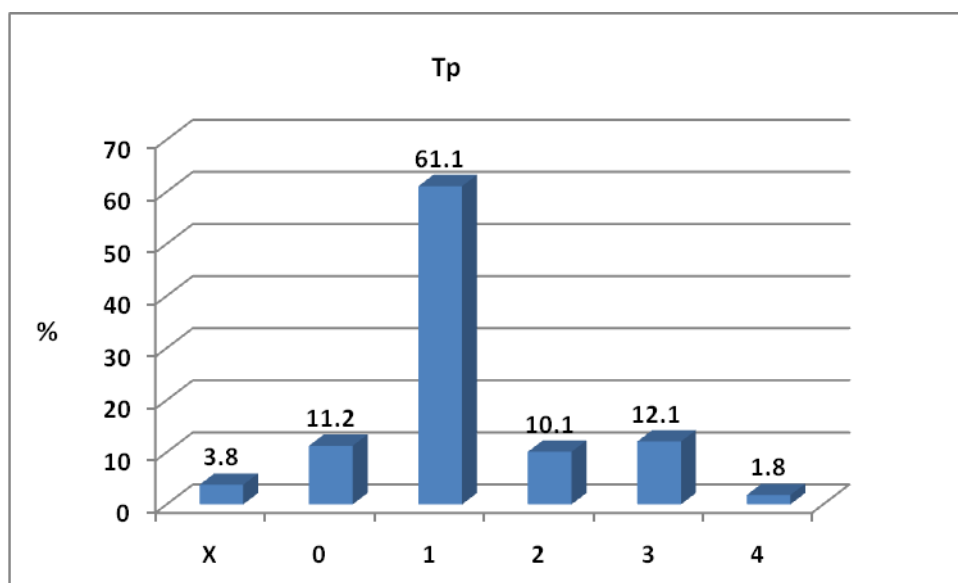
* Percentages calculated at the net of unknowns cases (N=2569;67.3%)



Pathologic TNM Staging

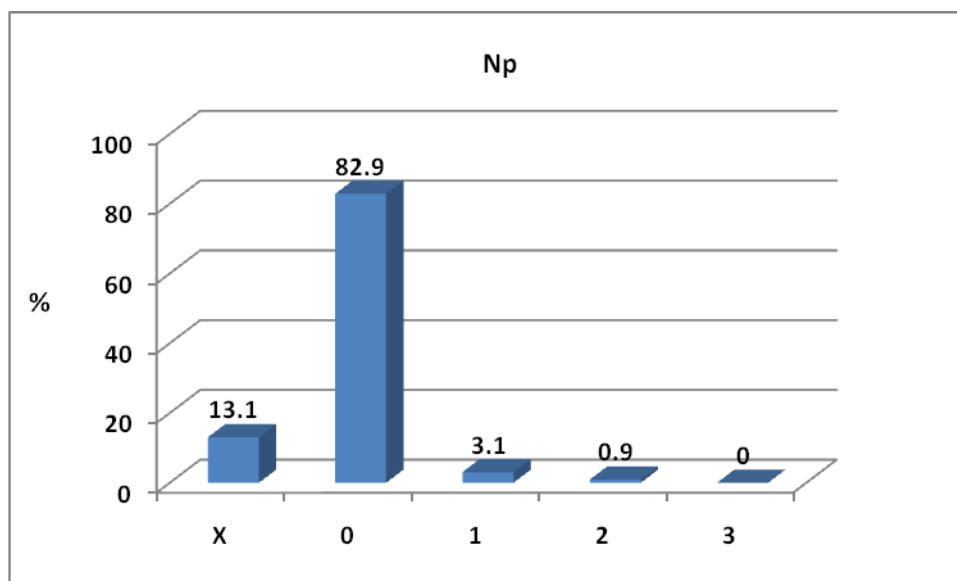
T pathology	Occurrences	Percent
X	97	3.8
0	290	11.2
1	1575	61.1
2	260	10.1
3	311	12.1
4	46	1.8
Total	2579	100.0

* Percentages calculated at the net of unknowns cases (N=1238;32.4%)



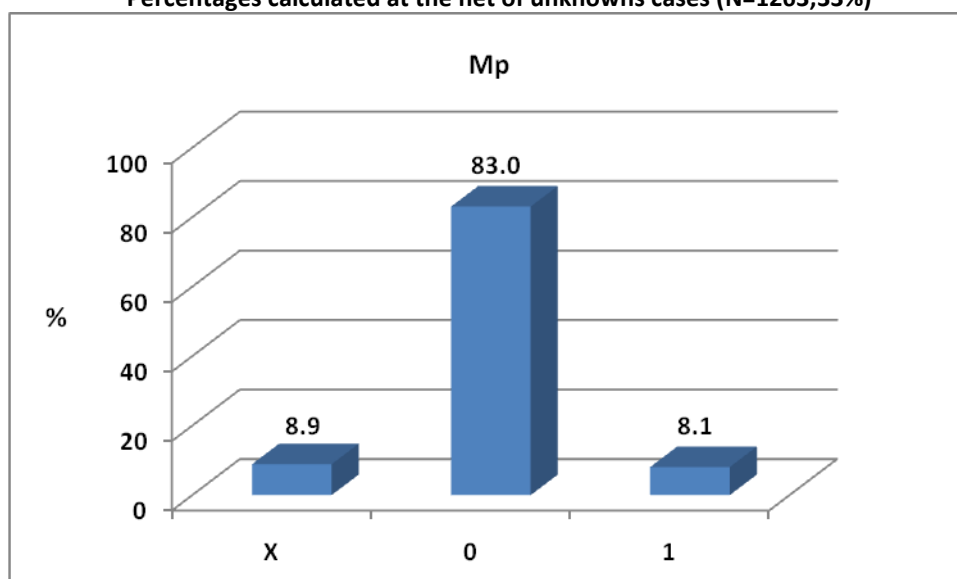
N pathology	Occurrences	Percent
X	310	13.1
0	1966	82.9
1	73	3.1
2	22	0.9
3	1	0.0
Total	2382	100.0

* Percentages calculated at the net of unknowns cases (N=1445;37.9%)



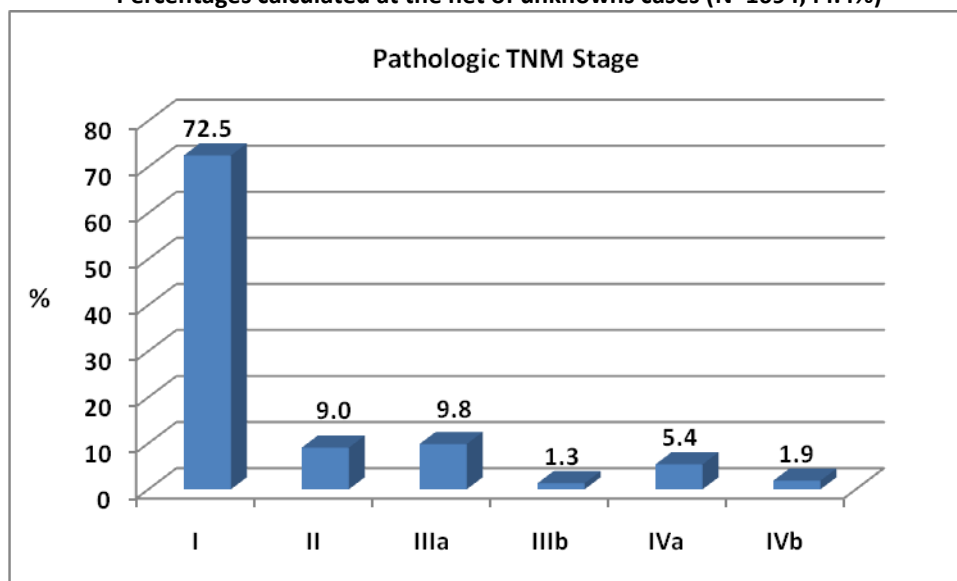
M pathology	Occurrences	Percent
X	227	8.9
0	2121	83.0
1	206	8.1
Total	2554	100.0

* Percentages calculated at the net of unknowns cases (N=1263;33%)



Pathologic TNM Stage	Occurrences	Percent
I	1539	72.5
II	192	9.0
IIIa	209	9.8
IIIb	28	1.3
IVa	115	5.4
IVb	40	1.9
Total	2123	100.0

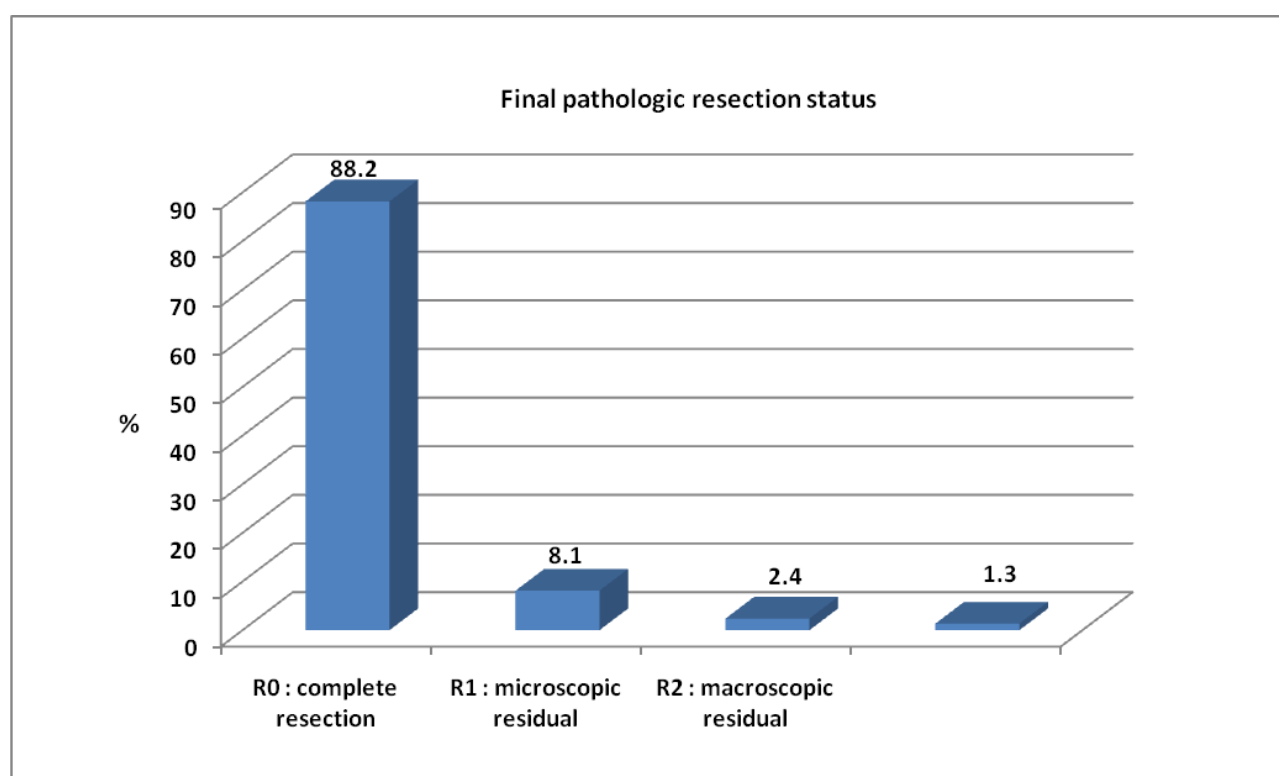
* Percentages calculated at the net of unknowns cases (N=1694;44.4%)



Final pathologic resection status

Final pathologic resection status	Occurrences	Percent
R0 : complete resection	2813	88.2
R1 : microscopic residual	259	8.1
R2 : macroscopic residual	76	2.4
RX : completeness of the resection unknown	43	1.3
Total	3191	100.0

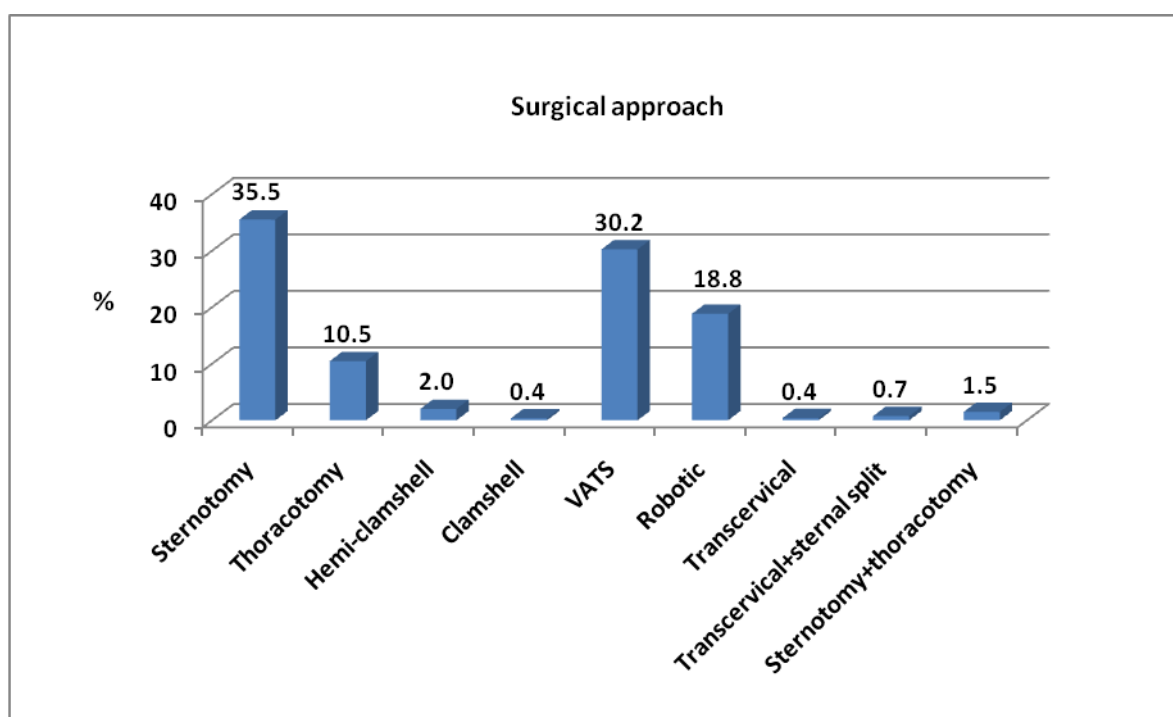
* Percentages calculated at the net of unknowns cases (N=626;16.4%)



Surgical approach

Surgical approach	Occurrences	Percent
Sternotomy	1112	35.5
Thoracotomy	328	10.5
Hemi-clamshell	63	2.0
Clamshell	11	0.4
VATS	947	30.2
Robotic	590	18.8
Transcervical	12	0.4
Transcervical+sternal split	23	0.7
Sternotomy+thoracotomy	46	1.5
Total	3132	100.0

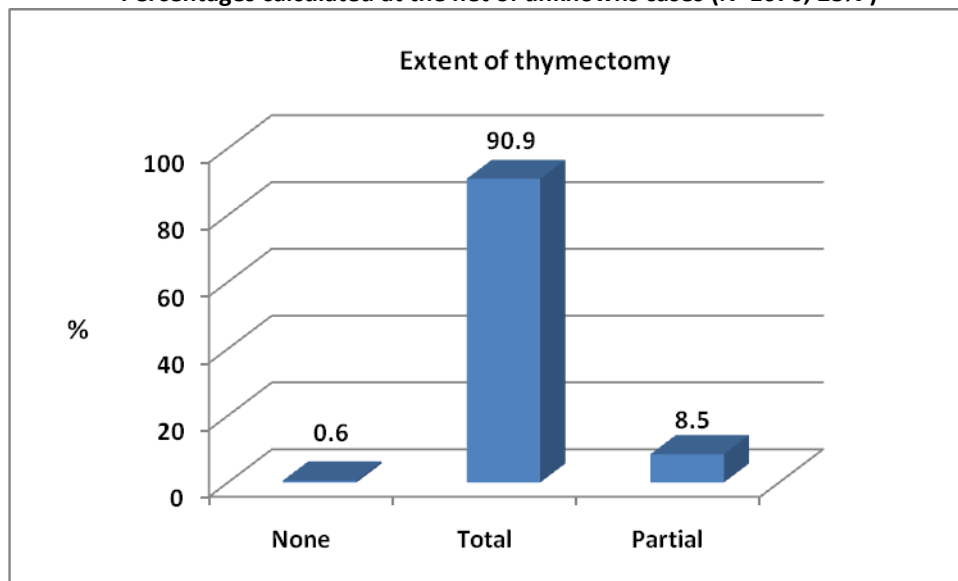
* Percentages calculated at the net of unknowns cases (N=685 17.9%)



Extent of associated thymectomy

Extent of thymectomy	Occurrences	Percent
None	17	0.6
Total	2497	90.9
Partial	233	8.5
Total	2747	100.0

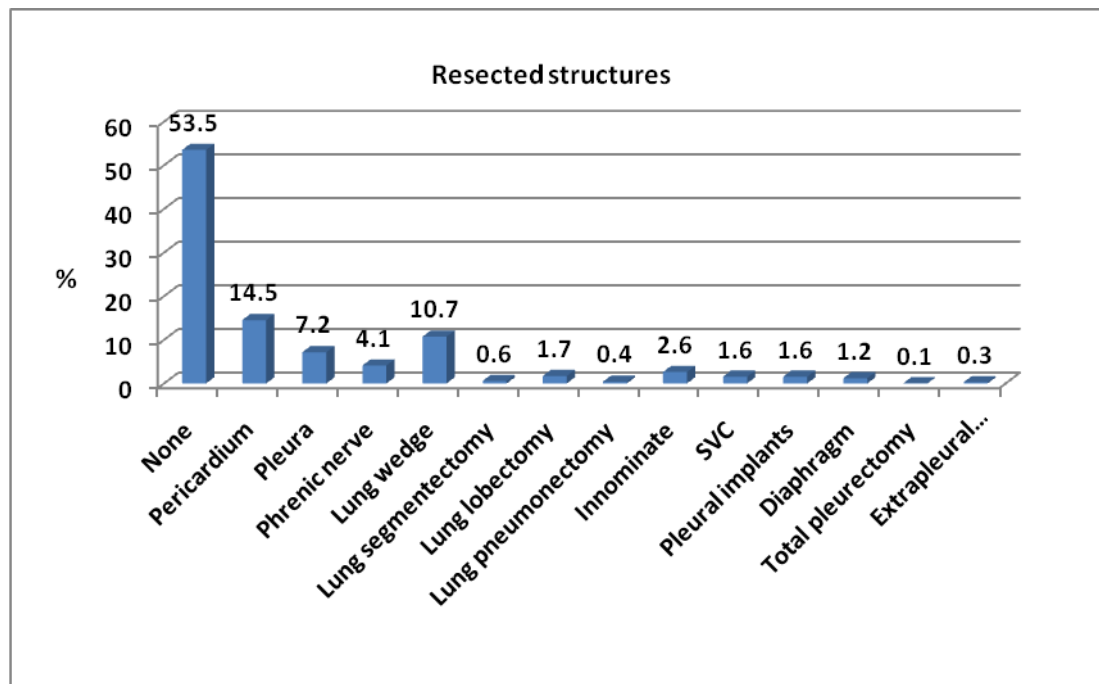
* Percentages calculated at the net of unknowns cases (N=1070; 28%)



Resected structures associated with thymic tumor resection

Resected structures	Occurrences	Percent
None	1651	53.5
Pericardium	448	14.5
Pleura	221	7.2
Phrenic nerve	127	4.1
Lung wedge	331	10.7
Lung segmentectomy	18	0.6
Lung lobectomy	53	1.7
Lung pneumonectomy	12	0.4
Innominate	81	2.6
SVC	48	1.6
Pleural implants	48	1.6
Diaphragm	37	1.2
Total pleurectomy	2	0.1
Extrapleural pneumonectomy	8	0.3
Total number of patients	3085	100

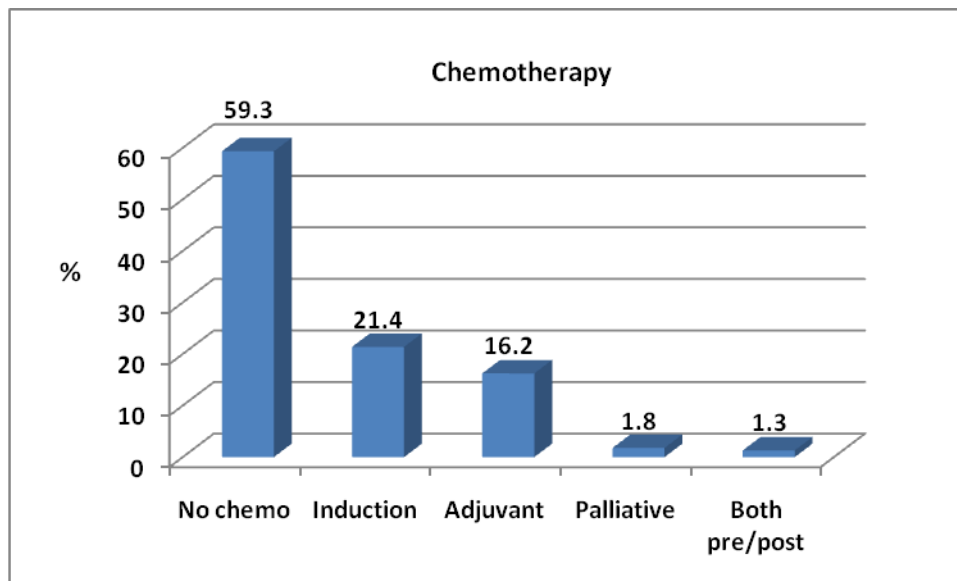
* Percentages calculated at the net of unknowns cases (N=1320; 34.6%)



Chemotherapy

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

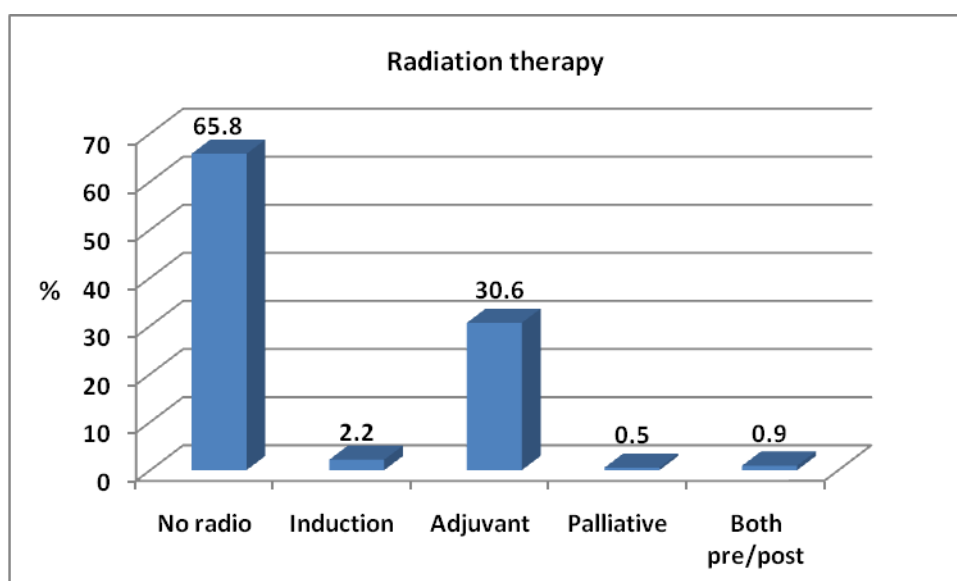
* Percentages calculated at the net of unknowns cases (N=3195;83.7%)



Radiotherapy

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

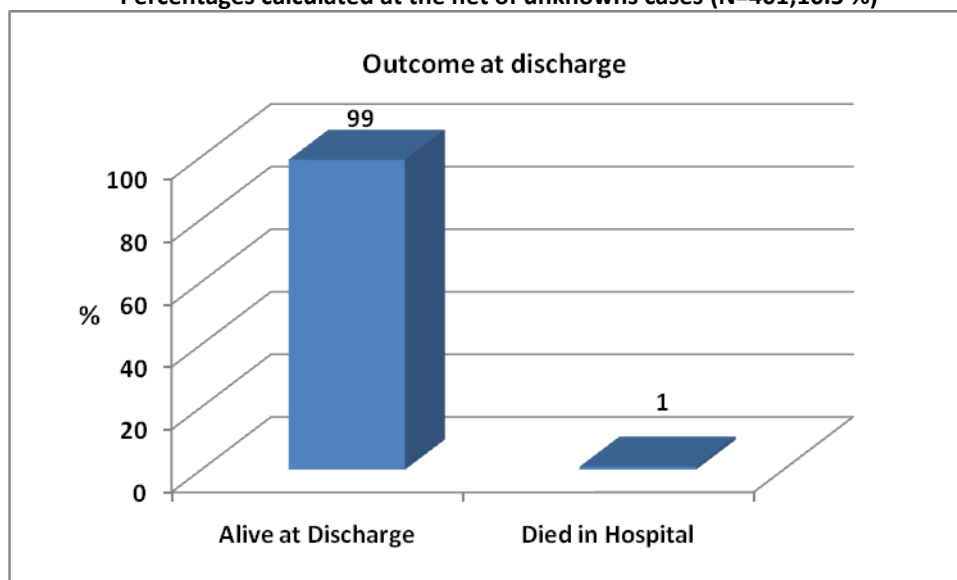
* Percentages calculated at the net of unknowns cases (N=2884;74%)



Outcome at hospital discharge

Outcome at Discharge	Occurrences	Percent
Alive at Discharge	3383	99.0
Died in Hospital	33	1.0
Total	3416	100.0

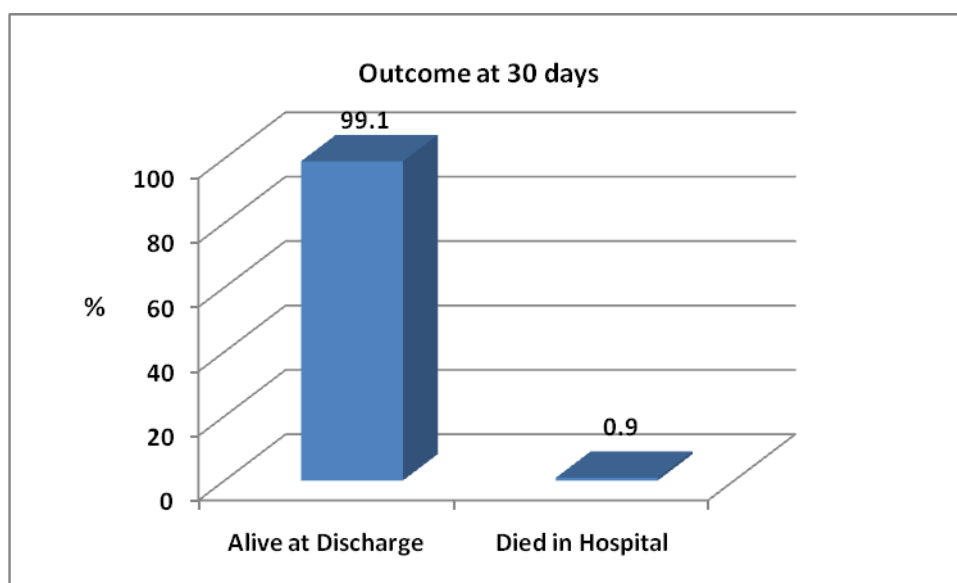
* Percentages calculated at the net of unknowns cases (N=401;10.5 %)



Outcome at 30 days

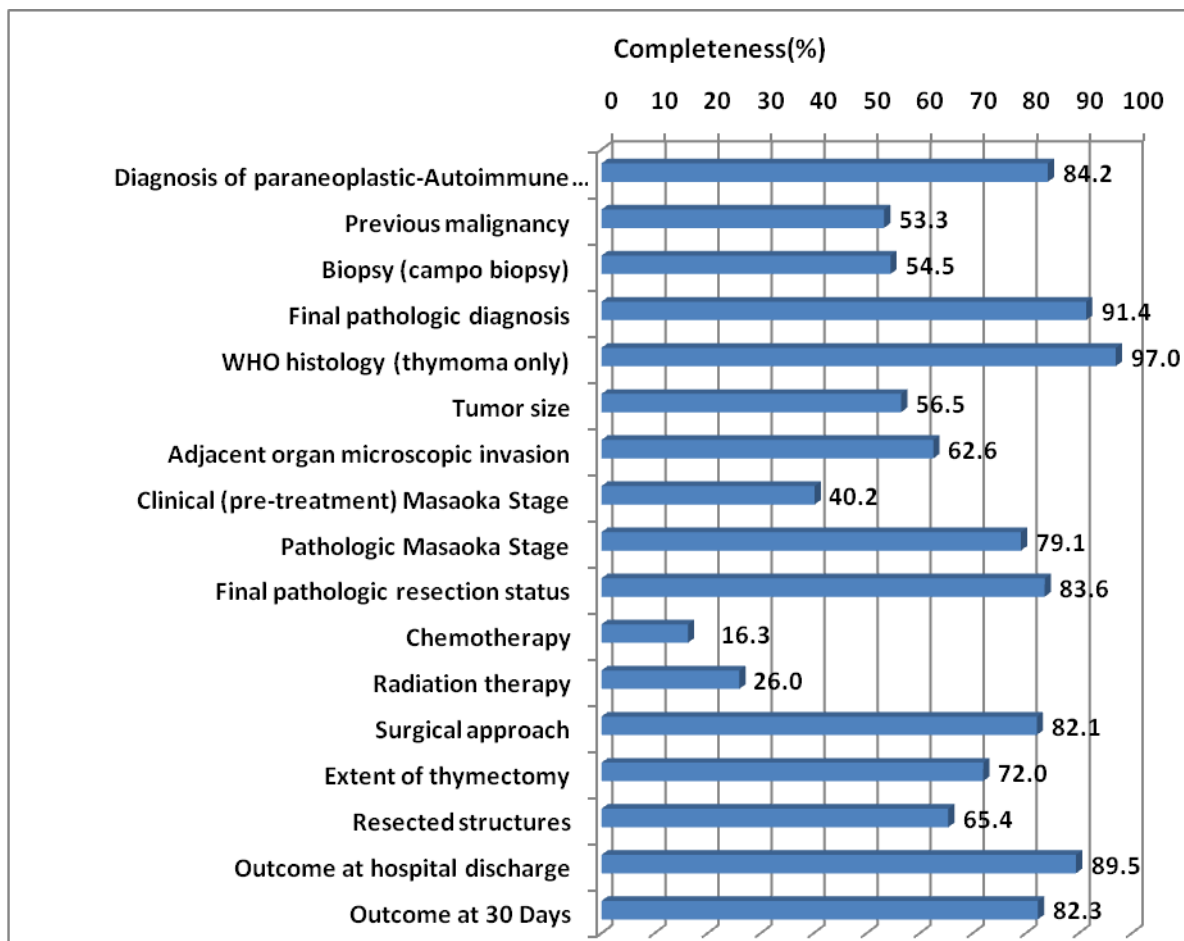
Outcome at 30 Days	Occurrences	Percent
Alive at Discharge	3115	99.1
Died in Hospital	27	0.9
Total	3142	100.0

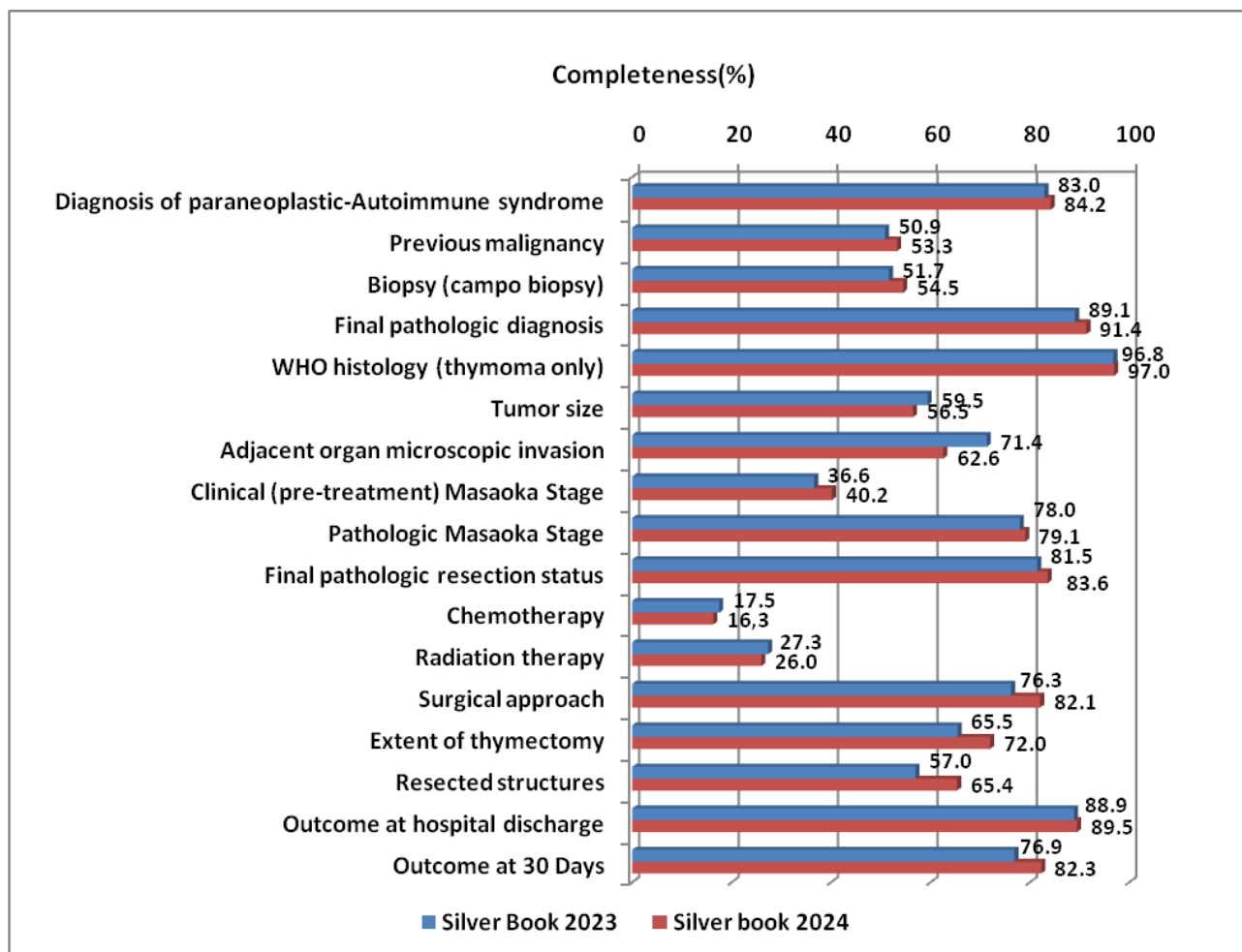
* Percentages calculated at the net of unknowns cases (N=675;17.7%)



Data Completeness

Name of Field	Unknown (%)	Completeness(%)
Diagnosis of paraneoplastic-Autoimmune syndrome	15.8	84.2
Previous malignancy	46.7	53.3
Biopsy (campo biopsy)	45.5	54.5
Final pathologic diagnosis	8.6	91.4
WHO histology (thymoma only)	3.0	97.0
Tumor size	43.5	56.5
Adjacent organ microscopic invasion	37.4	62.6
Clinical (pre-treatment) Masaoka Stage	59.8	40.2
Pathologic Masaoka Stage	20.9	79.1
Final pathologic resection status	16.4	83.6
Chemotherapy	83.7	16.3
Radiation therapy	74.0	26.0
Surgical approach	17.9	82.1
Extent of thymectomy	28.0	72.0
Resected structures	34.6	65.4
Outcome at hospital discharge	10.5	89.5
Outcome at 30 Days	17.7	82.3





PART 4

MESOTHELIOMA SECTION

(Database users only)

Message from Clinical Leader of the Mesothelioma section of ESTS Registry

This year the 9th edition of TNM for mesothelioma has been published and the T factor has changed significantly. The ESTS mesothelioma registry represent a valuable dataset with real world data on patients with mesothelioma. We have over 2000 patients

The ESTS registry has been linked with IASLC and ESTS has actively contributed to the staging system

This database is extremely important to validate data and your collaboration in putting more cases is crucial to improve the understanding of this very aggressive disease

I hope you and your unit will join this interesting project and collect more data.

Best regards

Dr. Andrea Billè

Chair of the ESTS Mesothelioma Working Group

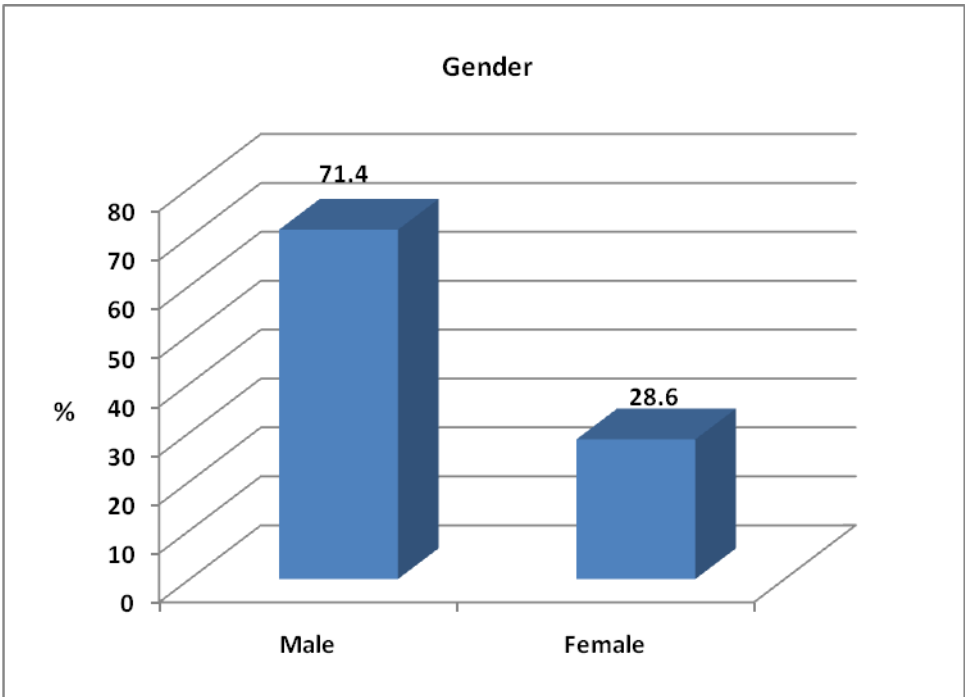
Andrea.Bille@gstt.nhs.uk

Mesothelioma Section fields

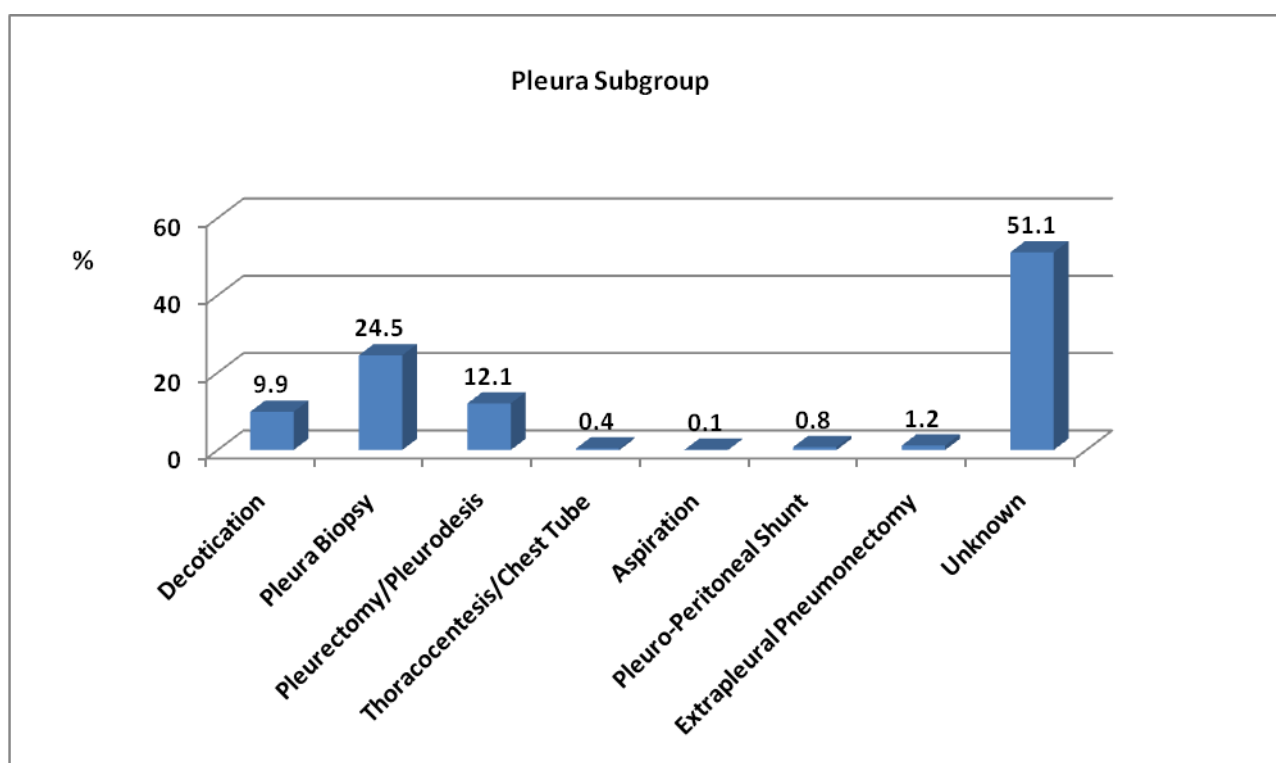
Group definition: Pleura – Diagnosis : Mesothelioma; prospective cases
January 1990- May 2024
N=2475

Demographics: gender

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

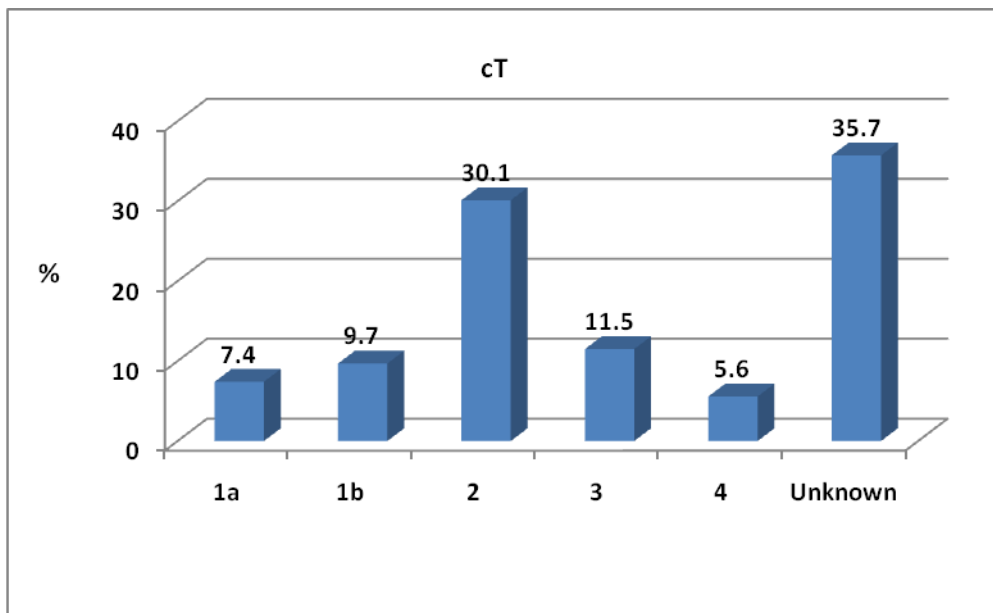


Pleura Subgroup	Occurrences	Percent
Decotication	247	9.9
Pleura Biopsy	612	24.5
Pleurectomy/Pleurodesis	301	12.1
Thoracocentesis/Chest Tube	10	0.4
Aspiration	2	0.1
Pleuro-Peritoneal Shunt	19	0.8
Extrapleural Pneumonectomy	29	1.2
Unknown	1277	51.1
Total	2497	100.0

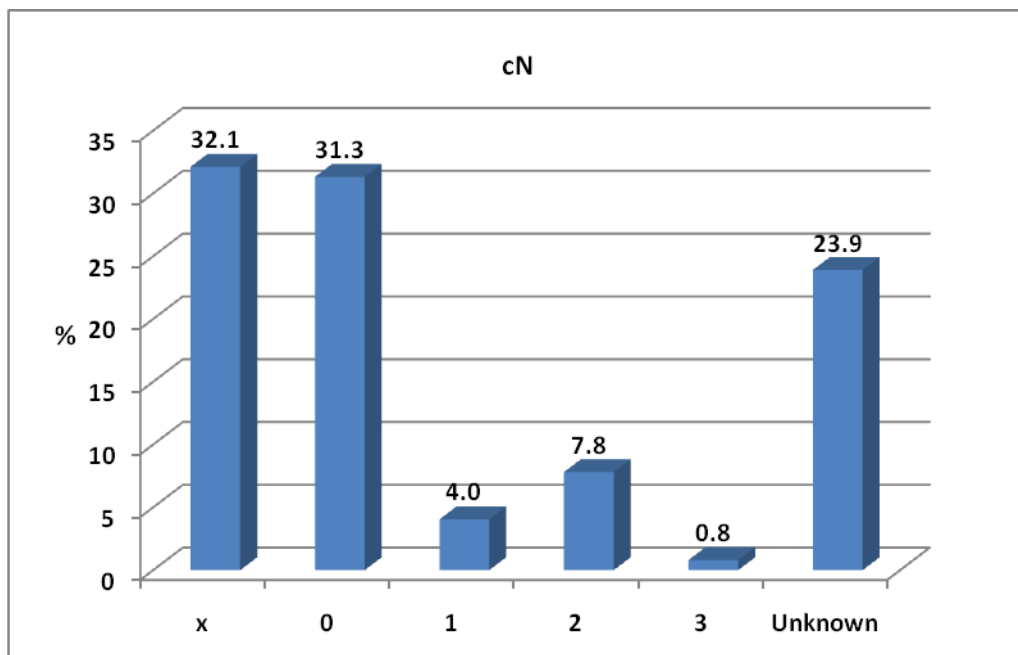


Clinical Staging : cT,cN,cM

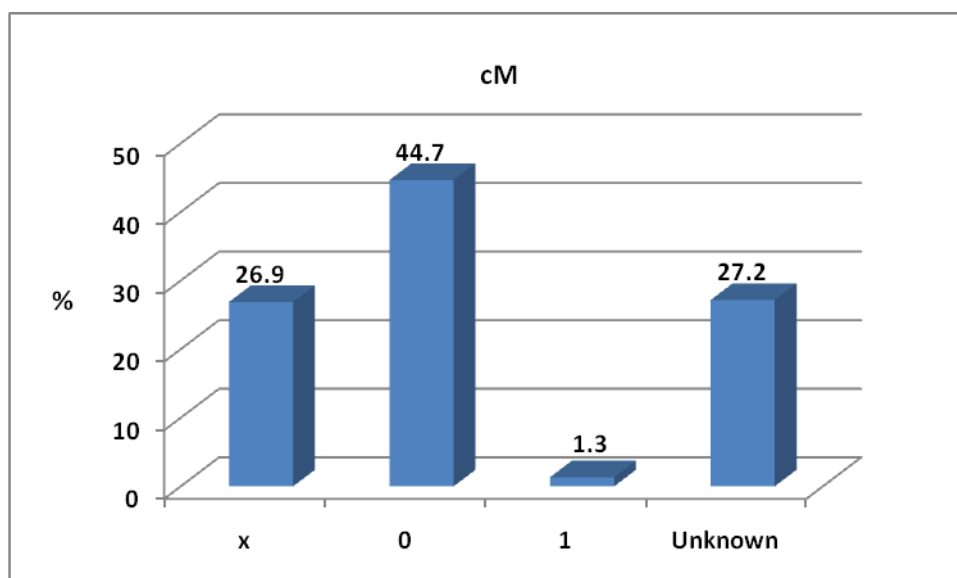
cT	Occurrences	Percent
1a	185	7.4
1b	242	9.7
2	752	30.1
3	287	11.5
4	139	5.6
Unknown	892	35.7
Total	2497	100.0



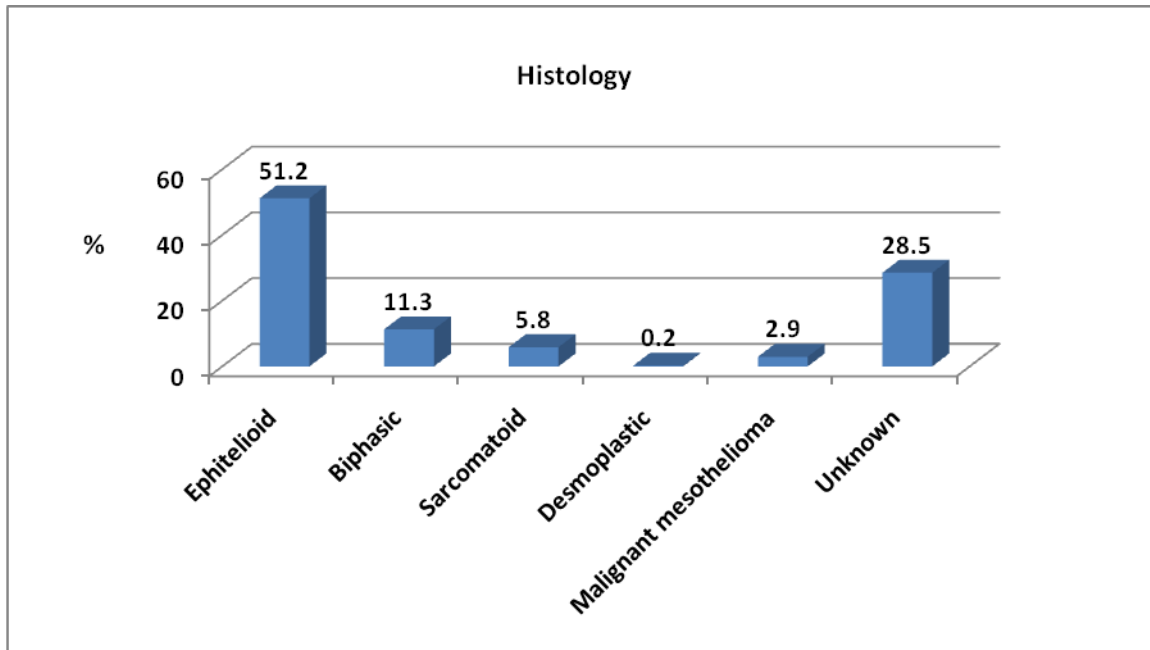
cN	Occurrences	Percent
X	802	32.1
0	782	31.3
1	101	4.0
2	195	7.8
3	20	0.8
Unknown	597	23.9
Total	2497	100.0



cM	Occurrences	Percent
X	671	26.9
0	1115	44.7
1	33	1.3
Unknown	678	27.2
Total	2497	100.0

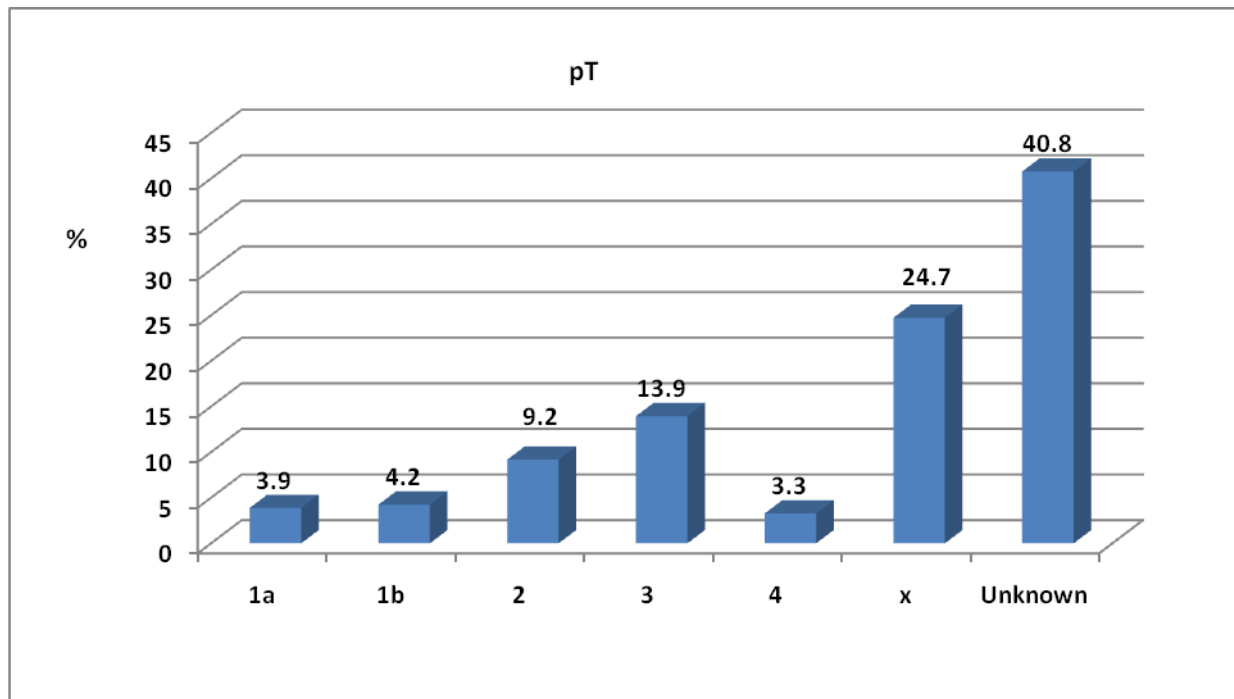


Histology	Occurrences	Percent
Ephitelioid	1278	51.2
Biphasic	282	11.3
Sarcomatoid	146	5.8
Desmoplastic	6	0.2
Malignant mesothelioma	73	2.9
Unknown	712	28.5
Total	2497	100.0

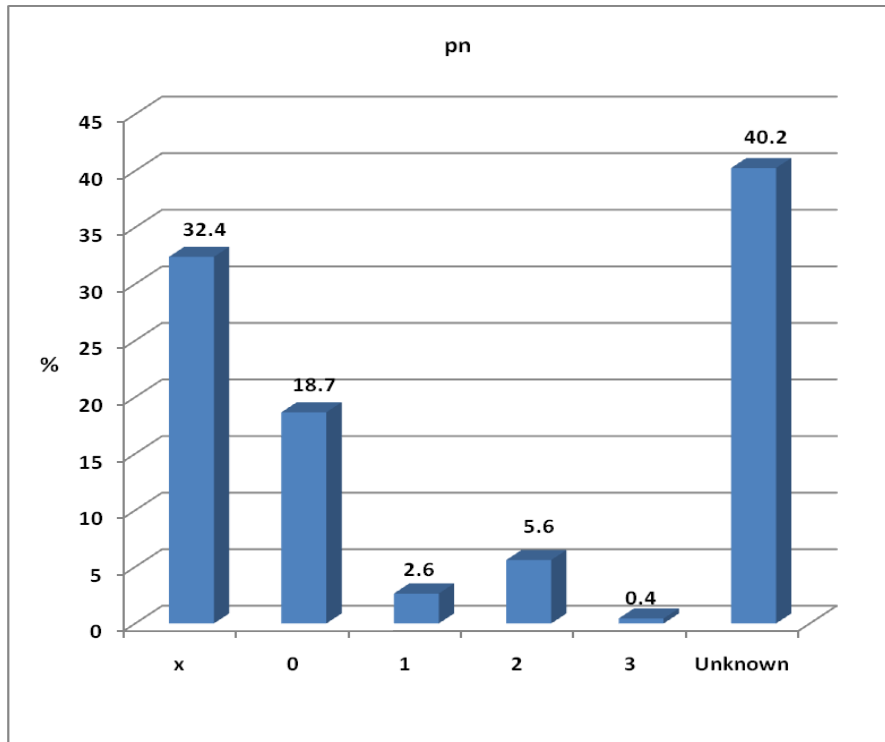


Pathological Staging : pT,pN,pM

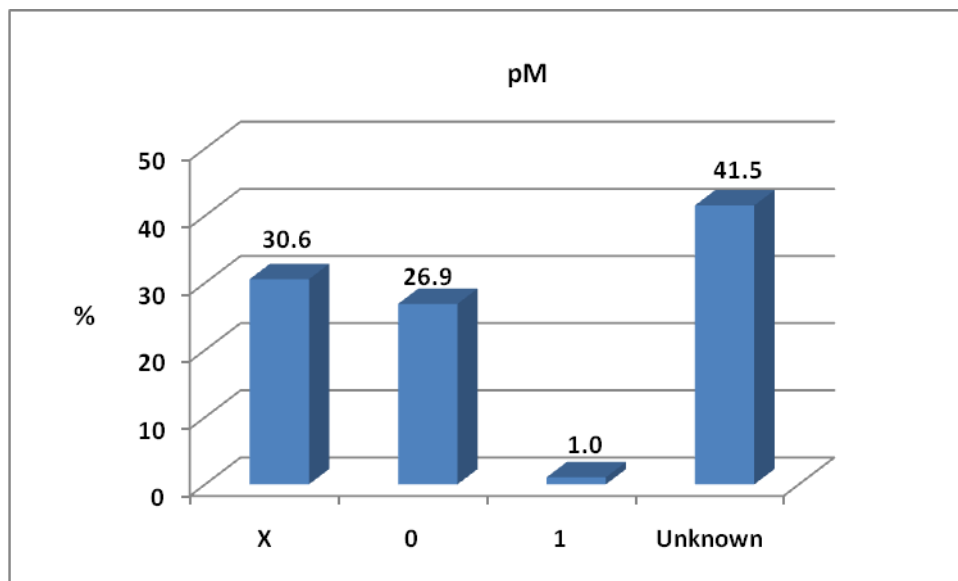
pT	Occurrences	Percent
1a	103	4.1
1b	103	4.1
2	230	9.2
3	350	14.0
4	83	3.3
X	615	24.6
Unknown	1013	40.6
Total	2497	100.0



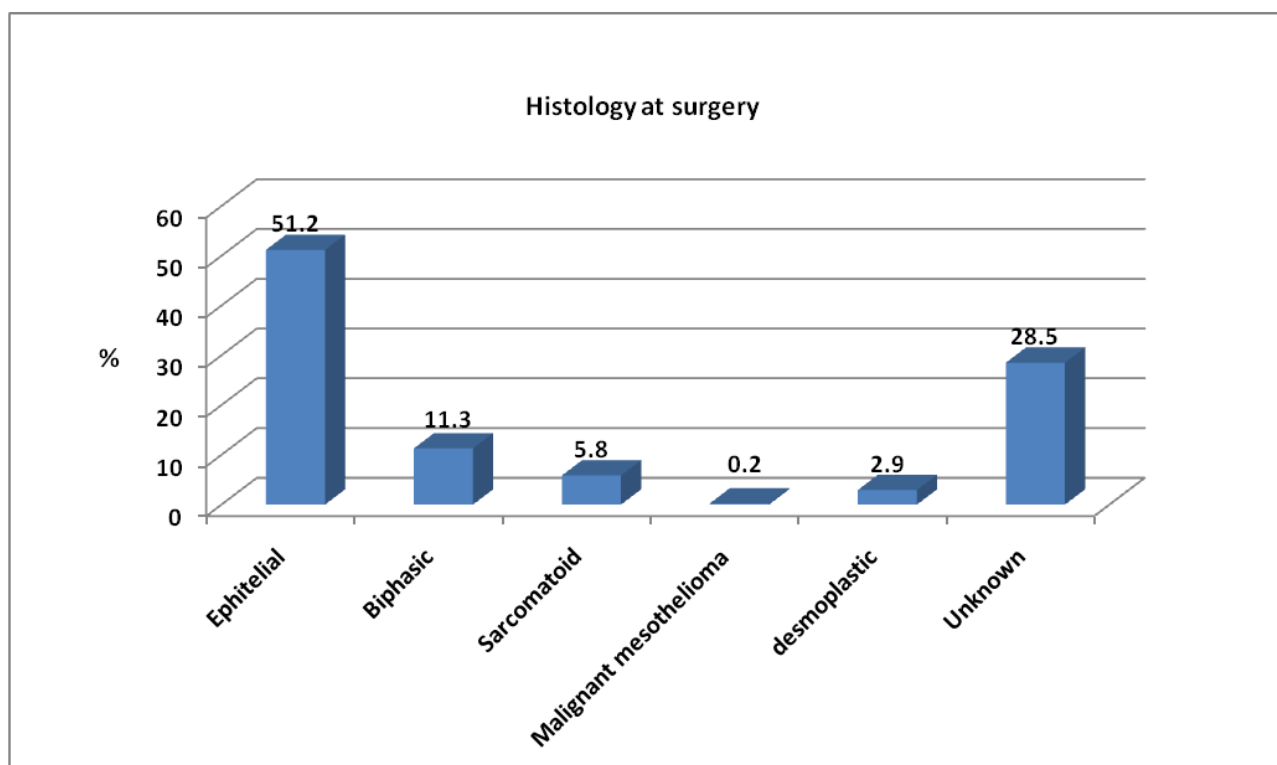
pN	Occurrences	Percent
X	809	32.4
0	466	18.7
1	66	2.6
2	140	5.6
3	11	0.4
Unknown	1005	40.2
Total	2497	100.0



pM	Occurrences	Percent
X	763	30.6
0	671	26.9
1	26	1.0
Unknown	1037	41.5
Total	2497	100.0



Histology at surgery	Occurrences	Percent
Ephitelial	1278	51.2
Biphasic	282	11.3
Sarcomatoid	146	5.8
Malignant mesothelioma	6	0.2
desmoplastic	73	2.9
Unknown	712	28.5
Total	2497	100.0

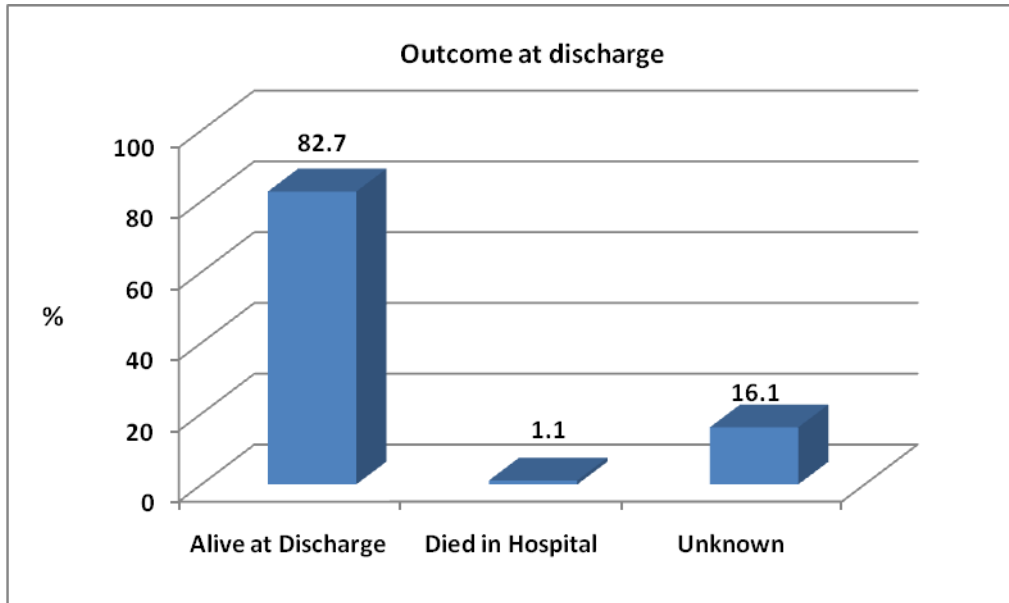


First Treatment at sequence	Occurrences	Percent
None	125	5.0
Surgery	376	15.1
Chemotherapy	388	15.5
Radiotherapy	8	0.3
Other	7	0.3
Unknown	1593	63.8
Total	2497	100.0

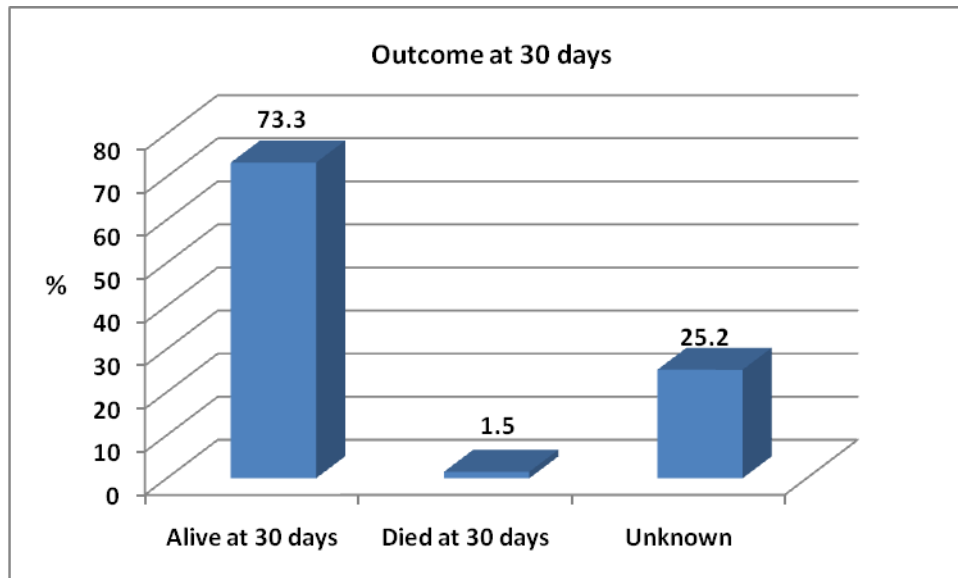
Second Treatment at sequence	Occurrences	Percent
None	183	7.3
Surgery	146	5.8
Chemotherapy	254	10.2
Radiotherapy	27	1.1
Other	12	0.5
Unknown	1875	75.1
Total	2497	100.0

Third Treatment at sequence	Occurrences	Percent
None	261	10.5
Surgery	7	0.3
Chemotherapy	28	1.1
Radiotherapy	86	3.4
Other	19	0.8
Unknown	2096	83.9
Total	2497	100.0

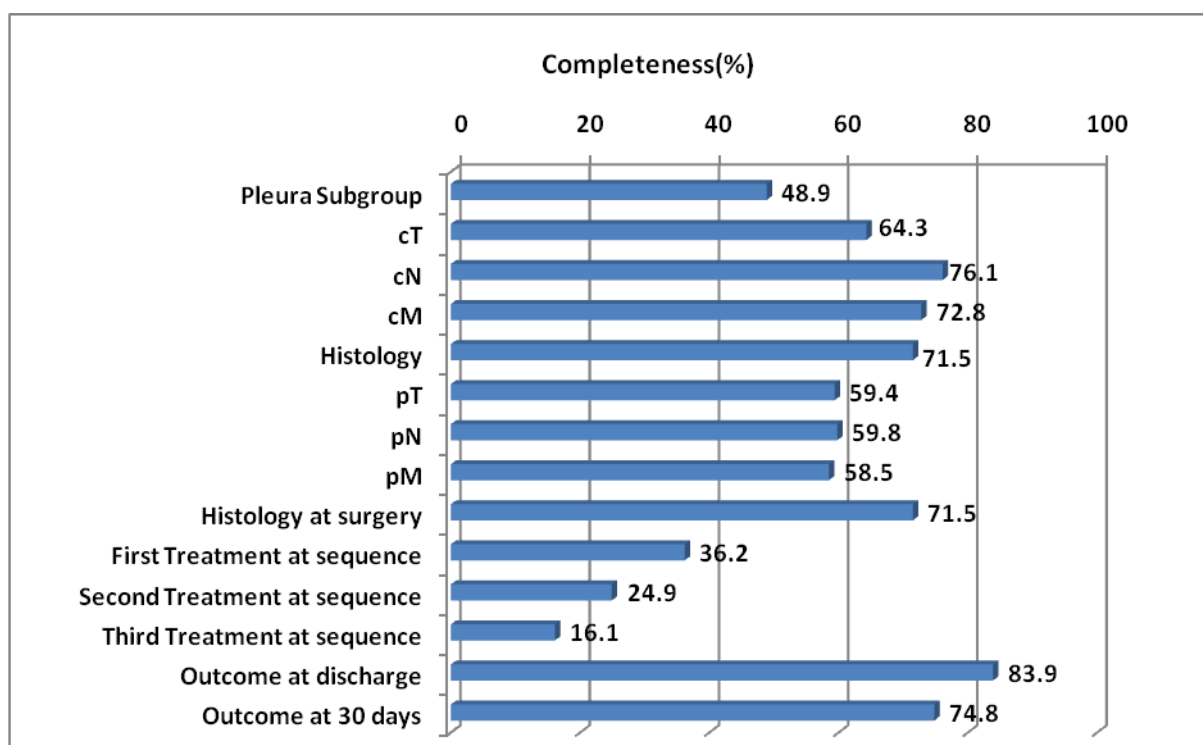
Outcome at discharge	Occurrences	Percent
Alive at Discharge	2066	82.7
Died in Hospital	28	1.1
Unknown	403	16.1
Total	2497	100.0



Outcome at 30 days	Occurrences	Percent
Alive at 30 days	1830	73.3
Died at 30 days	38	1.5
Unknown	629	25.2
Total	2497	100.0



Name of Field	Unknown (%)	Completeness(%)
Pleura Subgroup	51.1	48.9
cT	35.7	64.3
cN	23.9	76.1
cM	27.2	72.8
Histology	28.5	71.5
pT	40.6	59.4
pN	40.2	59.8
pM	41.5	58.5
Histology at surgery	28.5	71.5
First Treatment at sequence	63.8	36.2
Second Treatment at sequence	75.1	24.9
Third Treatment at sequence	83.9	16.1
Outcome at discharge	16.1	83.9
Outcome at 30 days	25.2	74.8



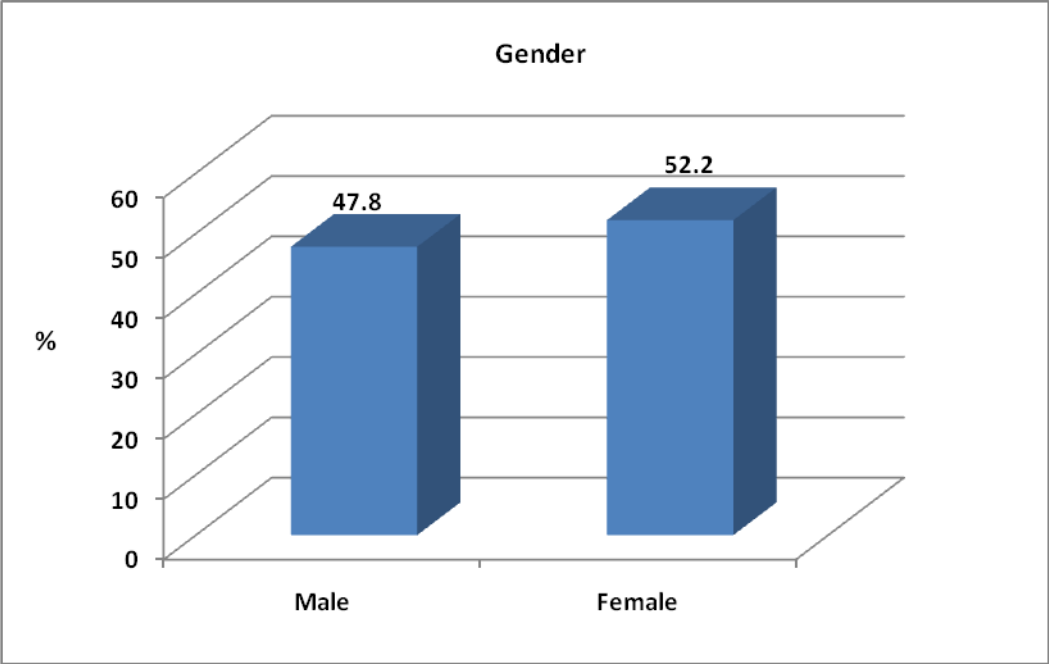
PART 5

NETTS SECTION (Database users only)

Group Definition : Lung And Diagnosis : Lung Cancer (NSCLC)
January 1980- December 2023
N=1766

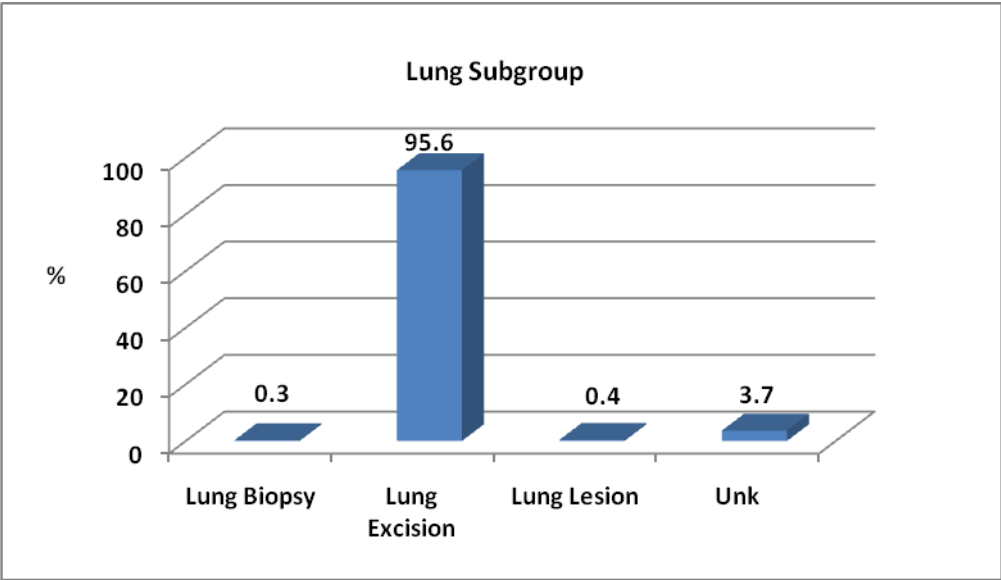
Demographics: gender

Gender	Occurrences	Percent
Male	844	47.8
Female	922	52.2
Total	1766	100



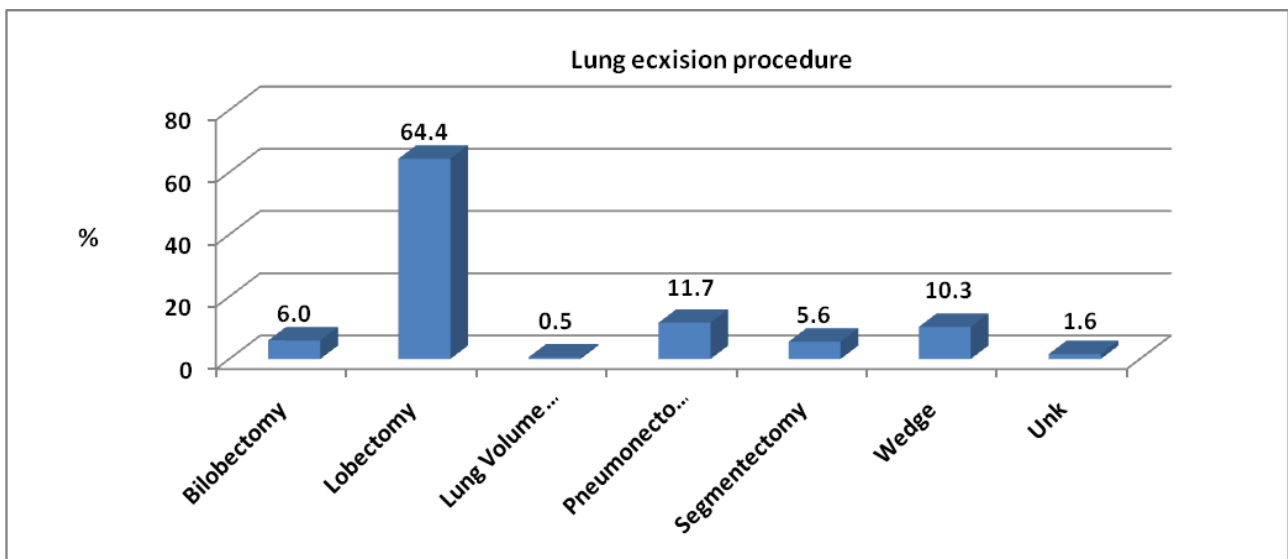
Lung Subgroup

Lungsubgroup	Occurrences	Percent
Lung Biopsy	5	0.3
Lung Excision	1689	95.6
Lung Lesion	7	0.4
Unk	65	3.7
Total	1766	100



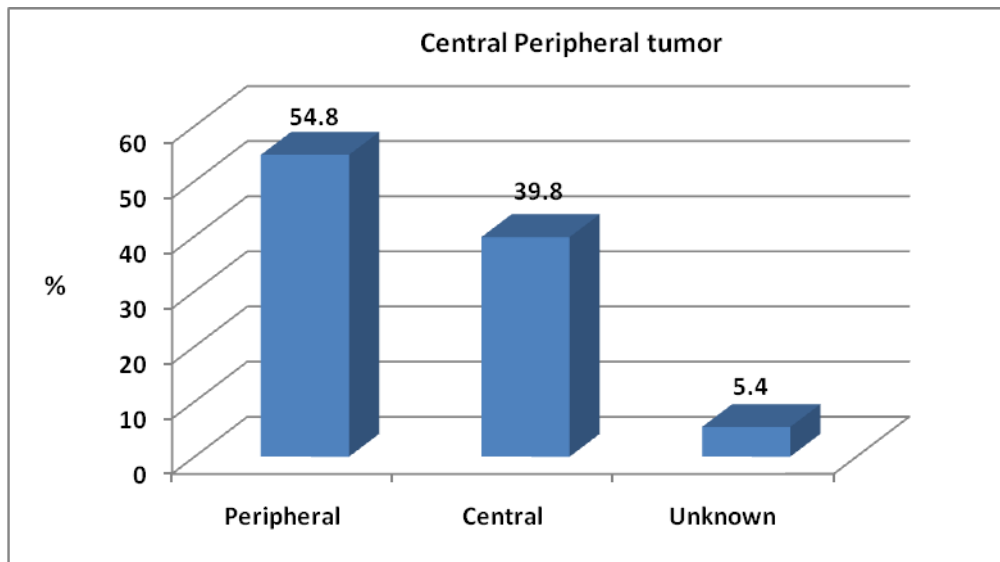
Lung Excision Procedure

Lung excision procedure	Occurrences	Percent
Bilobectomy	101	6.0
Lobectomy	1087	64.4
Lung Volume Reduction	9	0.5
Pneumonectomy	197	11.7
Segmentectomy	94	5.6
Wedge	174	10.3
Unk	27	1.6
Total	1689	100



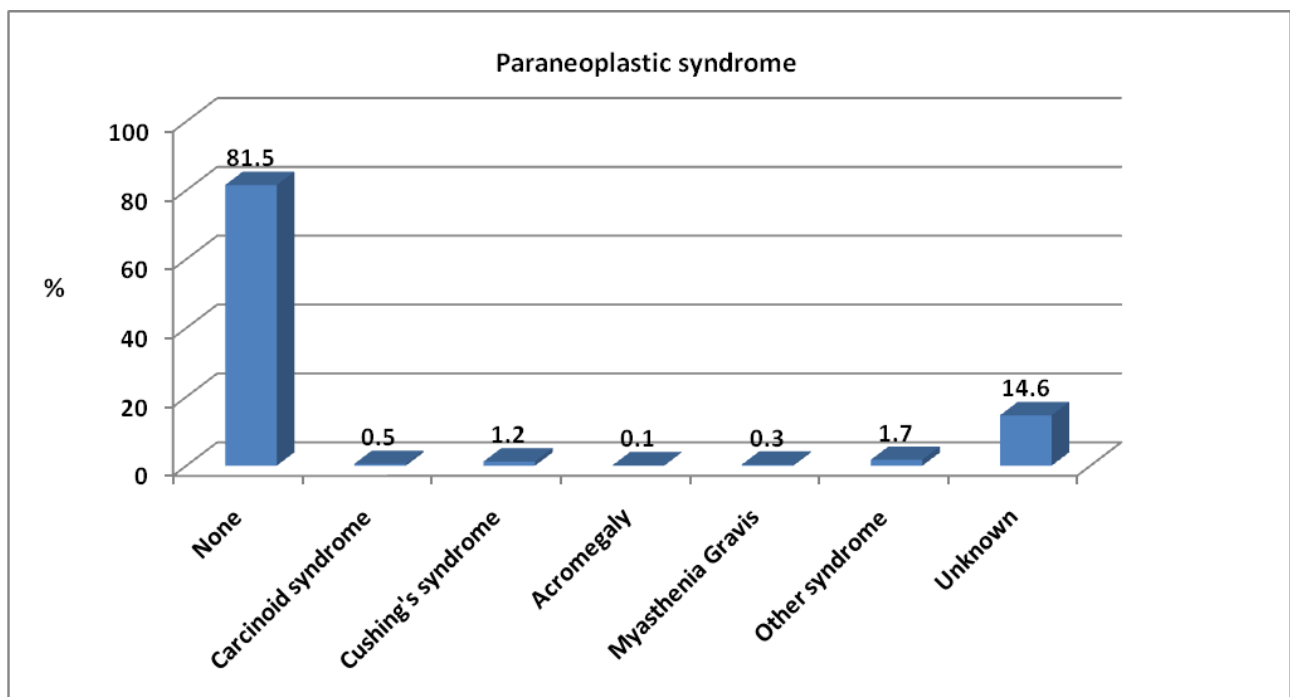
Centralperipheralumor

centralperipheralumor	Occurrences	Percent
Peripheral	925	54.8
Central	673	39.8
Unknown	91	5.4
Total	1689	100



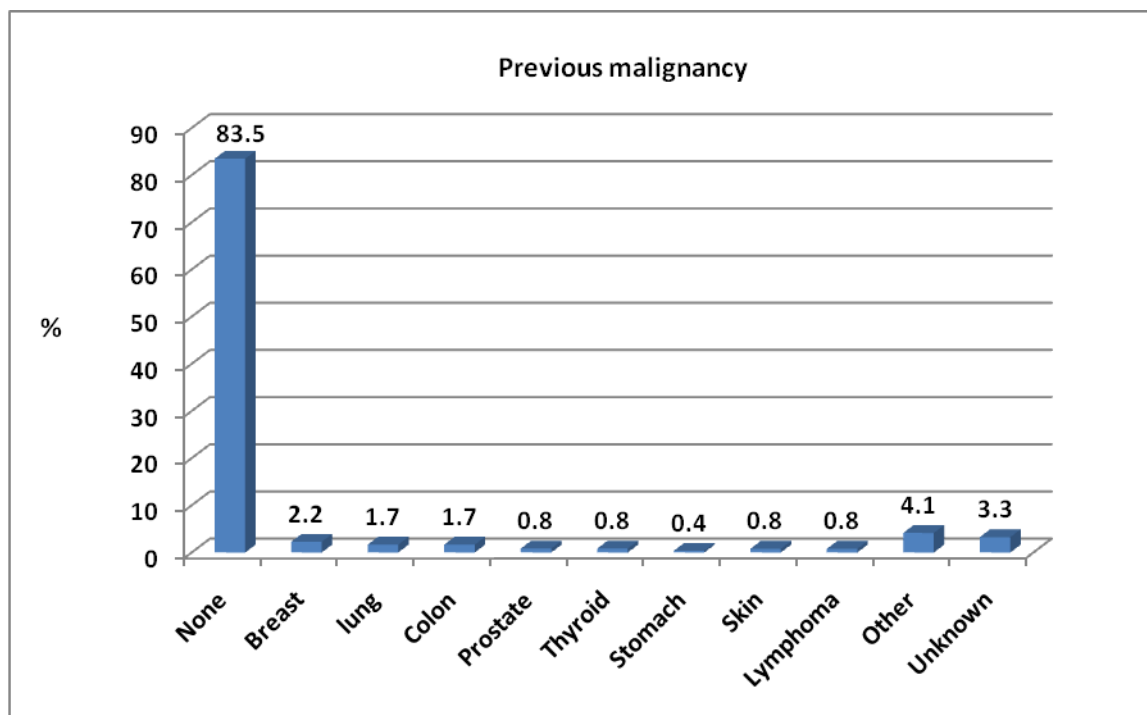
Paraneoplastic syndrome

paraneoplasticsyndrome	Occurrences	Percent
None	1377	81.5
Carcinoid syndrome	9	0.5
Cushing's syndrome	20	1.2
Acromegaly	2	0.1
Myasthenia Gravis	5	0.3
Other syndrome	29	1.7
Unknown	247	14.6
Total	1689	100



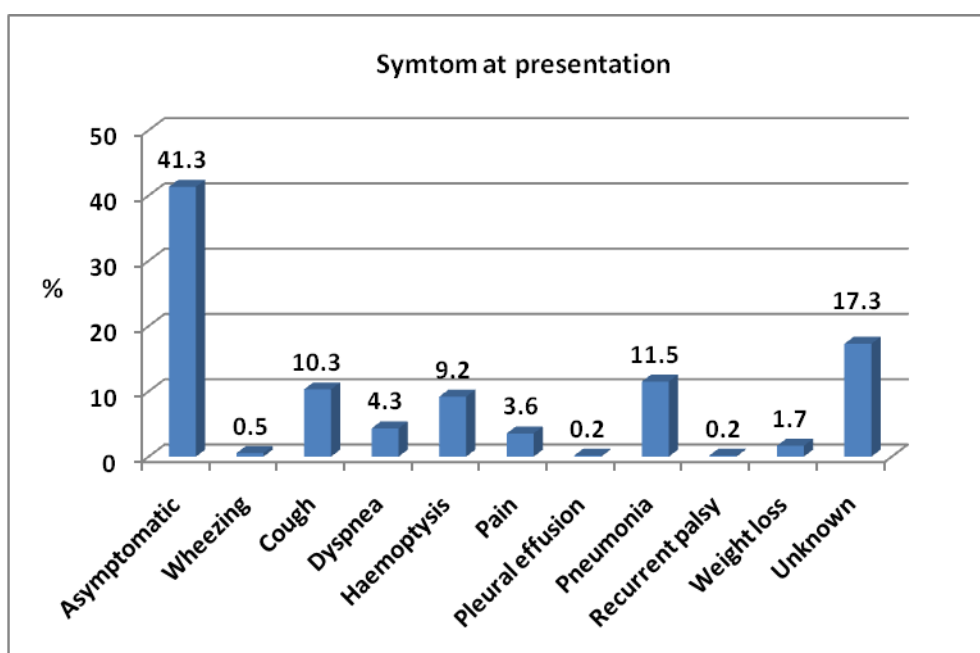
Previous Malignancy

previous malignancy	Occurrences	Percent
None	1410	83.5
Breast	38	2.2
lung	28	1.7
Colon	28	1.7
Prostate	14	0.8
Thyroid	14	0.8
Stomach	6	0.4
Skin	13	0.8
Lymphoma	13	0.8
Other	70	4.1
Unknown	55	3.3
Total	1689	100



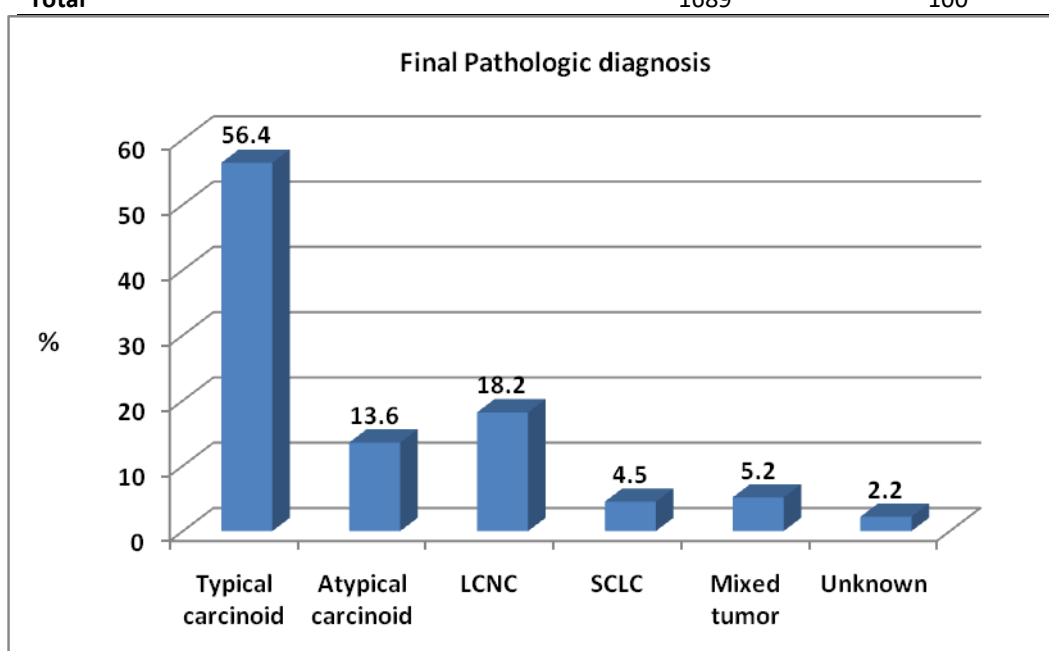
Symptom at presentation

symptomsatpresentation	Occurrences	Percent
Asymptomatic	698	41.3
Wheezing	9	0.5
Cough	174	10.3
Dyspnea	73	4.3
Haemoptysis	155	9.2
Pain	60	3.6
Pleural effusion	3	0.2
Pneumonia	194	11.5
Recurrent palsy	3	0.2
Weight loss	28	1.7
Unknown	292	17.3
Total	1689	100



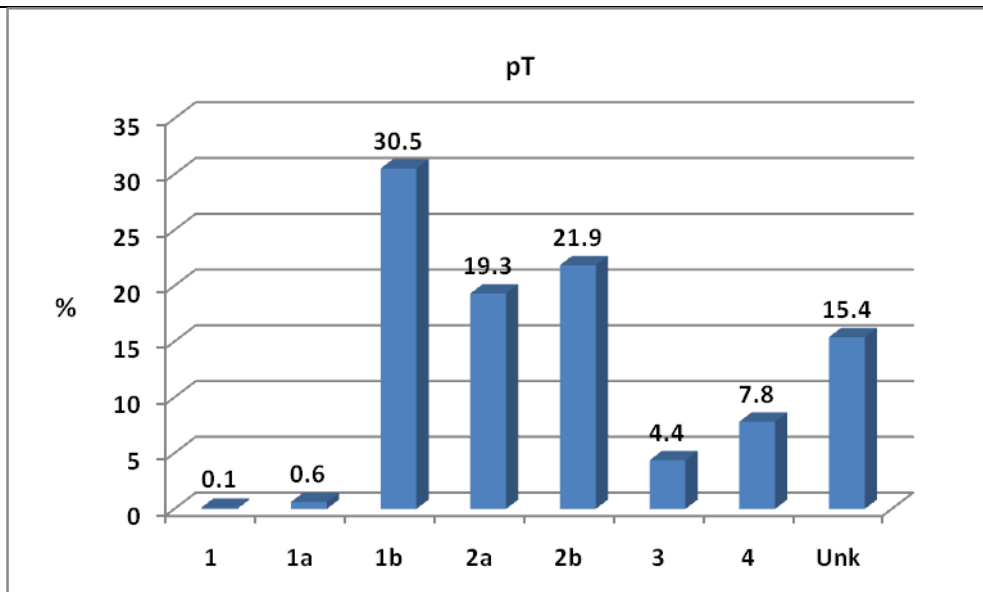
Final pathologic diagnosis

finalpathologicdiagnosis	Occurrences	Percent
Typical carcinoid	953	56.4
Atypical carcinoid	229	13.6
LCNC	307	18.2
SCLC	76	4.5
Mixed tumor	87	5.2
Unknown	37	2.2
Total	1689	100

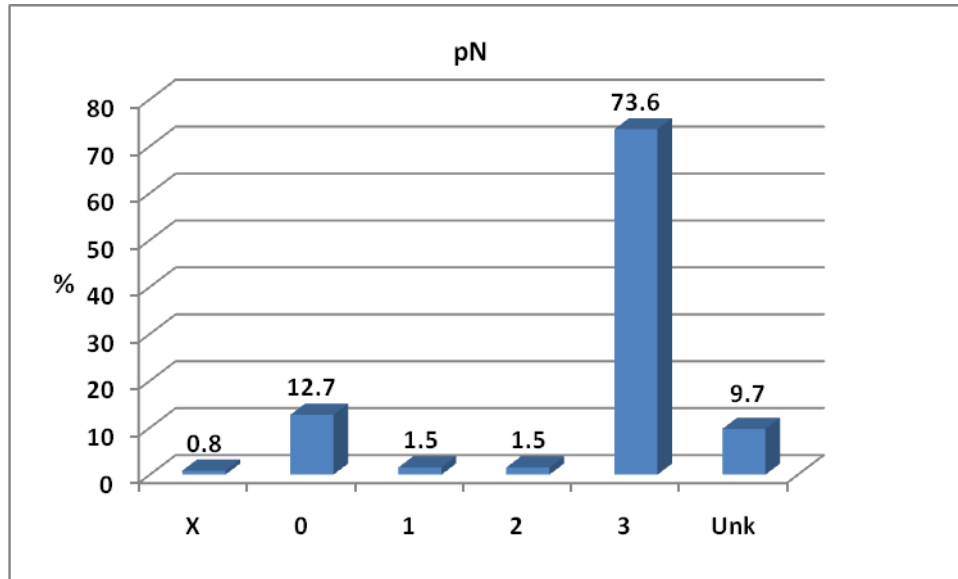


Pathological Staging (On all Lung Subgroup) : pT,pN,pM

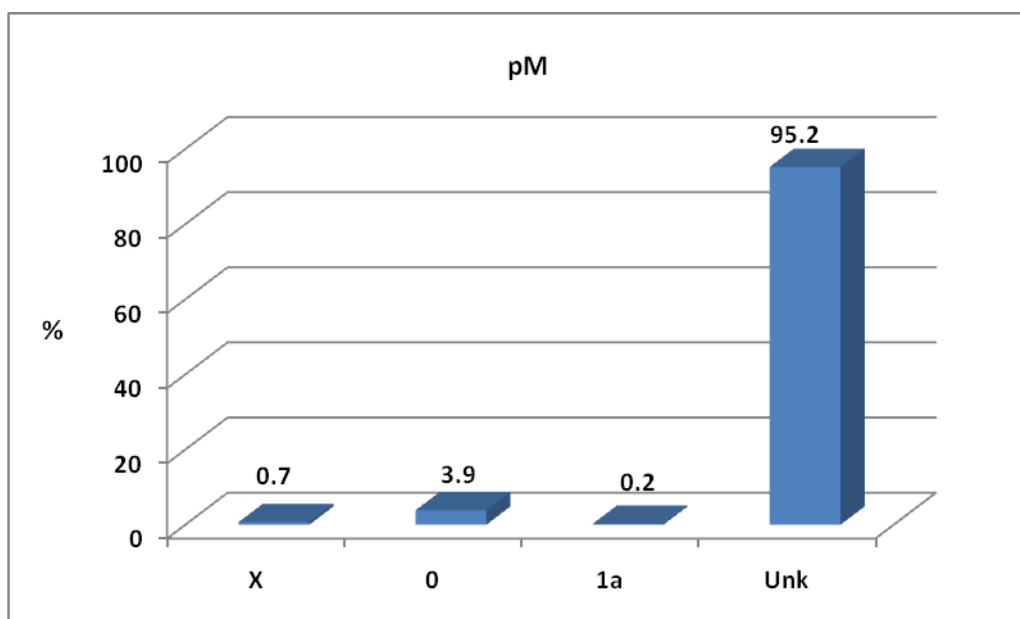
pT	Occurrences	Percent
1	2	0.1
1a	11	0.6
1b	539	30.5
2a	341	19.3
2b	386	21.9
3	77	4.4
4	138	7.8
Unk	272	15.4
Total	1766	100.0



pN	Occurrences	Percent
X	15	0.8
0	225	12.7
1	27	1.5
2	27	1.5
3	1300	73.6
Unk	172	9.7
Total	1766	100.0

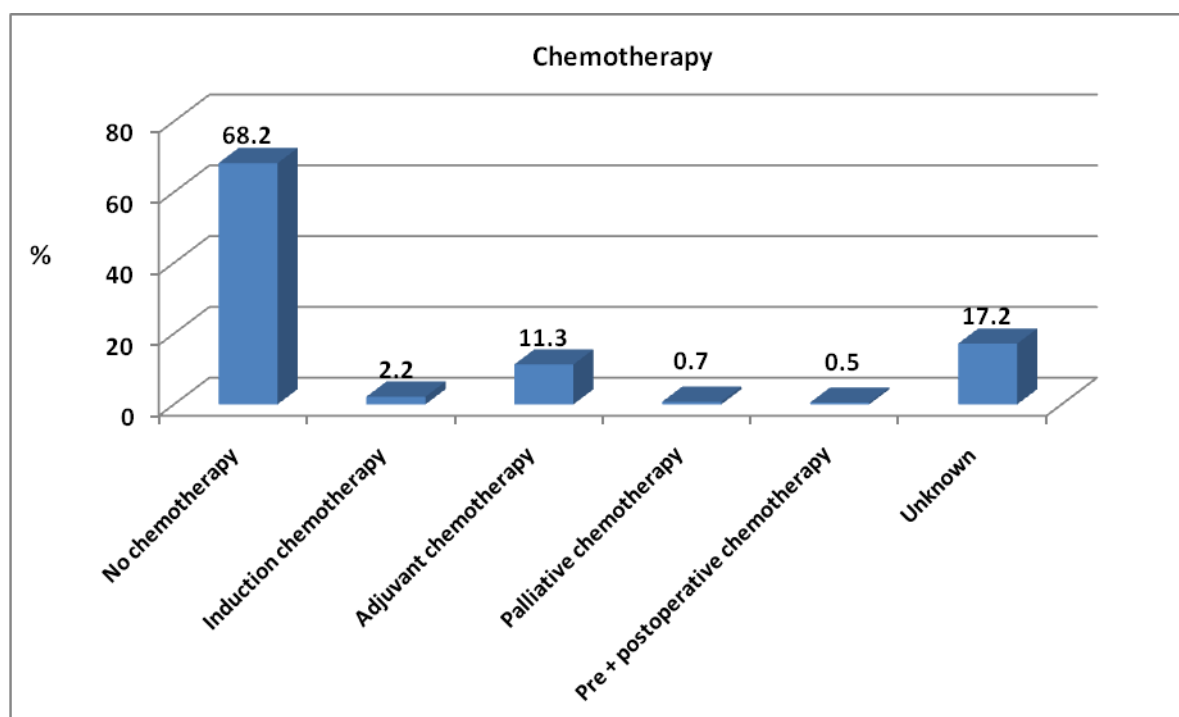


pM	Occurrences	Percent
X	12	0.7
0	68	3.9
1a	4	0.2
Unk	1682	95.2
Total	1766	100.0



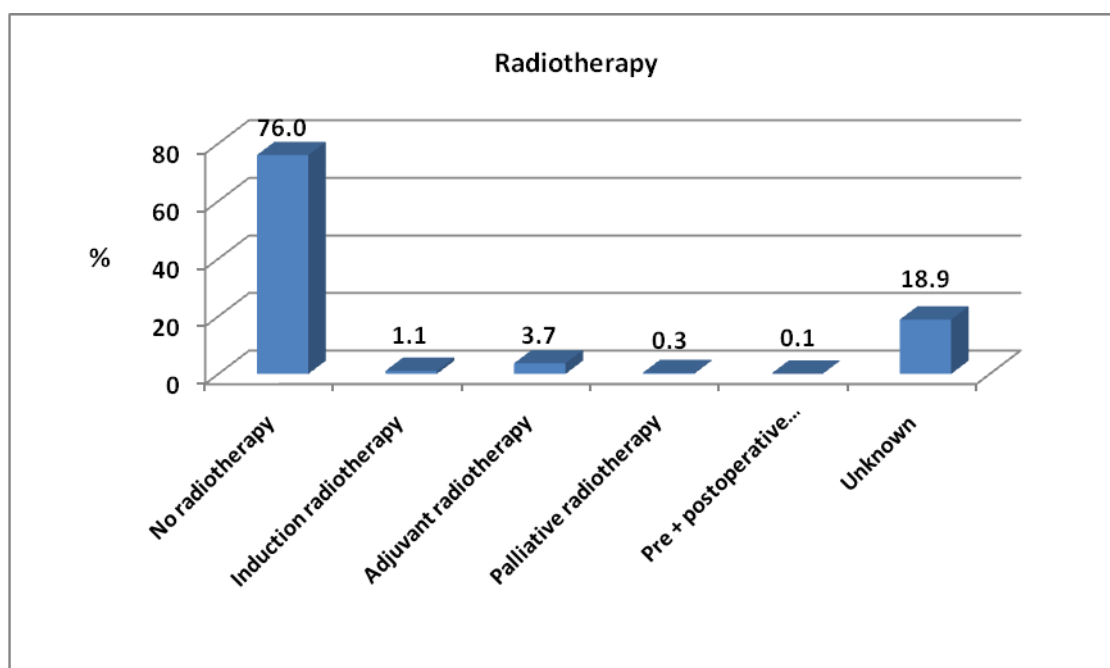
Chemotherapy

chemotherapy	Occurrences	Percent
No chemotherapy	1204	68.2
Induction chemotherapy	38	2.2
Adjuvant chemotherapy	199	11.3
Palliative chemotherapy	13	0.7
Pre + postoperative chemotherapy	9	0.5
Unknown	303	17.2
Total	1766	100



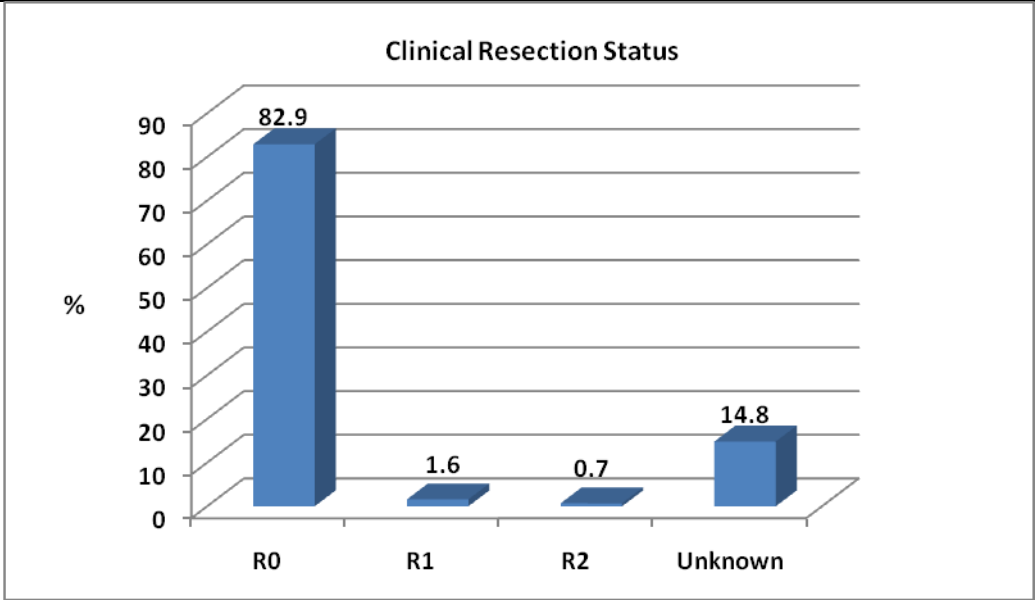
Radiotherapy

Radiotherapy	Occurrences	Percent
No radiotherapy	1342	76.0
Induction radiotherapy	19	1.1
Adjuvant radiotherapy	65	3.7
Palliative radiotherapy	6	0.3
Pre + postoperative radiotherapy	1	0.1
Unknown	333	18.9
Total	1766	100



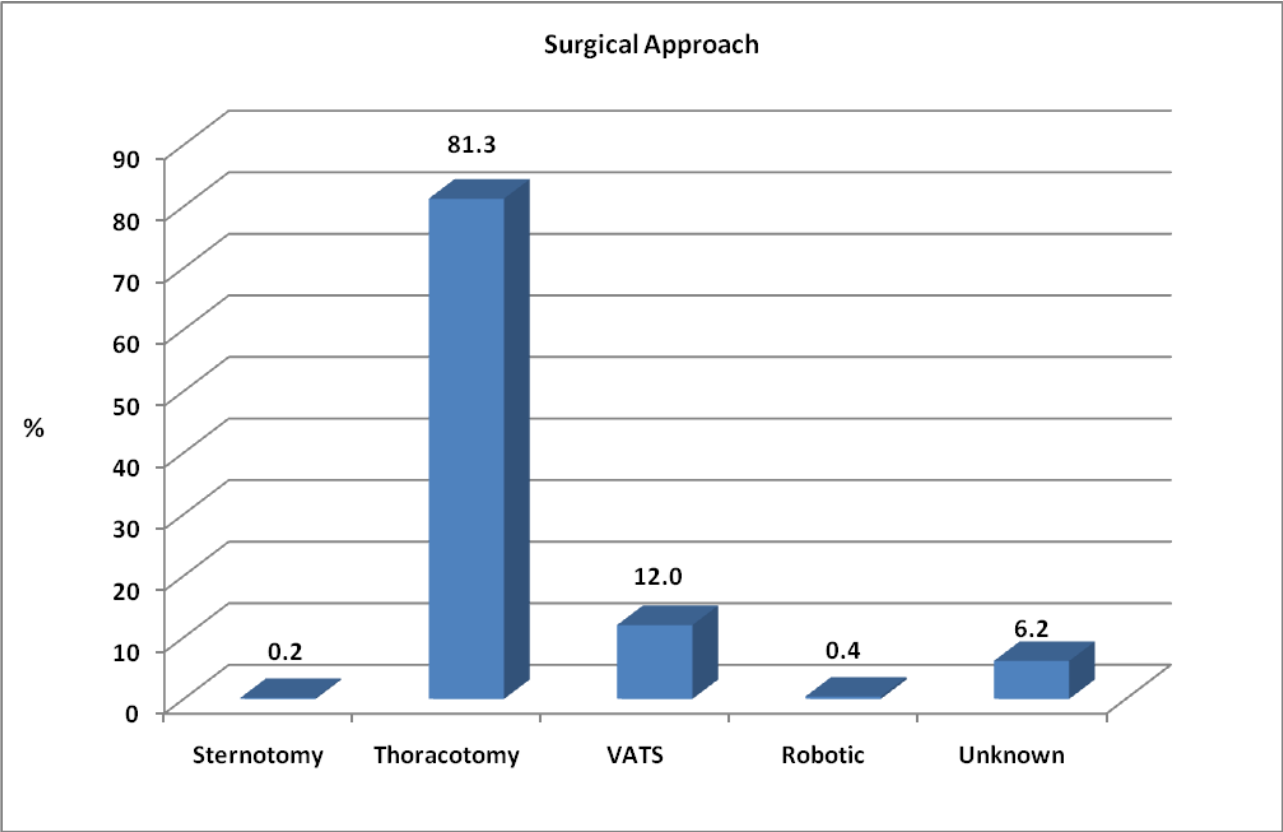
Clinical Resection Status

Clinical Resection Status	Occurrences	Percent
R0	1464	82.9
R1	28	1.6
R2	12	0.7
Unknown	262	14.8
Total	1766	100



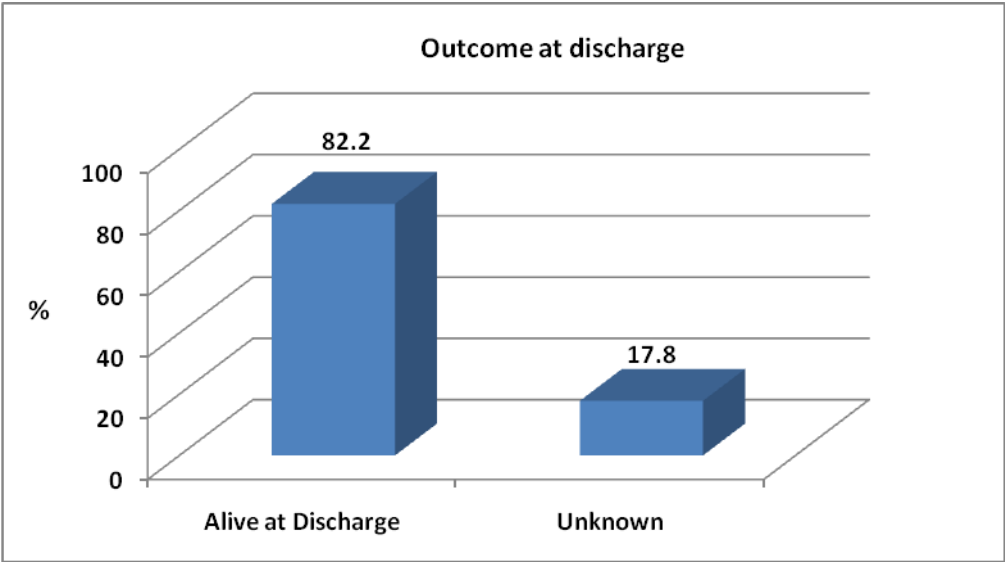
Surgical Approach

Surgical Approach	Occurrences	Percent
Sternotomy	3	0.2
Thoracotomy	1435	81.3
VATS	212	12.0
Robotic	7	0.4
Unknown	109	6.2
Total	1766	100



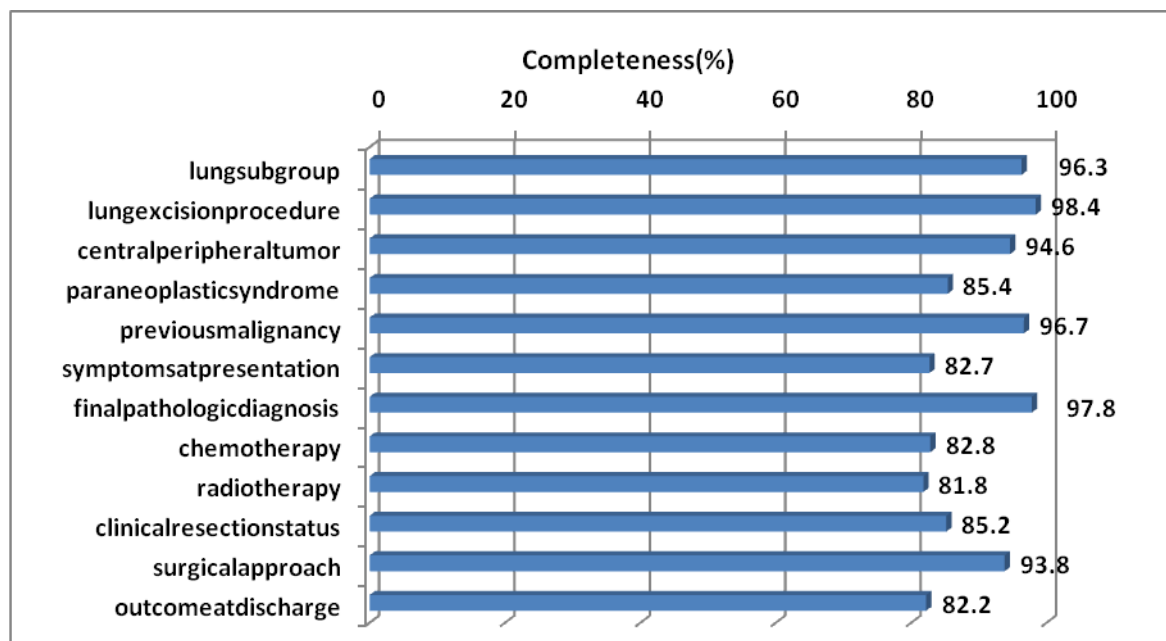
Outcome at discharge

Surgical Approach	Occurrences	Percent
Alive at Discharge	1451	82.2
Unknown	315	17.8
Total	1766	100



Data Completeness

Name of Field	Unknown (%)	Completeness(%)
lungsubgroup	3.7	96.3
lungexcisionprocedure	1.6	98.4
centralperipheralumor	5.4	94.6
paraneoplasticsyndrome	14.6	85.4
previousmalignancy	3.3	96.7
symptomsatpresentation	17.3	82.7
finalpathologicdiagnosis	2.2	97.8
chemotherapy	17.2	82.8
radiotherapy	18.2	81.8
clinicalresectionstatus	14.8	85.2
surgicalapproach	6.2	93.8
outcomeatdischarge	17.8	82.2



PART 6

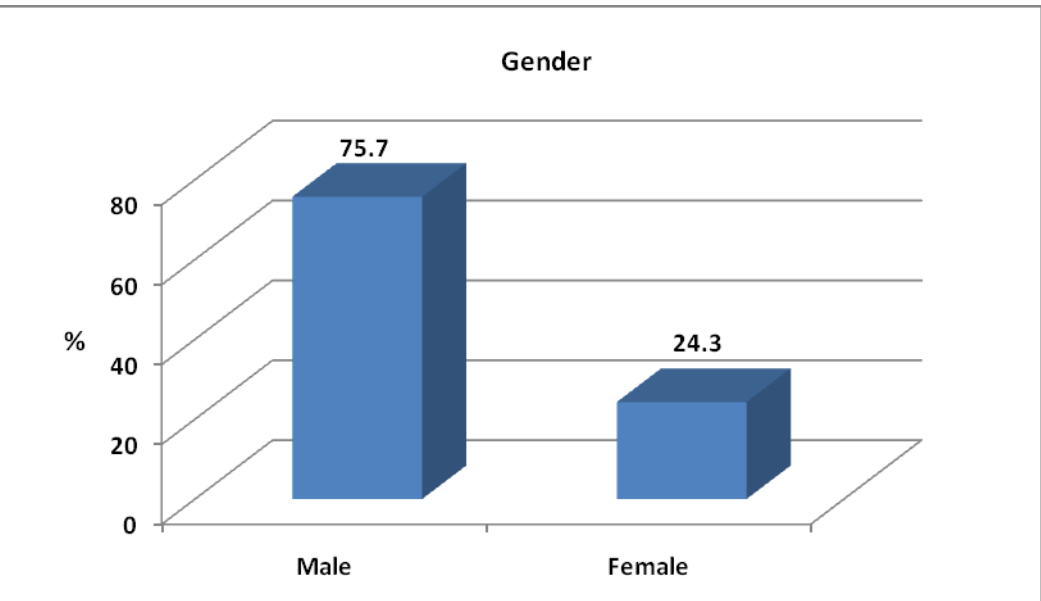
CHEST WALL SECTION (Database users only)

CHEST WALL Section fields

Group Definition Chest Wall
January 2003- December 2023
N=1622

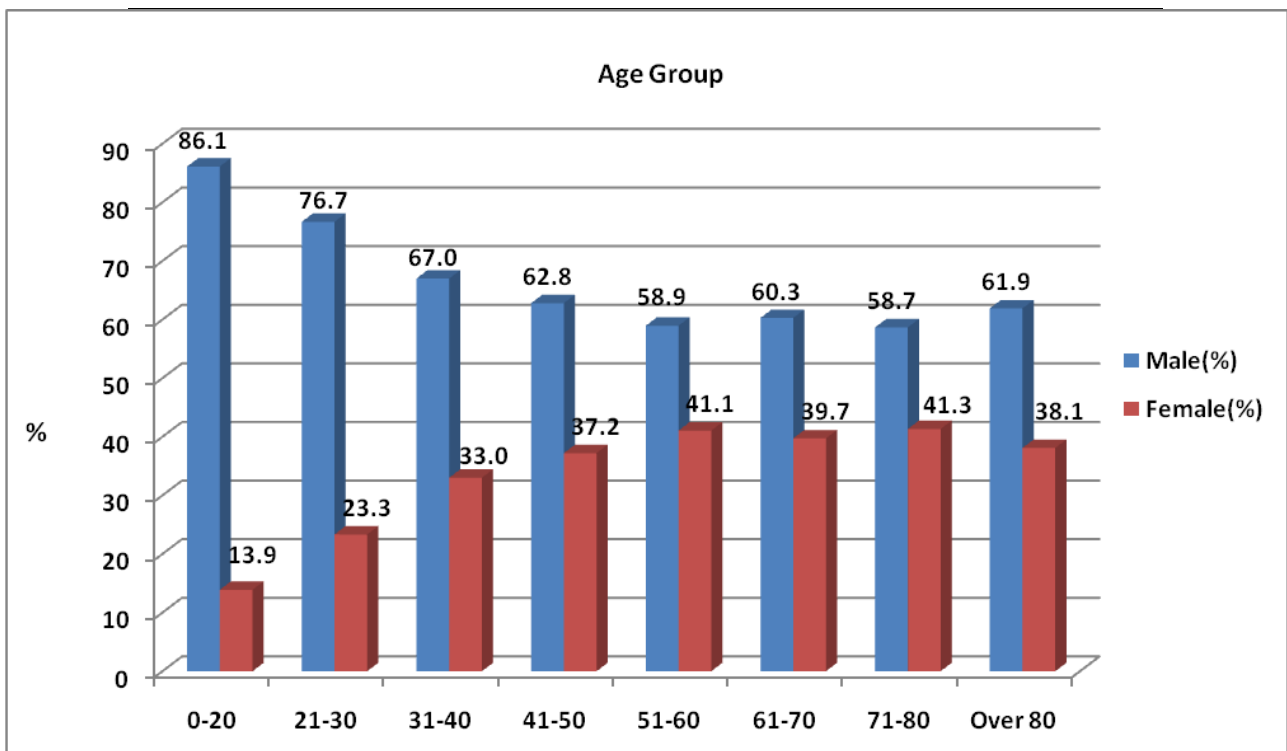
Demographics: gender

Gender	Occurrences	Percent
Male	1228	75.7
Female	394	24.3
Total	1622	100



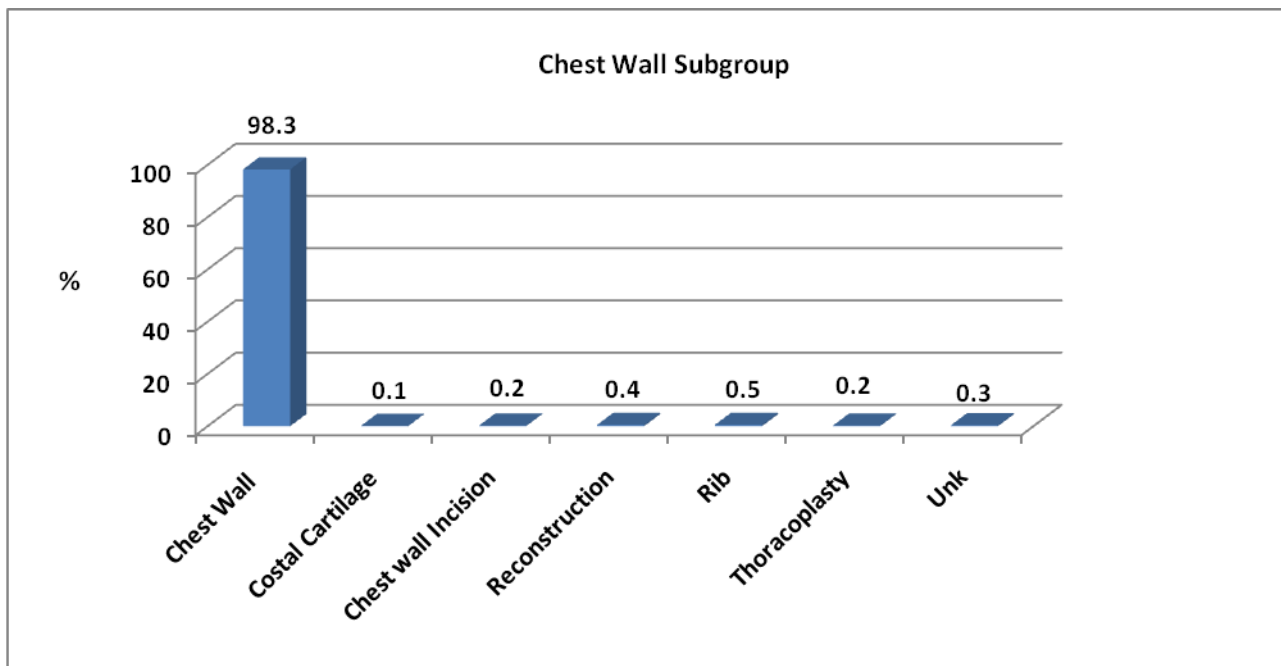
Age Group

Age Group	Male(%)	Female(%)
0-20	86.1	13.9
21-30	76.7	23.3
31-40	67.0	33.0
41-50	62.8	37.2
51-60	58.9	41.1
61-70	60.3	39.7
71-80	58.7	41.3
Over 80	61.9	38.1



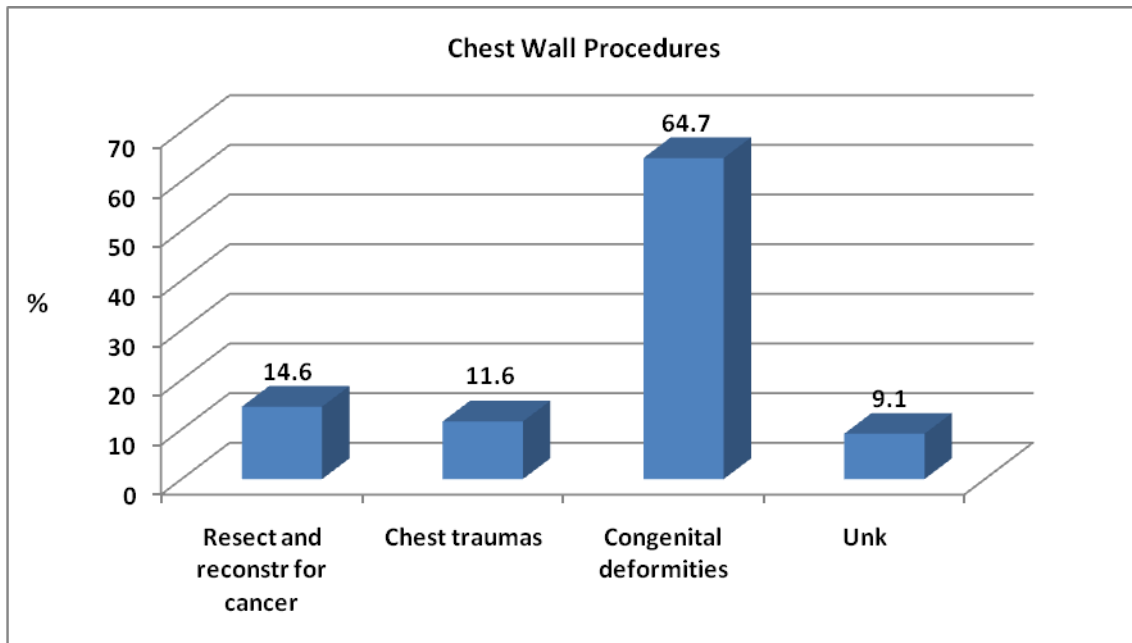
Chest Wall Subgroup

Chestwallsubgroup	Occurrences	Percent
Chest Wall (autosetting)	1577	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	5	0.3
Total	1605	100



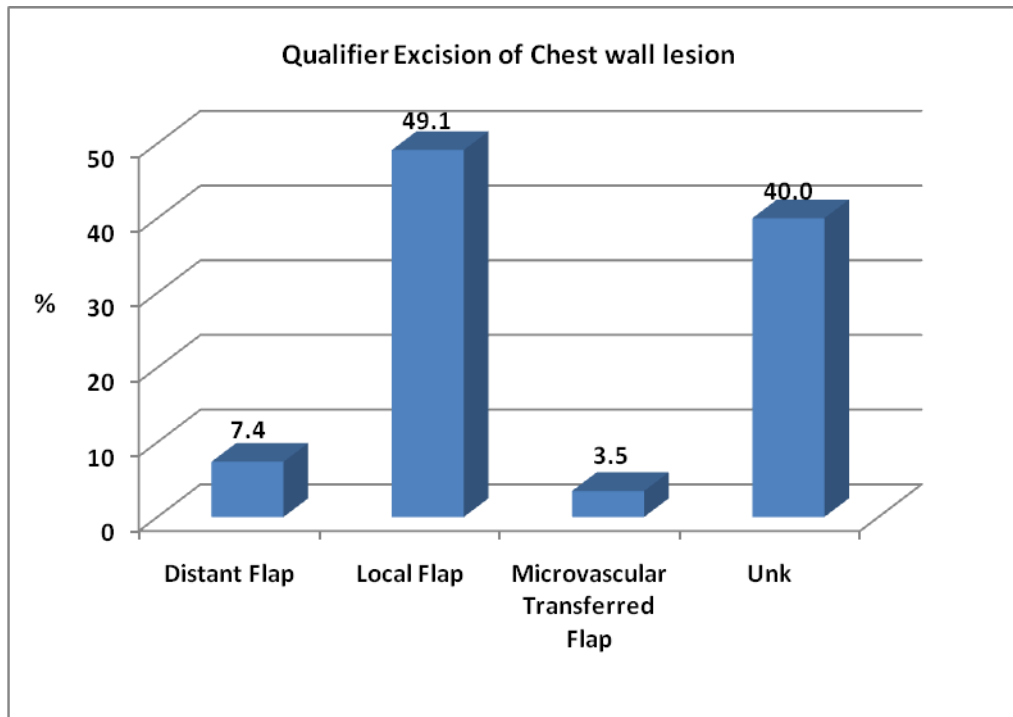
Chest Wall Procedures

Chest Wall procedures	Occurrences	Percent
Resect and reconstr for cancer	230	14.6
Chest traumas	183	11.6
Congenital deformities	1020	64.7
Unk	144	9.1
Total	1577	100



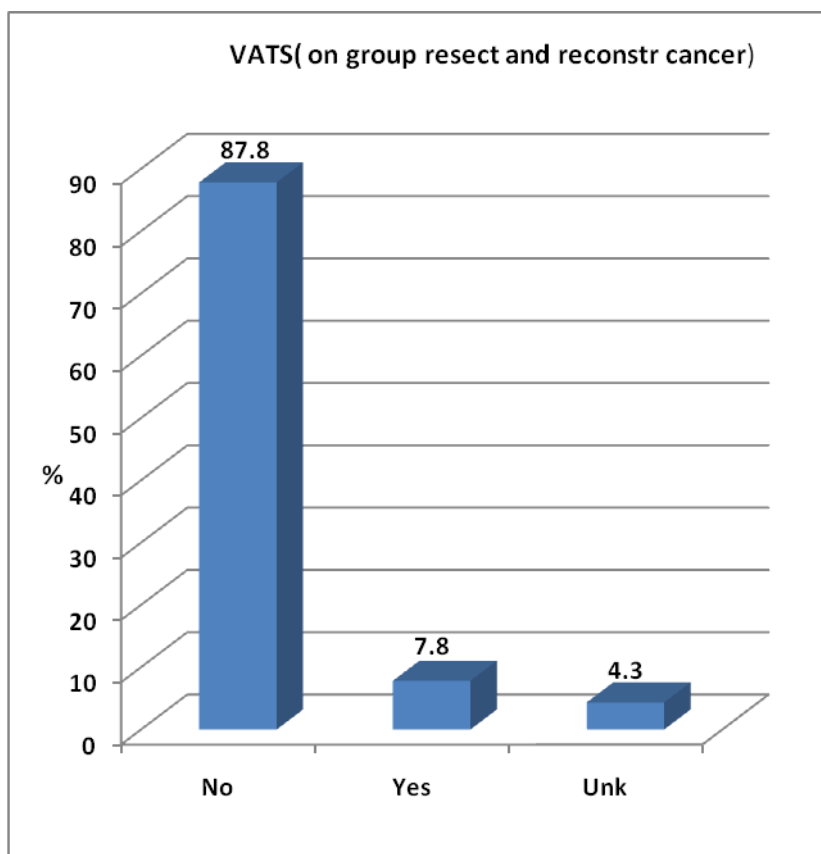
On Group Resect and reconstr Cancer

qualifierexcisionofchestwalllesion	Occurrences	Percent
Distant Flap	17	7.4
Local Flap	113	49.1
Microvascular Transferred Flap	8	3.5
Unk	92	40.0
Total	230	100



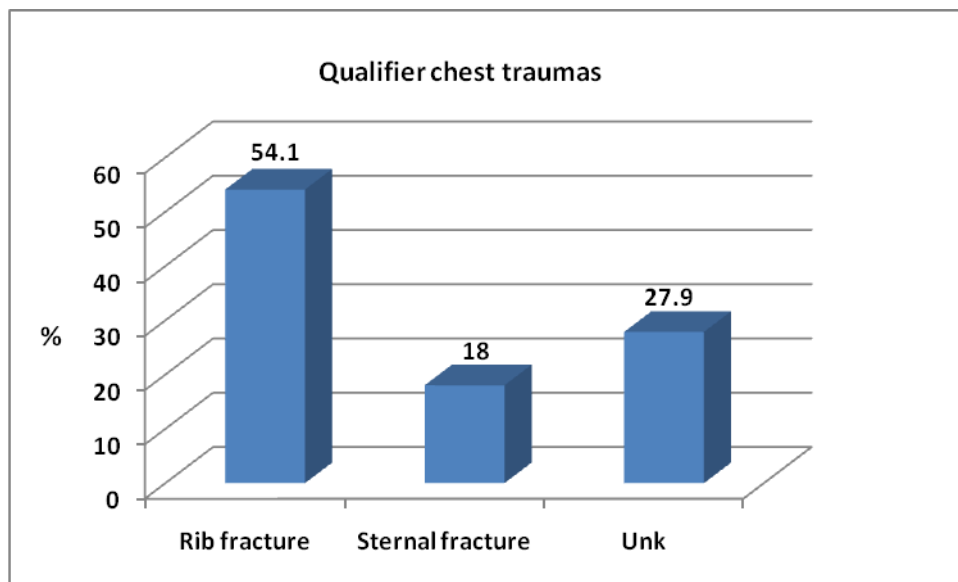
VATS

vats	Occurrences	Percent
No	202	87.8
Yes	18	7.8
Unk	10	4.3
Total	230	100



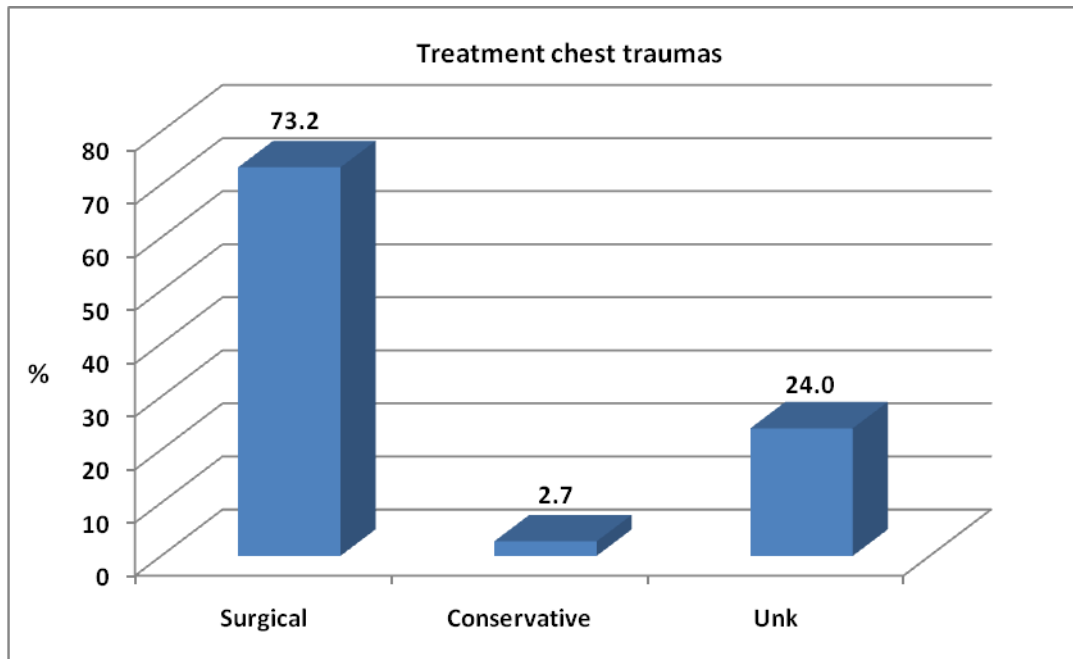
On Group Chest Traumas

qualifierchesttraumas	Occurrences	Percent
Rib fracture	99	54.1
Sternal fracture	33	18.0
Unk	51	27.9
Total	183	100



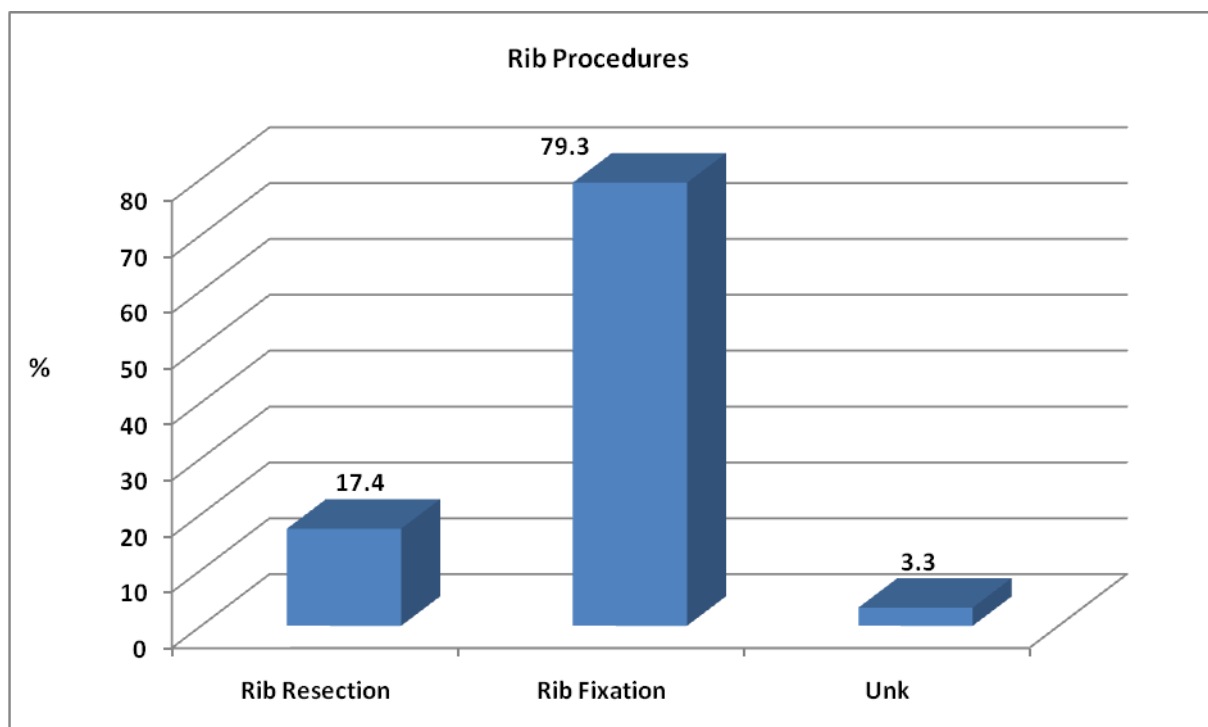
Treatment chest Traumas

Treatment chest traumas	Occurrences	Percent
Surgical	134	73.2
Conservative	5	2.7
Unk	44	24.0
Total	183	100



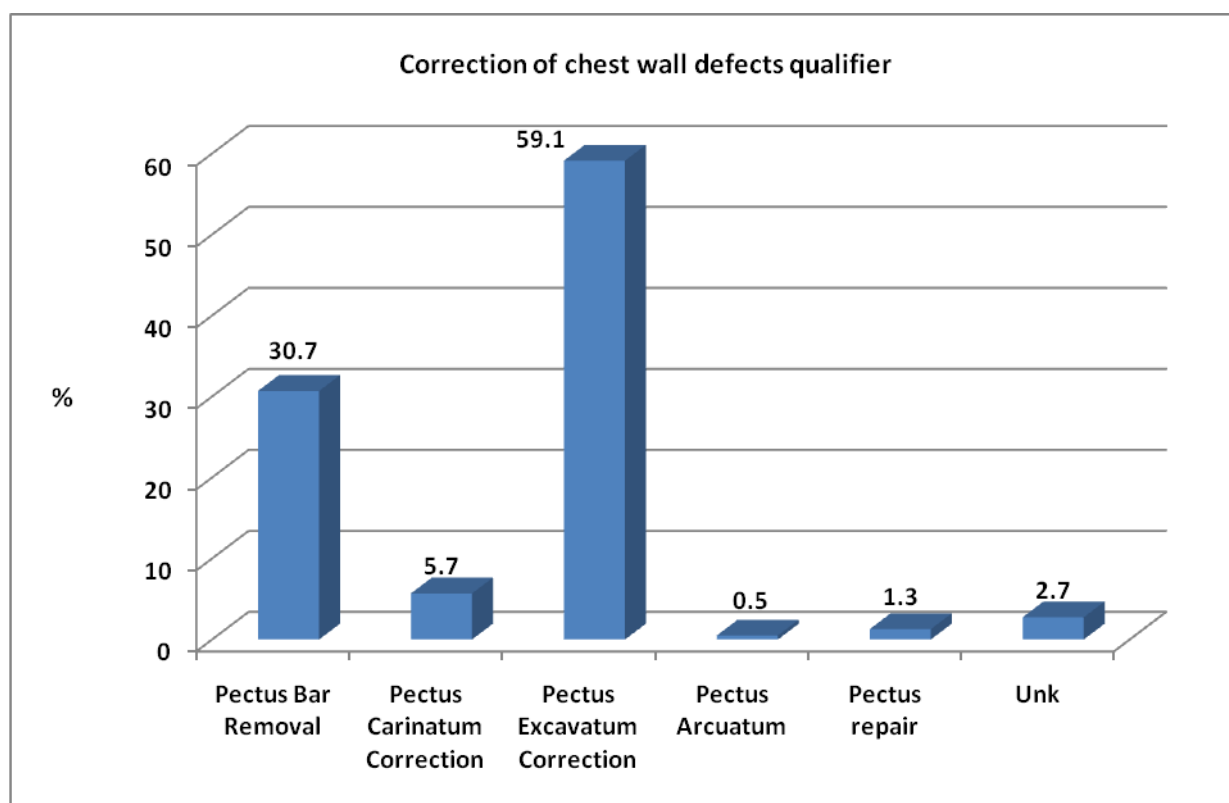
On Group Rib Fracture And Surgical

Rib procedures	Occurrences	Percent
Rib Resection	16	17.4
Rib Fixation	73	79.3
Unk	3	3.3
Total	92	100



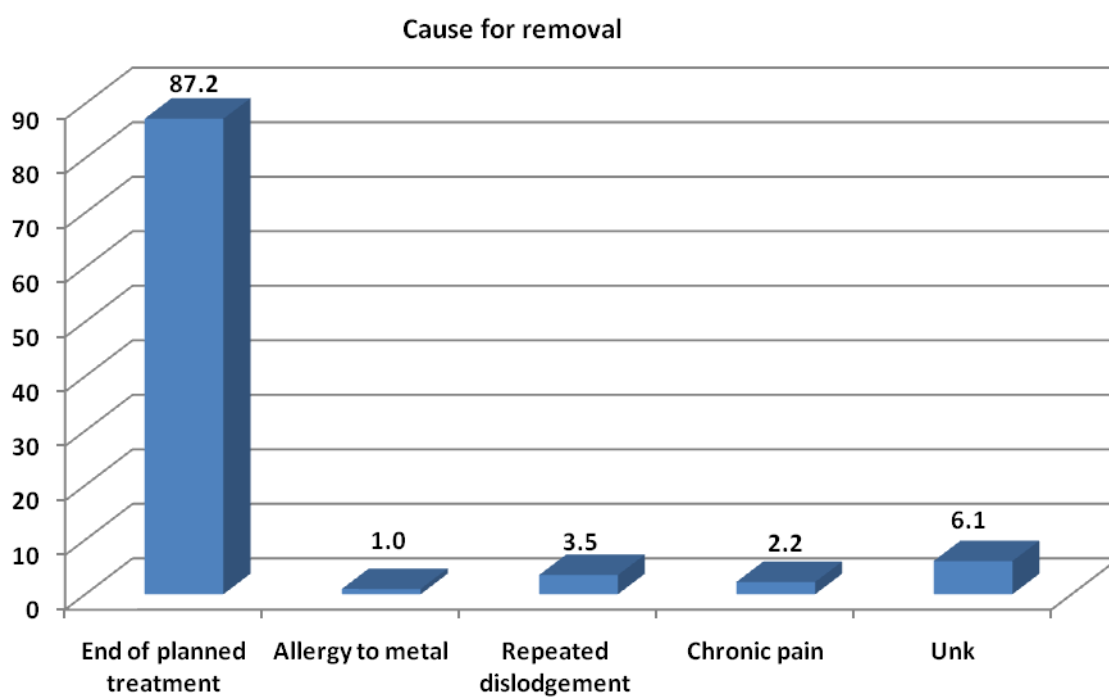
On Group Congenital deformities

Correction of chest wall defectsqualifier	Occurrences	Percent
Pectus Bar Removal	313	30.7
Pectus Carinatum Correction	58	5.7
Pectus Excavatum Correction	603	59.1
Pectus Arcuatum	5	0.5
Pectus repair	13	1.3
Unk	28	2.7
Total	1020	100.0



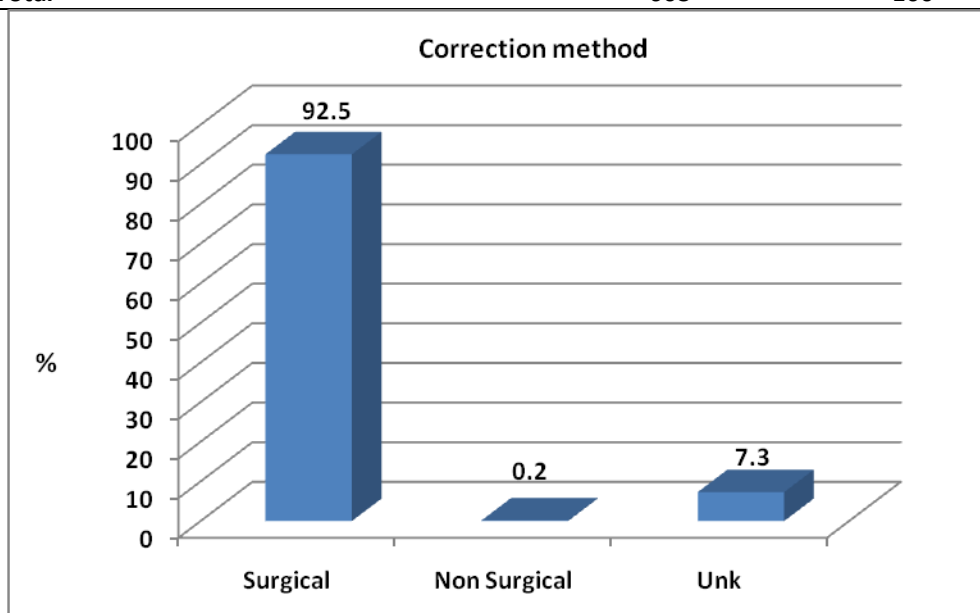
On Group Pectus Bar Removal

Cause for removal	Occurrences	Percent
End of planned treatment	273	87.2
Repeated dislodgement	3	1.0
Chronic pain	11	3.5
Unk	7	2.2
Total	313	100.0



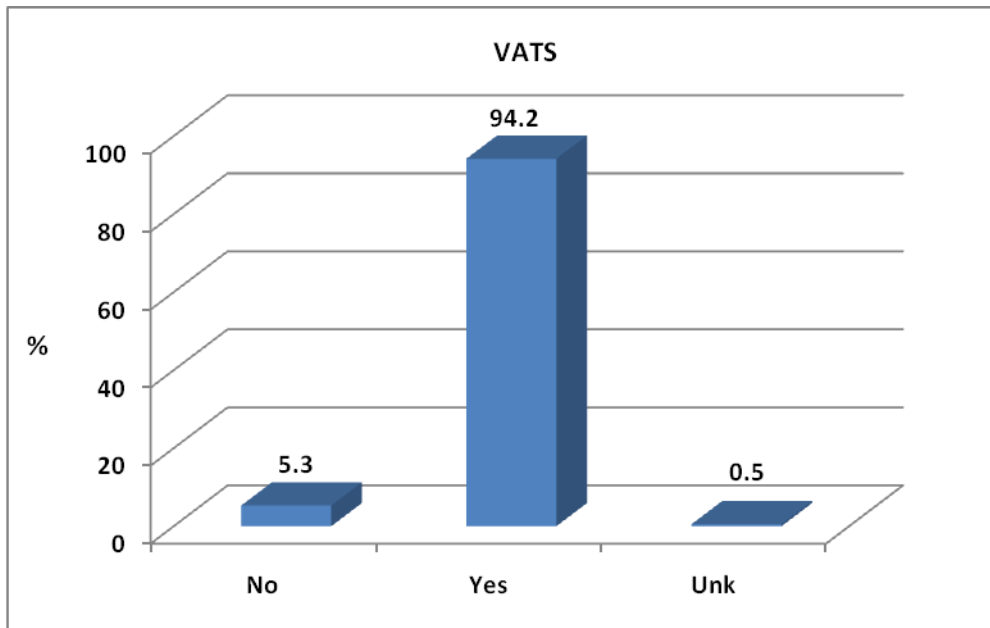
On Group Pectus Excavatum Correction

Correction method	Occurrences	Percent
Surgical	558	92.5
Non Surgical	1	0.2
Unk	44	7.3
Total	603	100



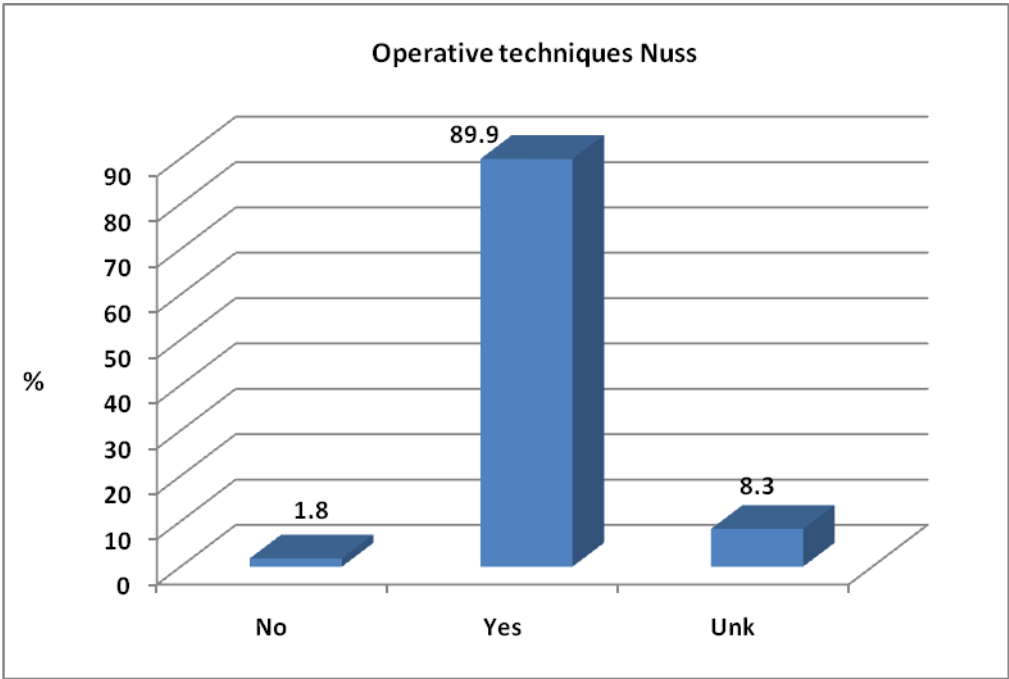
VATS

vats	Occurrences	Percent
No	32	5.3
Yes	568	94.2
Unk	3	0.5
Total	603	100



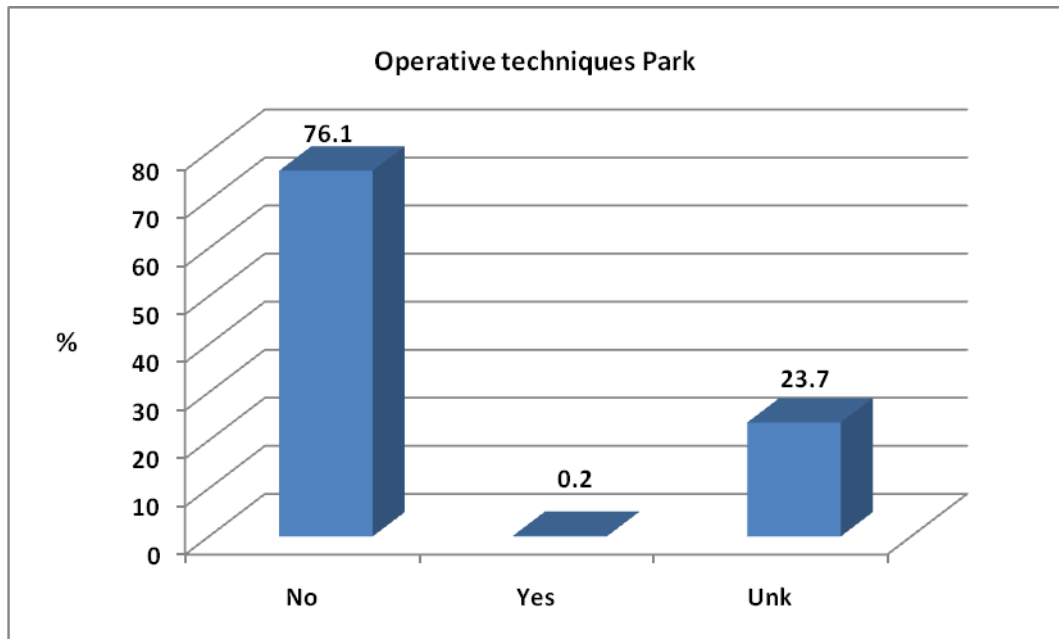
Operative technique Nuss

Operative techniques Nuss	Occurrences	Percent
No	11	1.8
Yes	542	89.9
Unk	50	8.3
Total	603	100



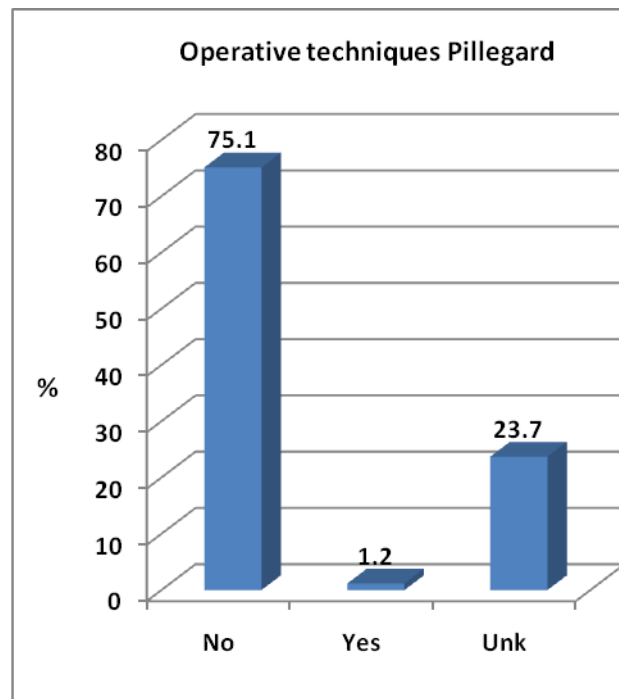
Operative Technique Park

Operative technique Park	Occurrences	Percent
No	459	76.1
Yes	1	0.2
Unk	143	23.7
Total	603	100



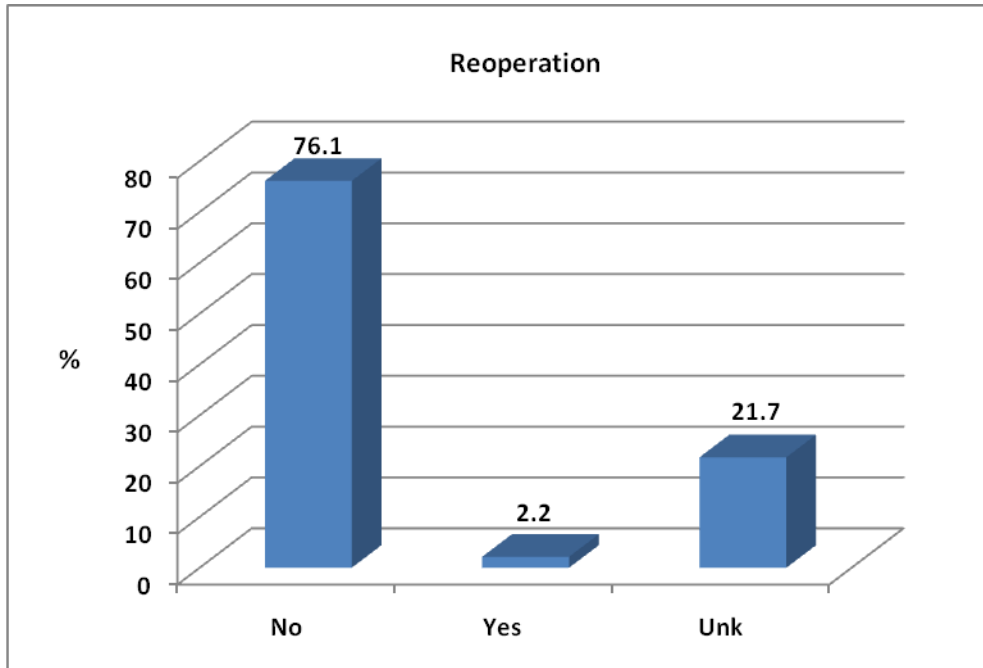
Operative Technique Pillegard

Operative technique Pillegard	Occurrences	Percent
No	453	75.1
Yes	7	1.2
Unk	143	23.7
Total	603	100



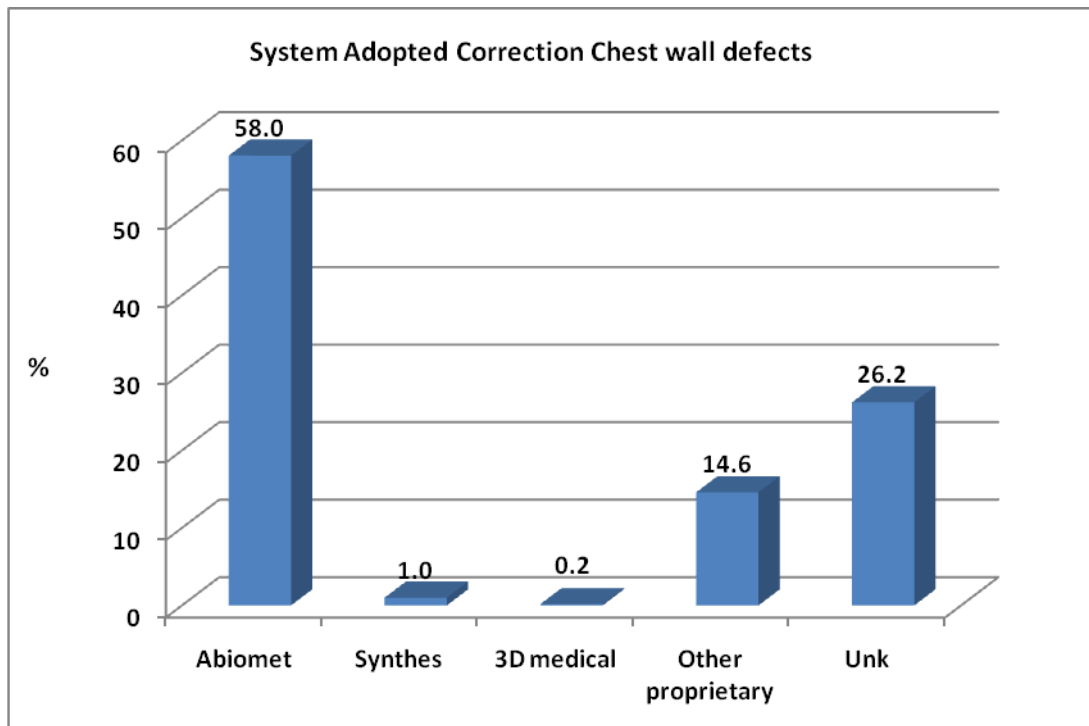
Reoperation

Reoperation	Occurrences	Percent
No	459	76.1
Yes	13	2.2
Unk	131	21.7
Total	603	100



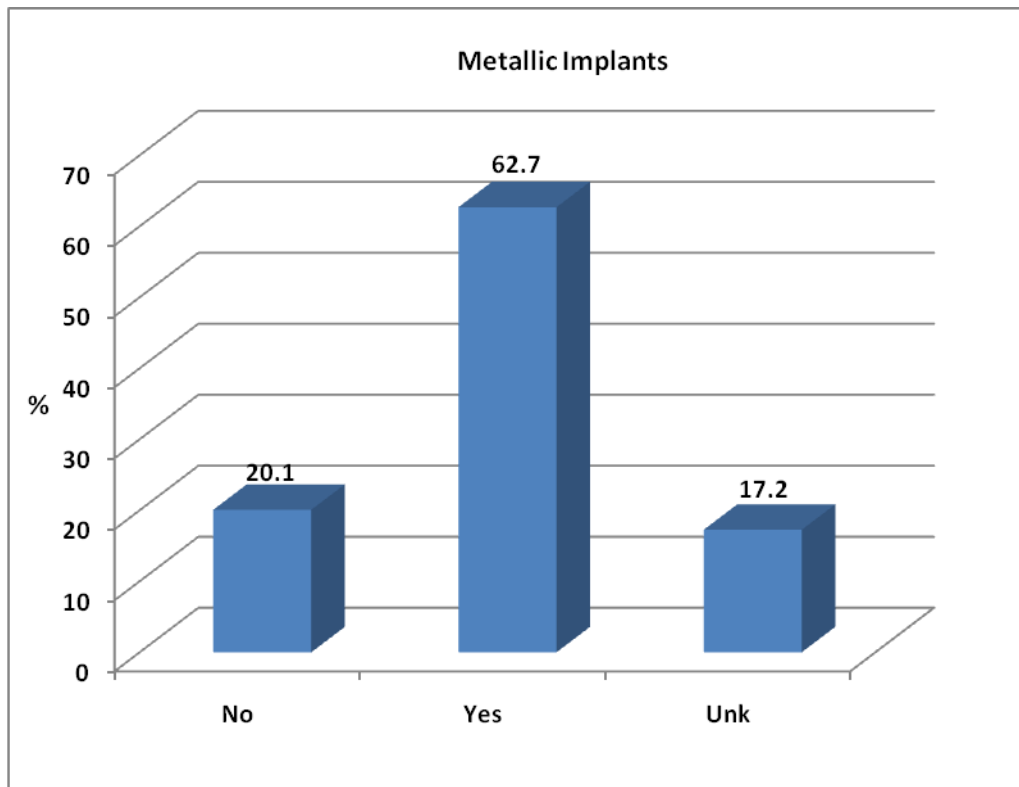
System Adopted Correction chest wall defects

systemadoptedcorrectioncwaldefects	Occurrences	Percent
Abiomet	350	58.0
Synthes	6	1.0
3D medical	1	0.2
Other proprietary	88	14.6
Unk	158	26.2
Total	603	100



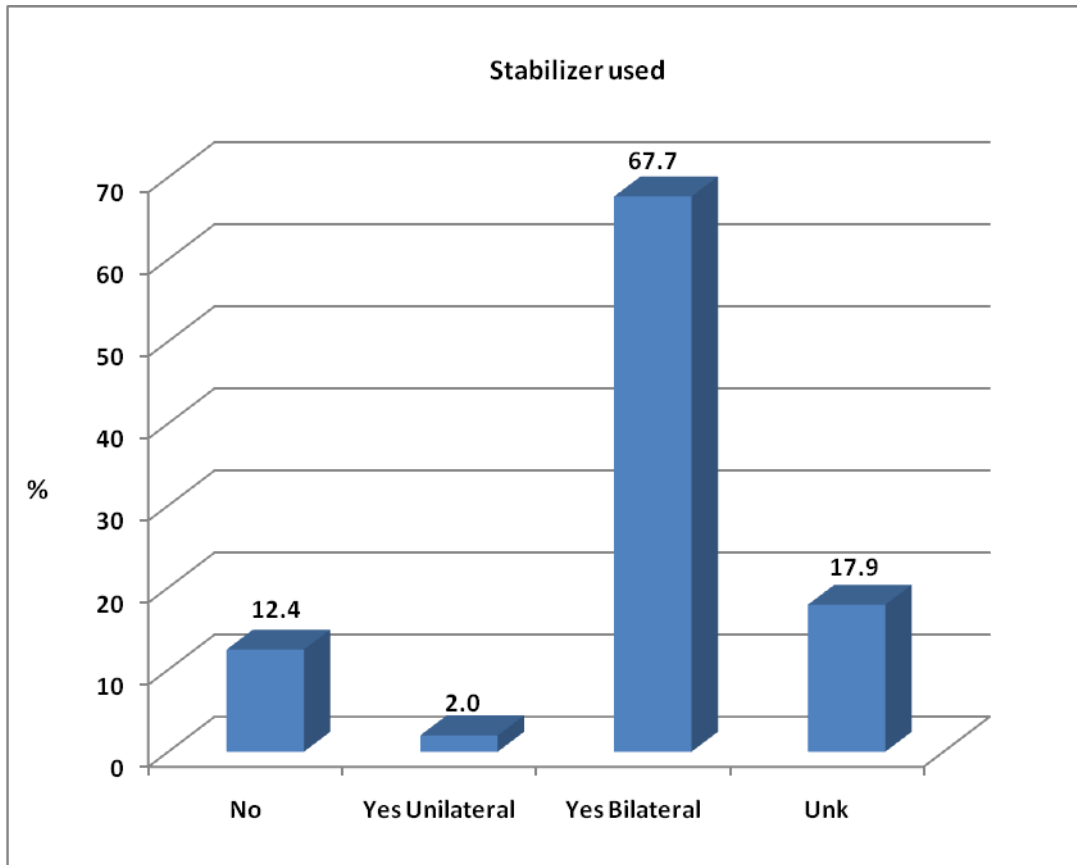
Metallic Implants

Metallic implants	Occurrences	Percent
No	121	20.1
Yes	378	62.7
Unk	104	17.2
Total	603	100



Stabilizer used

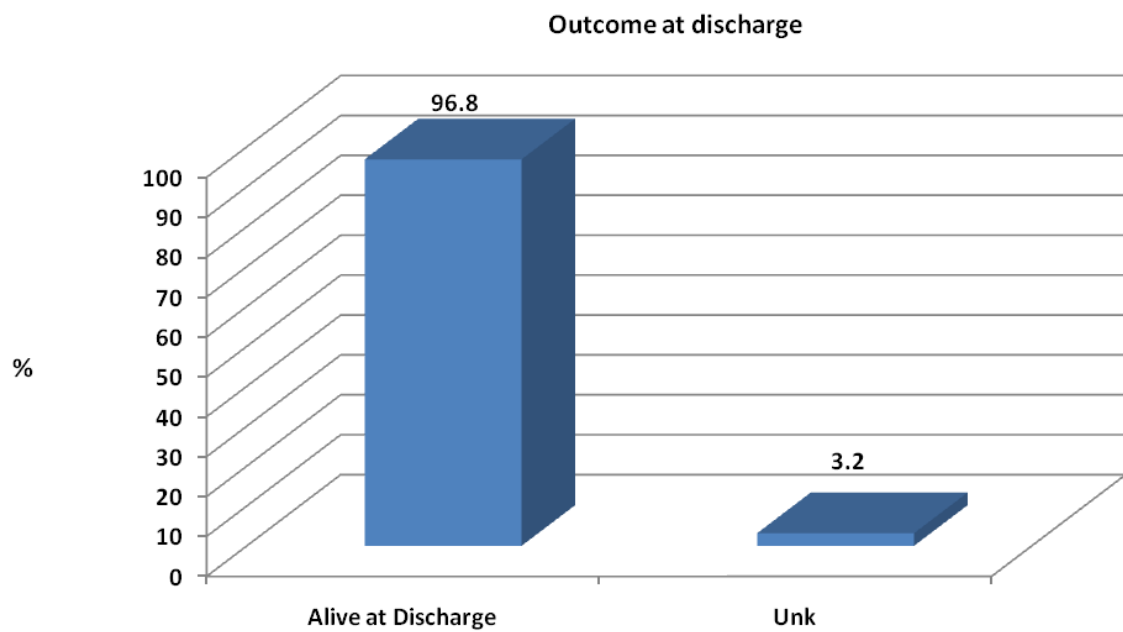
Stabilizer used	Occurrences	Percent
No	75	12.4
Yes Unilateral	12	2.0
Yes Bilateral	408	67.7
Unk	108	17.9
Total	603	100



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

Outcome at discharge	Occurrences	Percent
Alive at Discharge [°]	584	96.8
Unk	19	3.2
Total	603	100

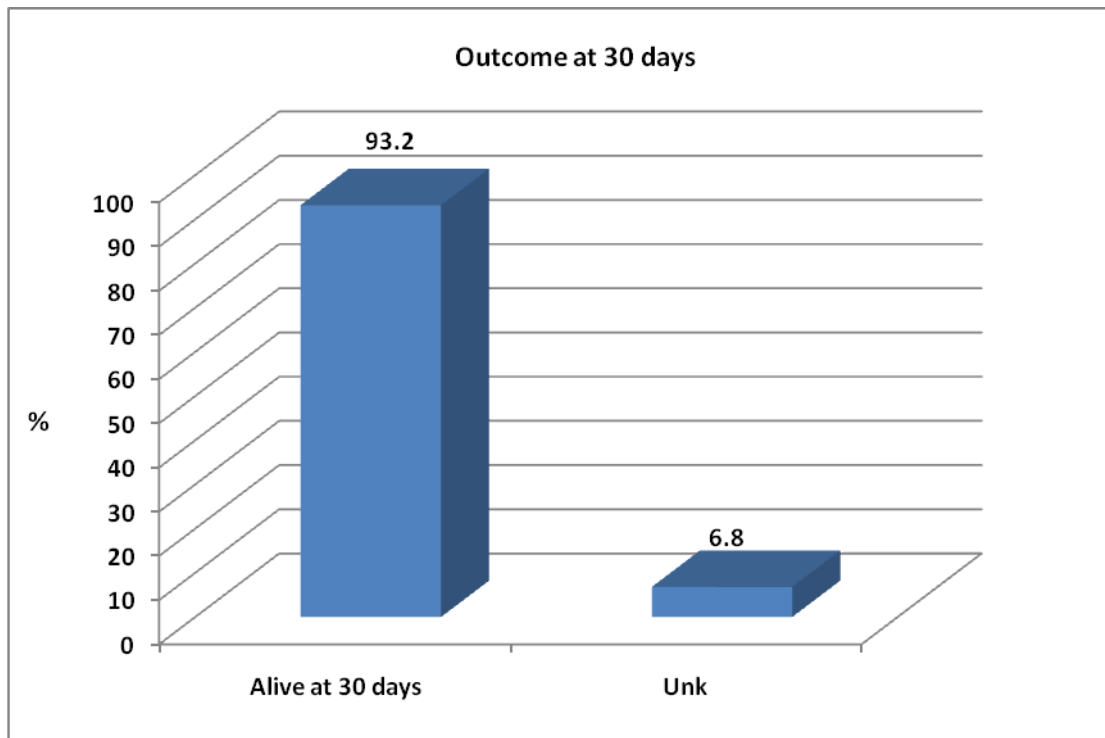
(°): Units with less than 500 patients included, results must be interpreted with caution



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

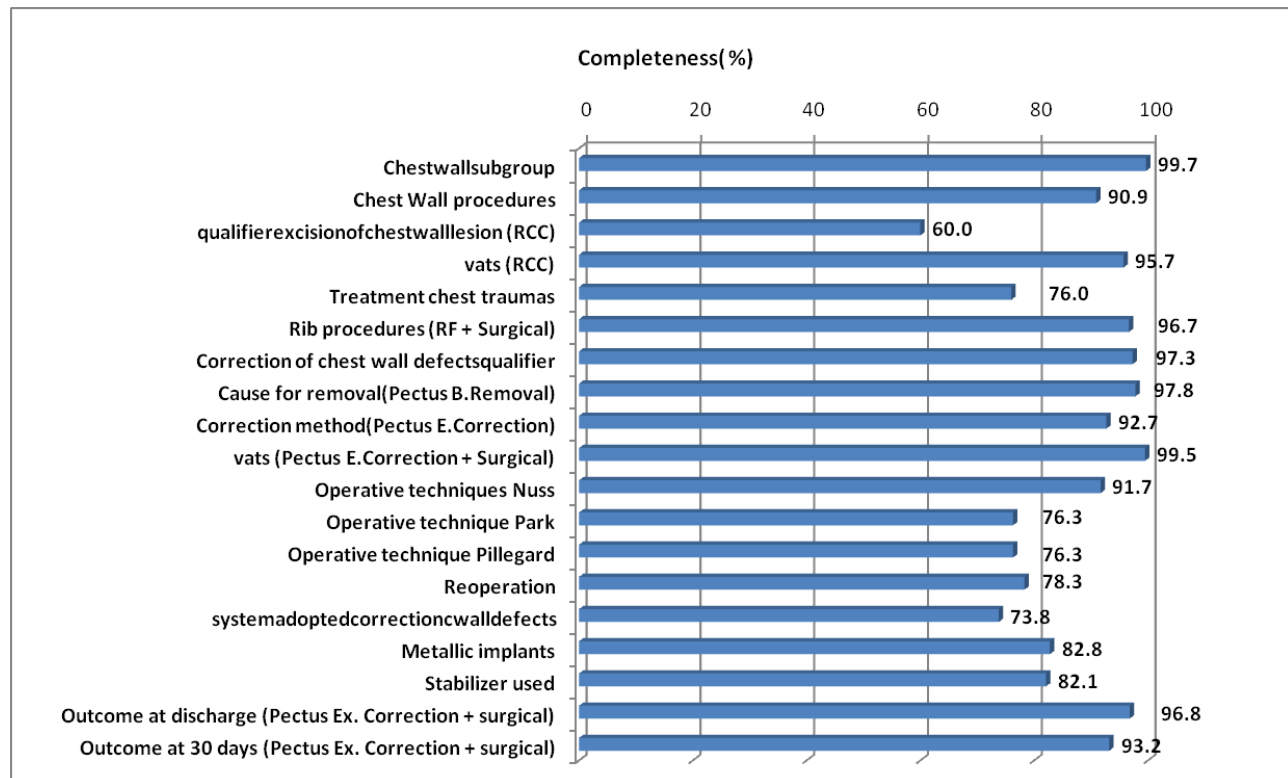
Outcome at 30 days	Occurrences	Percent
Alive at 30 days [°]	562	93.2
Unk	41	6.8
Total	603	100

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



Data Completeness

Name of Field	Unknown (%)	Completeness(%)
Chestwallsubgroup	0.3	99.7
Chest Wall procedures	9.1	90.9
qualifierexcisionofchestwalllesion (RCC)	40.0	60.0
vats (RCC)	4.3	95.7
Treatment chest traumas	24.0	76.0
Rib procedures (RF + Surgical)	3.3	96.7
Correction of chest wall defectsqualifier	2.7	97.3
Cause for removal(Pectus B.Removal)	2.2	97.8
Correction method(Pectus E.Correction)	7.3	92.7
vats (Pectus E.Correction + Surgical)	0.5	99.5
Operative techniques Nuss	8.3	91.7
Operative technique Park	23.7	76.3
Operative technique Pillegard	23.7	76.3
Reoperation	21.7	78.3
systemadoptedcorrectioncwalldefects	26.2	73.8
Metallic implants	17.2	82.8
Stabilizer used	17.9	82.1
Outcome at discharge (Pectus Ex. Correction + surgical)	3.2	96.8
Outcome at 30 days (Pectus Ex. Correction + surgical)	6.8	93.2



Appendix 1: Database format and submission of data

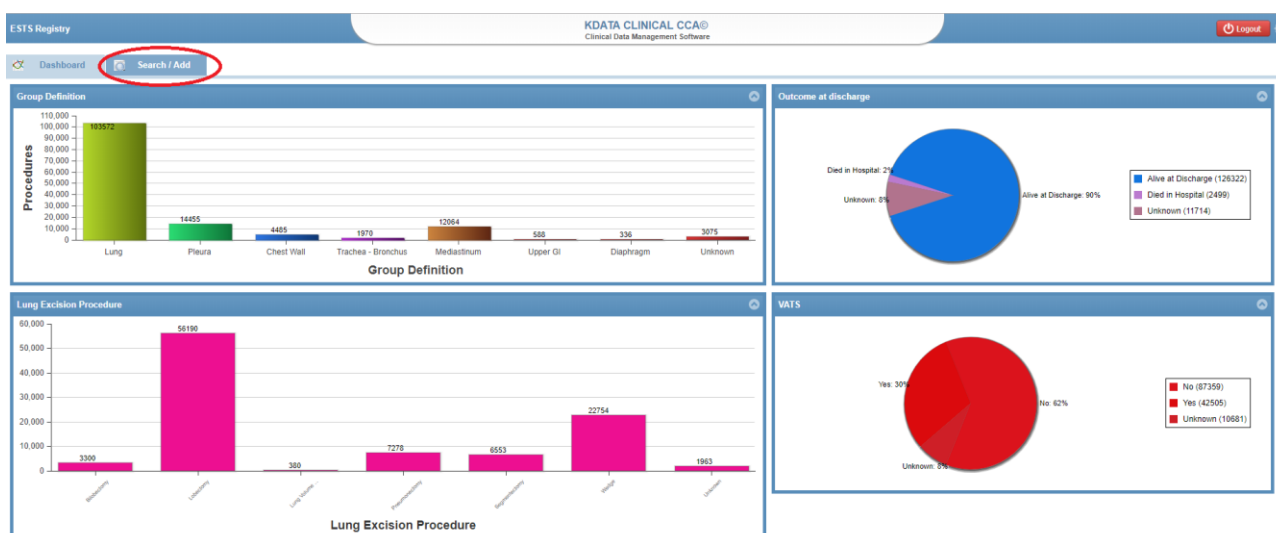
The first step is to request and obtain a login account through the relevant link found in the ESTS homepage (<http://www.ests.org>) or by directly sending an email to one of the members of the Database Committee. Once you have a valid login account you can proceed through the following data entry interface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

KDATA Clinical CCE

Dashboard Search / Add

Search / Add patients

Family name First name Sex Hospital Number Search patients Add new patient

Last name First name Date of birth Sex Hospital Number

Add new patient

Insert patient data

Last name: First name: Gender: Date of birth: Hospital Number:

Add patient

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	WRVREF243R3R
VERDI	Giuseppe	15/05/1915	M	PPPPPPPPPPPPPPPP
TESTINA	Testino	12/12/2044	M	ERGRGFEGQF
Patient	Test	11/12/1955	M	PTNTST55S12D643B

Page 1 of 1 All Patients Data export Displaying 1 - 17 of 17

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.

KDATA Clinical CCE

Dashboard Search / Add

Search / Add patients

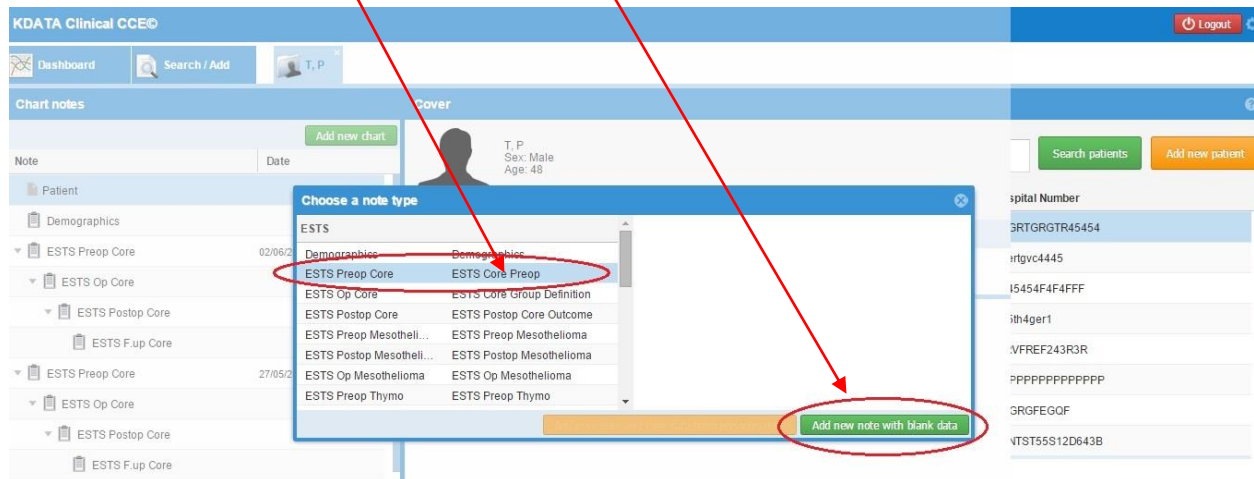
Family name First name Sex Hospital Number Search patients Add new patient

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	WRVREF243R3R
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

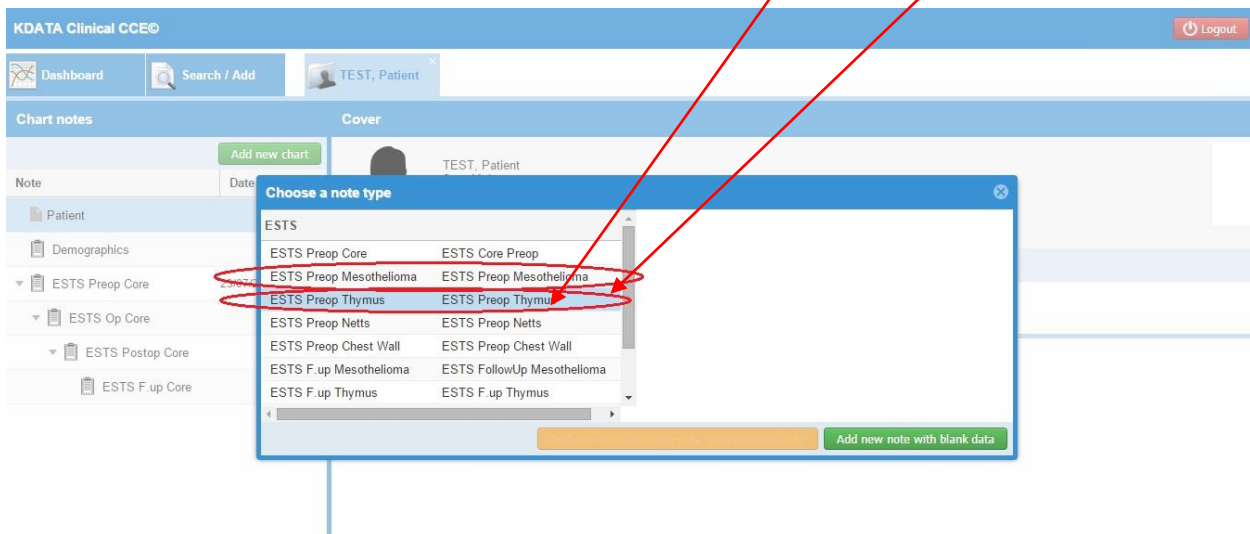
Name	Date	Last modified
ESTS Postop Core	02/06/2015	10/07/2015
ESTS Postop Core	27/05/2015	02/06/2015

Link to selected note

Age at surgery	48
Urgency	
Smoking History	
ASA	
ECOG	Light Work Only
Height (m)	1.7
MRC Score	3
FEV1 (%)	77
FVC (Litres)	
FEV1(L)/FVC(L)	

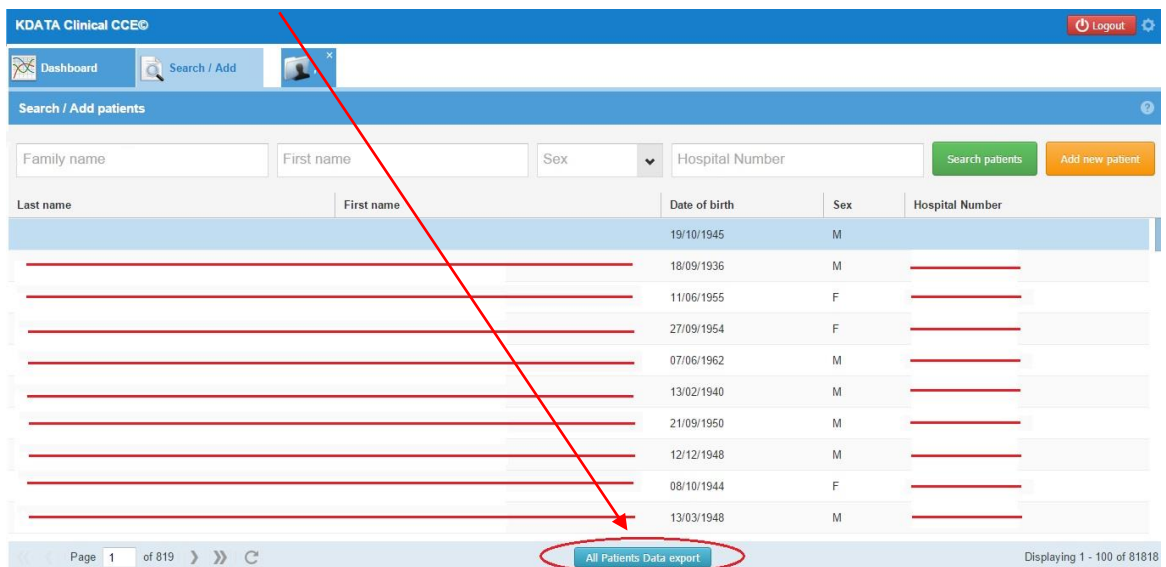
Reset Save

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.

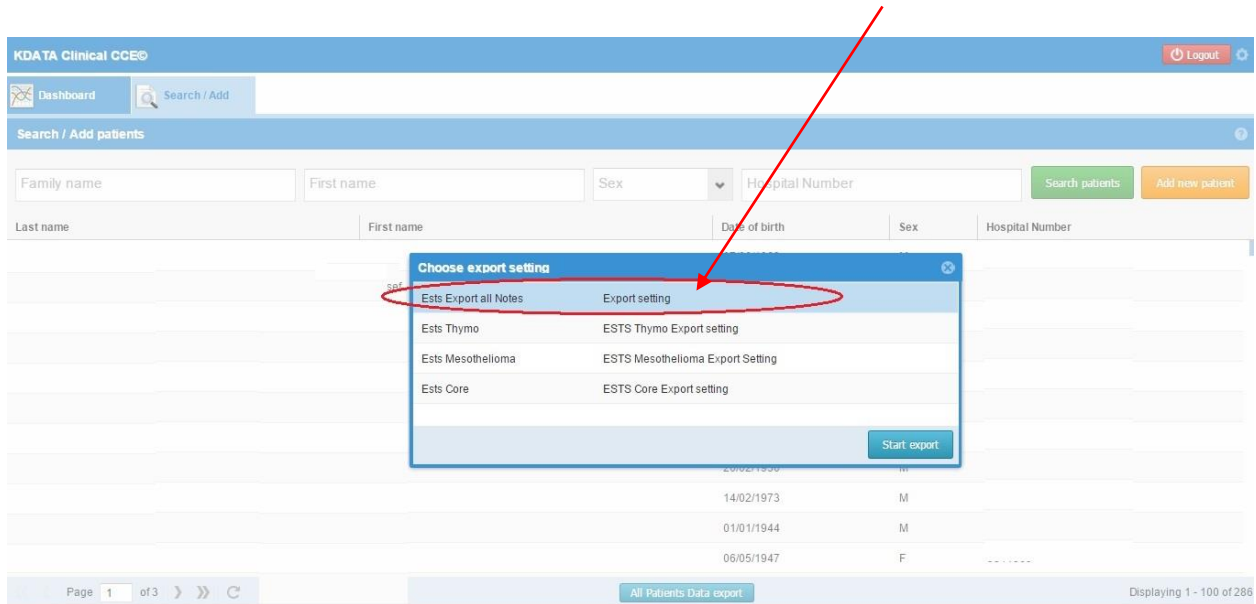


In summary the first step after put in the demographics data or search a patient just saved is to select the specific note and in case of thymo or MEsothelioma or NEtts or chest wall is necessary select the specific note.

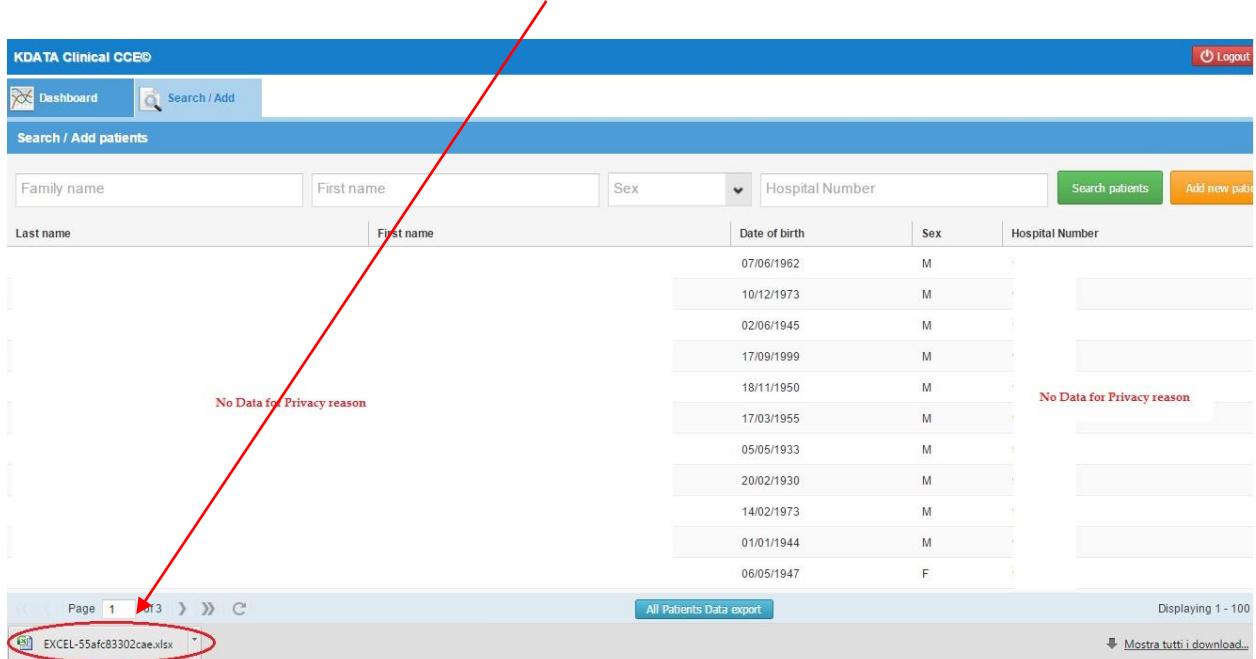
In any case the total export permit to have a cumulative file with all type of procedures



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

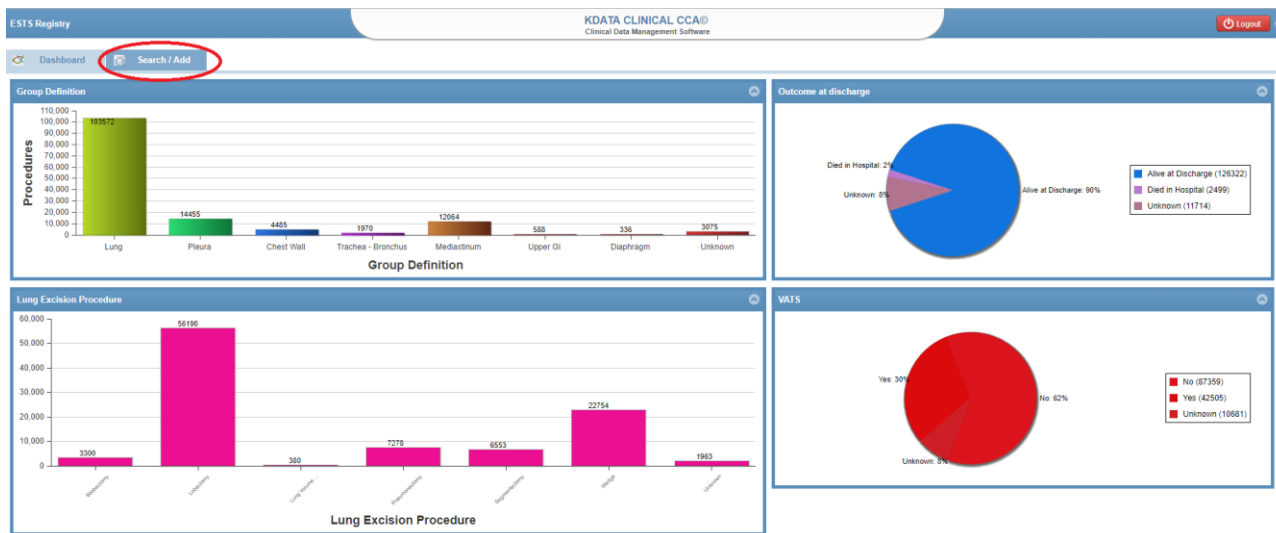


After you can open the file downloaded on the taskbar below



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.

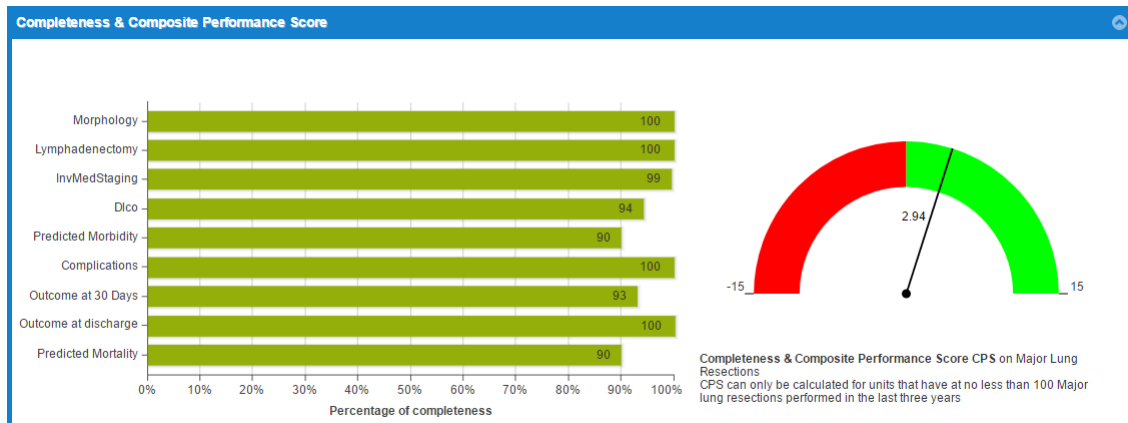
Completeness and Composite Performance Score.

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

By Dr Attila Enyedi
drenyediattila@gmail.com

The “Hungarian Model” Experience

Dear Colleagues,

I am happy to share the summary of the data of the Hungarian Thoracic Surgical Society contributed in 2024. Our colleague uploaded nationwide the complete spectrum of their activity into the ESTS Database each year and enjoy using it later as our National Database. It gives an excellent opportunity to build a regular benchmarking platform, in which the society gets immediate feedback from the European thoracic performance. It allocates the strong and weak points of our activity by using a solid multinational basis for comparison.



That's why Hungary uses the ESTS database nationally as a quality indicator too.

Our data show that the ratio of minimally invasive thoracic surgeries in Hungary is above the European average, consequently resulting in shorter overall hospital stay. Subsequently we have the important feedback from this comparison, that our patients' mortality and morbidity rates are also below the European average, which is one of the main targets of our activity.

Parallelly, using the benchmarking potential with ESTS we noted the impaired values of certain common parameters. That shows we got strong notifications by discovering the discrepancies in the lower number of DLCO tests performed, and the differences in PET-CT performed. Focused and serious efforts were made by our Society to balance this deviation and try to overcome these alterations.

The following summary of data is subjected to a detailed discussion with all involved institutions on our annual general assembly meeting. If any indicator falls below the European average, we can improve it in a targeted manner.

Due to this continuous protocol of improvement and feedback from ESTS we are able to confirm this year, that we have most of our Institutions ready to go for the ESTS Institutional accreditation

process in 2024. I consider it as a proof of a wide population level quality improvement of the last 10 years since we have this close cooperation with the European society.

I am glad that we will soon have the opportunity to meet in person at the upcoming ESTS congress in Barcelona and have the opportunity to exchange ideas about our experiences in person.

Best regards

Dr Attila Enyedi,

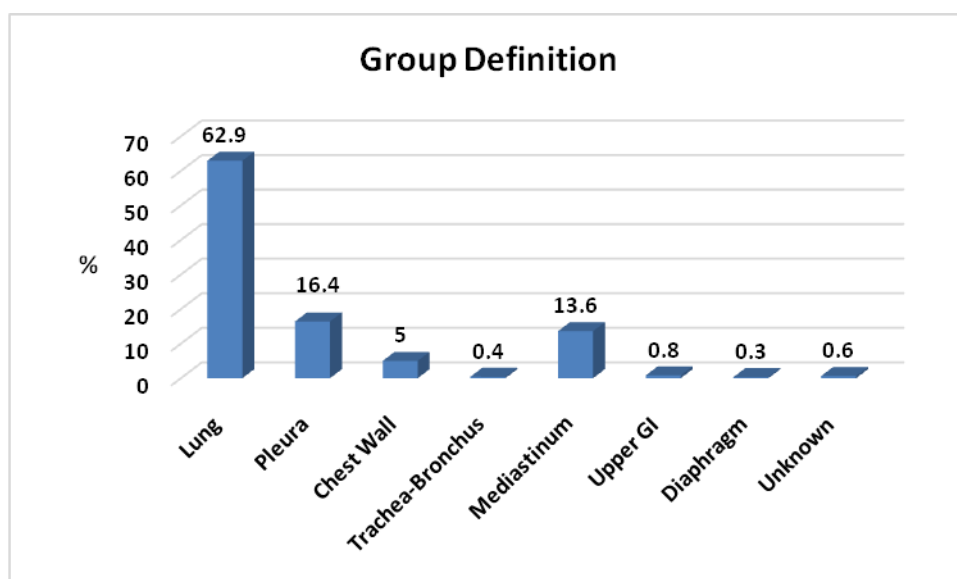
ESTS Regent for Hungary

drenyediattila@gmail.com

Hungarian Cumulative Data

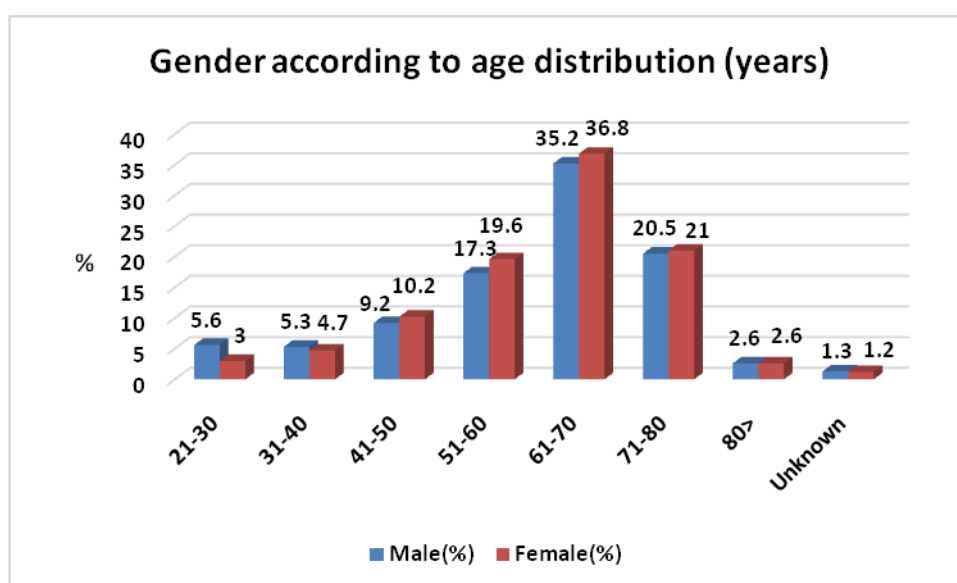
Group Definitions

Group Definition	Occurrences	Percent
Lung	22712	62.9
Pleura	5900	16.4
Chest Wall	1800	5
Trachea-Bronchus	150	0.4
Mediastinum	4925	13.6
Upper GI	281	0.8
Diaphragm	116	0.3
Unknown	208	0.6
Total	36092	100



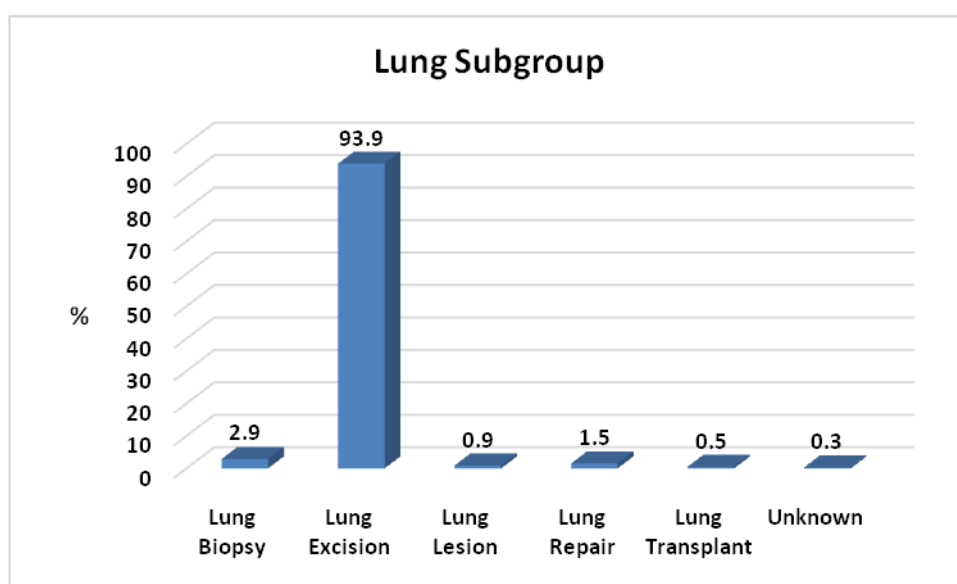
Gender according to age distribution (years)

Age (years)	Male (%)	Female (%)
<=20	3	0.9
21-30	5.6	3
31-40	5.3	4.7
41-50	9.2	10.2
51-60	17.3	19.6
61-70	35.2	36.8
71-80	20.5	21
80>	2.6	2.6
80>	2.6	2.6



Lung Subgroup

	Occurrences	Percent
Lung Biopsy	661	2.9
Lung Excision	21319	93.9
Lung Lesion	209	0.9
Lung Repair	339	1.5
Lung Transplant	108	0.5
Unk	76	0.3
Total	22712	100

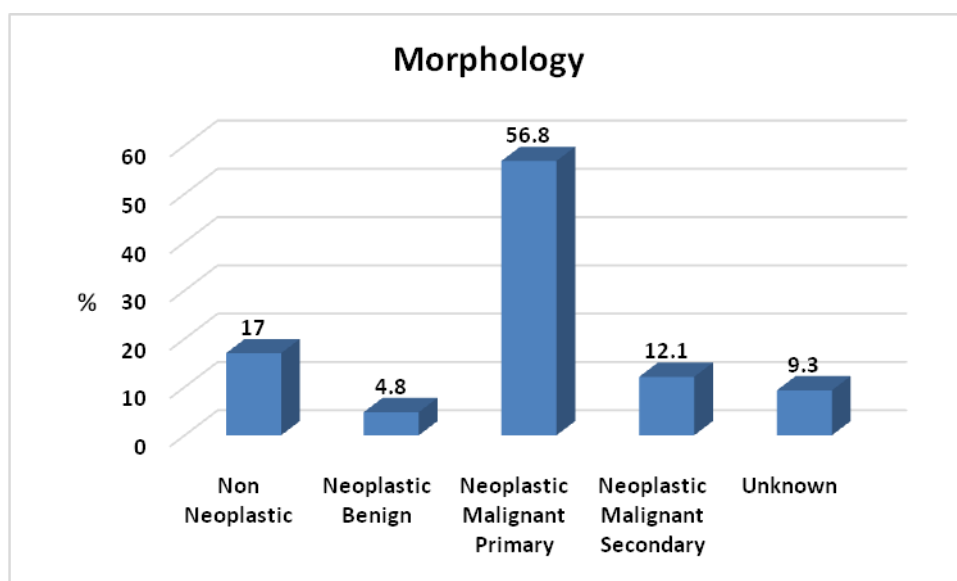


Lung Excision Procedure

	Occurrences	Percent
Bilobectomy	331	1.6
Lobectomy	10093	47.3
Lung Volume Reduction	40	0.2
Pneumonectomy	848	4
Segmentectomy	1495	7
Wedge	8340	39.1
Unk	172	0.8
Total	21319	100

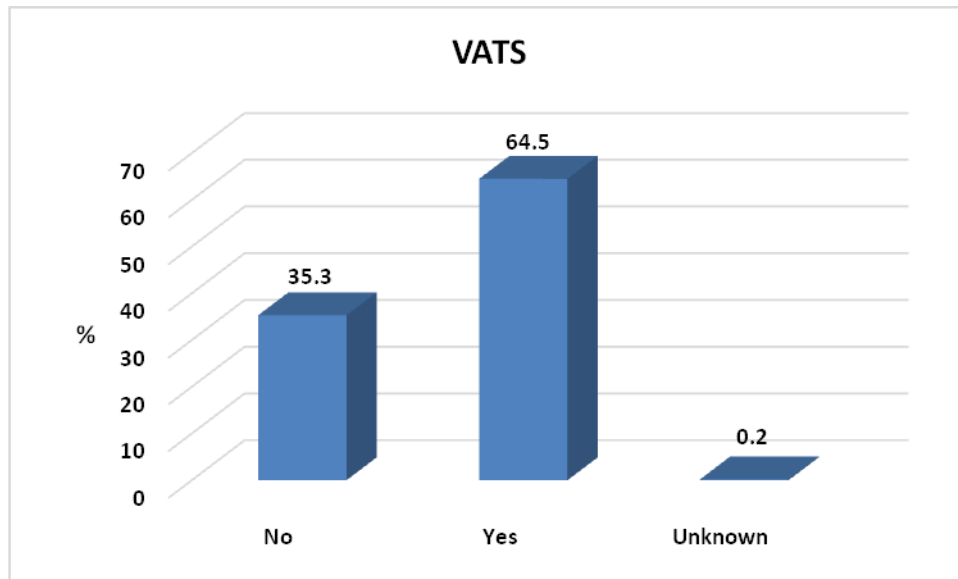
Lung resections pathology

Morphology	Occurrences	Percent (%)
Non Neoplastic	3618	17
Neoplastic Benign	1020	4.8
Neoplastic Malignant Primary	12112	56.8
Neoplastic Malignant Secondary	2581	12.1
Unknown	1988	9.3
Total	21319	100



Lung resections pathology (All lung resections)

VATS	Occurrences	Percent (%)
No	7522	35.3
Yes	13749	64.5
Unknown	48	0.2
Total	21319	100

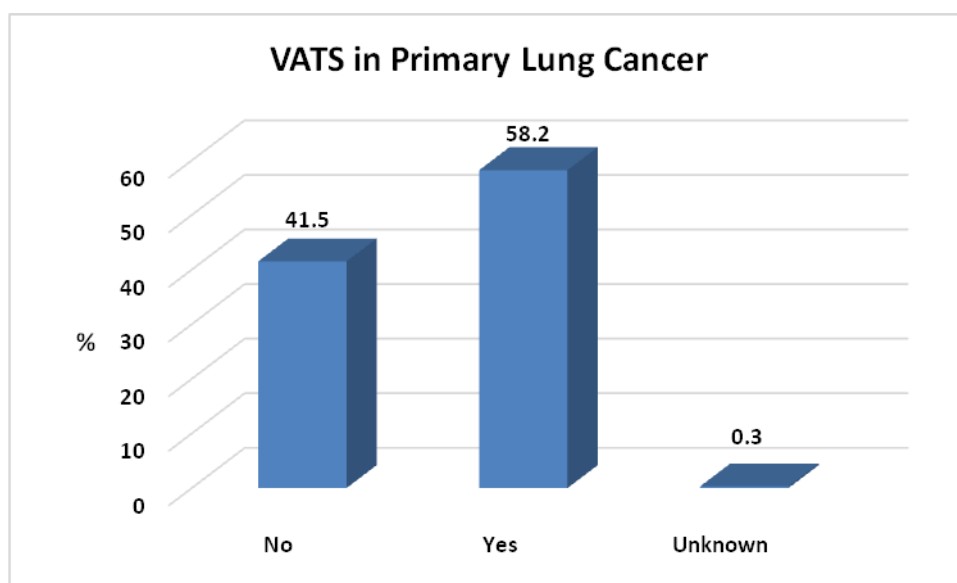


Lung resections pathology (Only Lobectomy)

VATS	Occurrences	Percent (%)
No	4194	41.6
Yes	5885	58.3
Unknown	14	0.1
Total	10093	100

Lung resections pathology (Primary malignant)

VATS	Occurrences	Percent (%)
No	5030	41.5
Yes	7048	58.2
Unknown	34	0.3
Total	12112	100

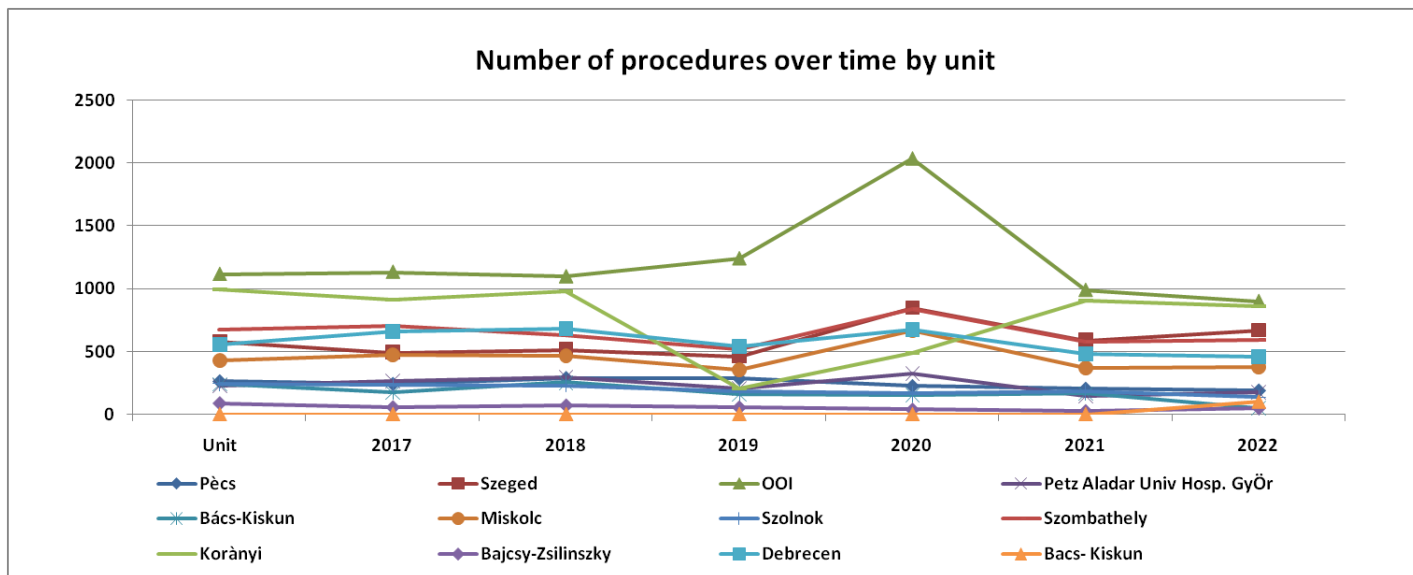


Unadjusted in-hospital mortality rates in lung excision procedures (Primary Lung Cancer)

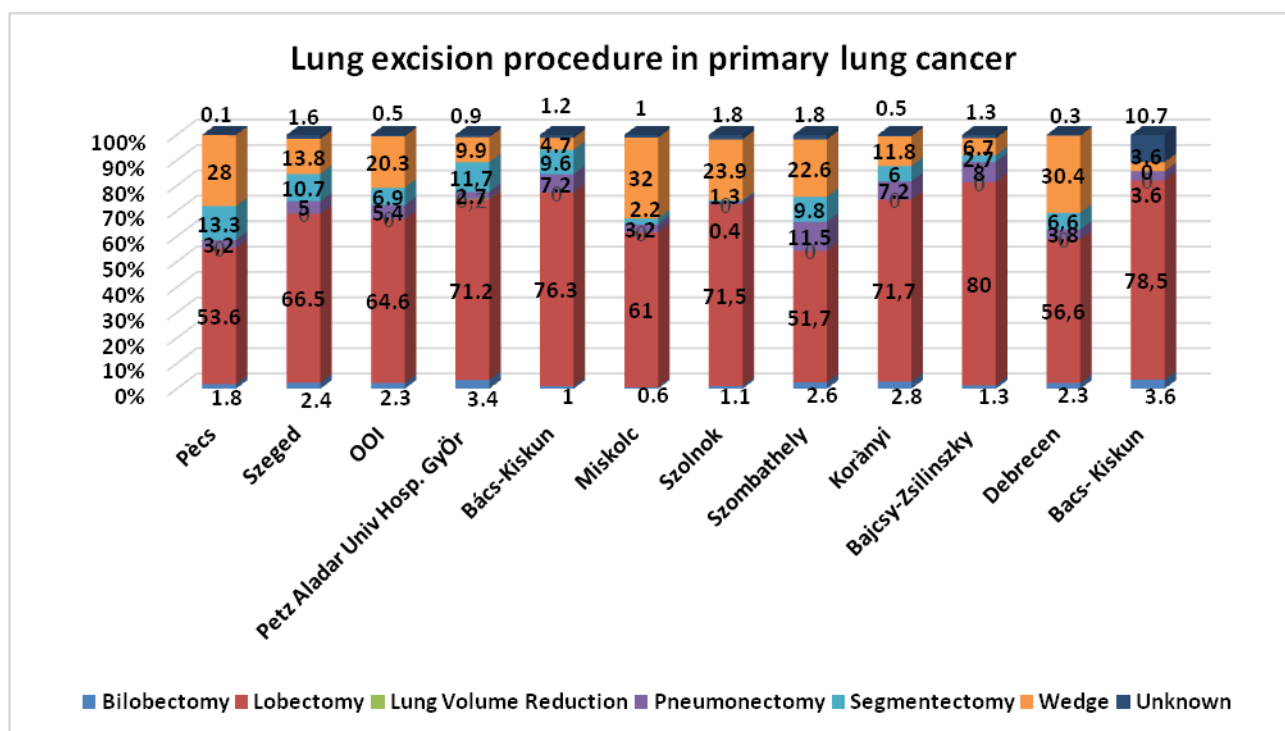
Outcome at Discharge - Died in Hospital	N	Died in Hospital	Percent(%)
Bilobectomy	257	6	2.3
Lobectomy	7431	45	0.6
Lung Volume Reduction	1	0	0
Pneumonectomy	643	24	3.7
Segmentectomy	920	5	0.5
Wedge	2400	8	0.3
Total	11652	88	0.8

Units specific activity & Comparative Analysis between contributing units

Unit	2017	2018	2019	2020	2021	2022	2023	Total
Pécs	261	240	287	284	223	202	188	1685
Szeged	579	493	515	462	849	591	671	4160
OOI	1117	1134	1098	1242	2040	989	900	8520
Petz Aladar Univ Hosp. Győr	226	266	293	206	323	146	178	1638
Bács-Kiskun	240	174	254	159	154	165	49	1195
Miskolc	430	472	463	353	665	367	374	3124
Szolnok	243	233	229	182	166	181	136	1370
Szombathely	676	700	626	519	835	576	592	4524
Korányi	998	913	984	202	487	907	863	5354
Bajcsy-Zsilinszky	88	56	70	54	37	25	50	380
Debrecen	553	658	680	540	672	482	457	4042
Bacs- Kiskun	0	0	0	0	0	0	100	100
Total	5411	5339	5499	4203	6451	4631	4558	36092

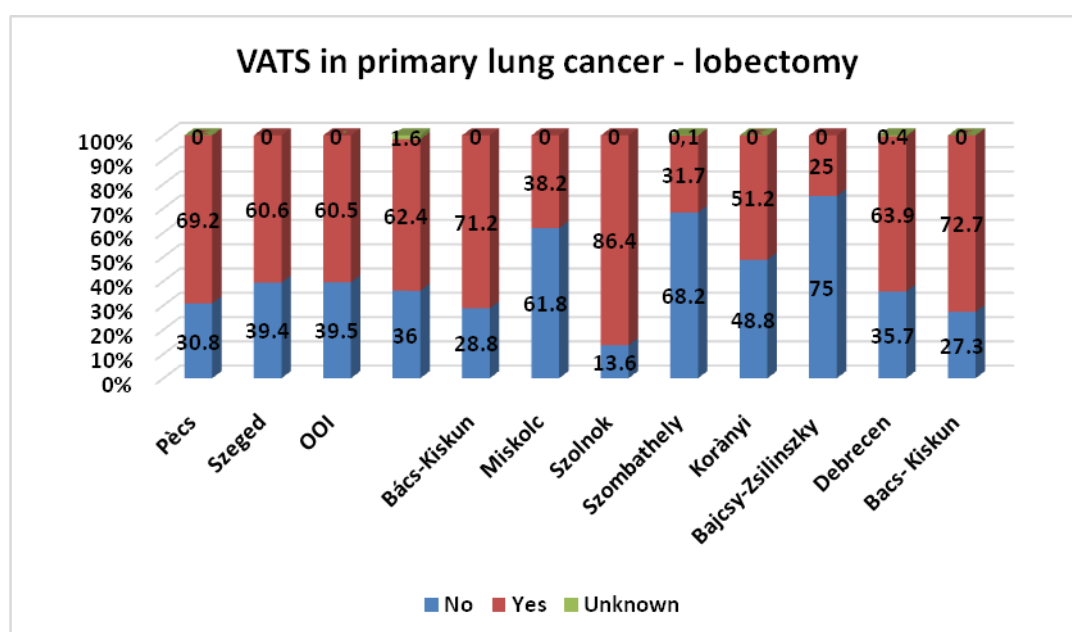


Unit	Total	Bilobectomy	Lobectomy	Lung Volume Reduction	Pneumonectomy	Segmentectomy	Wedge	Unk
Pécs	822	1.8	53.6	0	3.2	13.3	28	0.1
Szeged	1661	2.4	66.5	0	5	10.7	13.8	1.6
OOI	3591	2.3	64.6	0	5.4	6.9	20.3	0.5
Petz Aladar Univ Hosp. Győr	445	3.4	71.2	0.2	2.7	11.7	9.9	0.9
Bács-Kiskun	405	1	76.3	0	7.2	9.6	4.7	1.2
Miskolc	597	0.6	61	0	3.2	2.2	32	1
Szolnok	452	1.1	71.5	0	1.3	0.4	23.9	1.8
Szombathely	1246	2.6	51.7	0	11.5	9.8	22.6	1.8
Korányi	1320	2.8	71.7	0	7.2	6	11.8	0.5
Bajcsy-Zsilinszky	75	1.3	80	0	8	2.7	6.7	1.3
Debrecen	1470	2.3	56.6	0	3.8	6.6	30.4	0.3
Bacs- Kiskun	28	3.6	78.5	0	3.6	0	3.6	10.7
Total	12112	2.2	63.4	0	5.5	7.8	20.2	0.9



Lung resections pathology (Only Lobectomy – Primary Lung Cancer)

Unit	VATS No (%)	VATS Yes (%)
Pécs	30.8	69.2
Szeged	39.4	60.6
OOI	39.5	60.5
Petz Aladar Univ Hosp. Győr	36	62.4
Bács-Kiskun	28.8	71.2
Miskolc	61.8	38.2
Szolnok	13.6	86.4
Szombathely	68.2	31.7
Korányi	48.8	51.2
Bajcsy-Zsilinszky	75	25
Debrecen	35.7	63.9
Bacs- Kiskun	27.3	72.7



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

- 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).

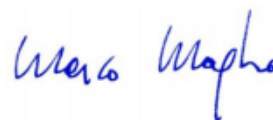
As a result of this verification I can acknowledge that the Holder, in order to prepare the documentation useful to certify the adoption of security measures suitable to prevent the illegal processing of personal data to be placed, has correctly carried out the adjustment activity to the EU Regulation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

