Colorectal Carcinoma Resection Audit

(2017 -2018)

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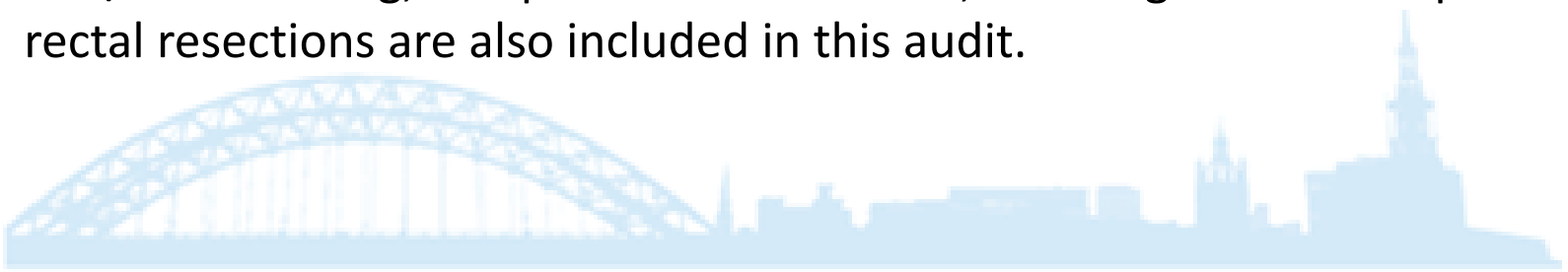
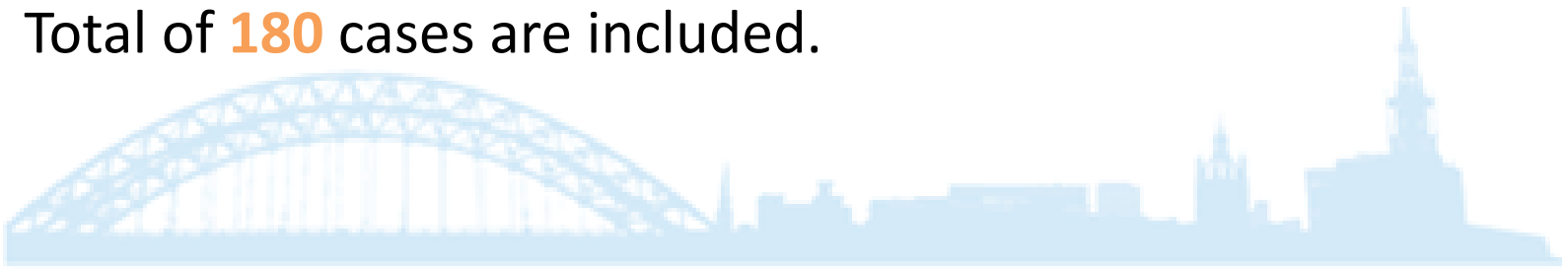
Introduction

- This is the annual colorectal cancer resection audit recommend by the Royal College of Pathologists (RCPath).
- CRC resections are audited against 3 main standards:
    1. Median Number of lymph nodes examined.
    2. Frequency of serosal involvement
    3. Frequency of venous invasion
- Other audited key performance indicators (KPI) as per RCPath recommendations are: turnaround times and compliance to the college data sets for reporting (proforma).
- MSI/MMR testing, completeness of excision, and surgical excision plane in rectal resections are also included in this audit.

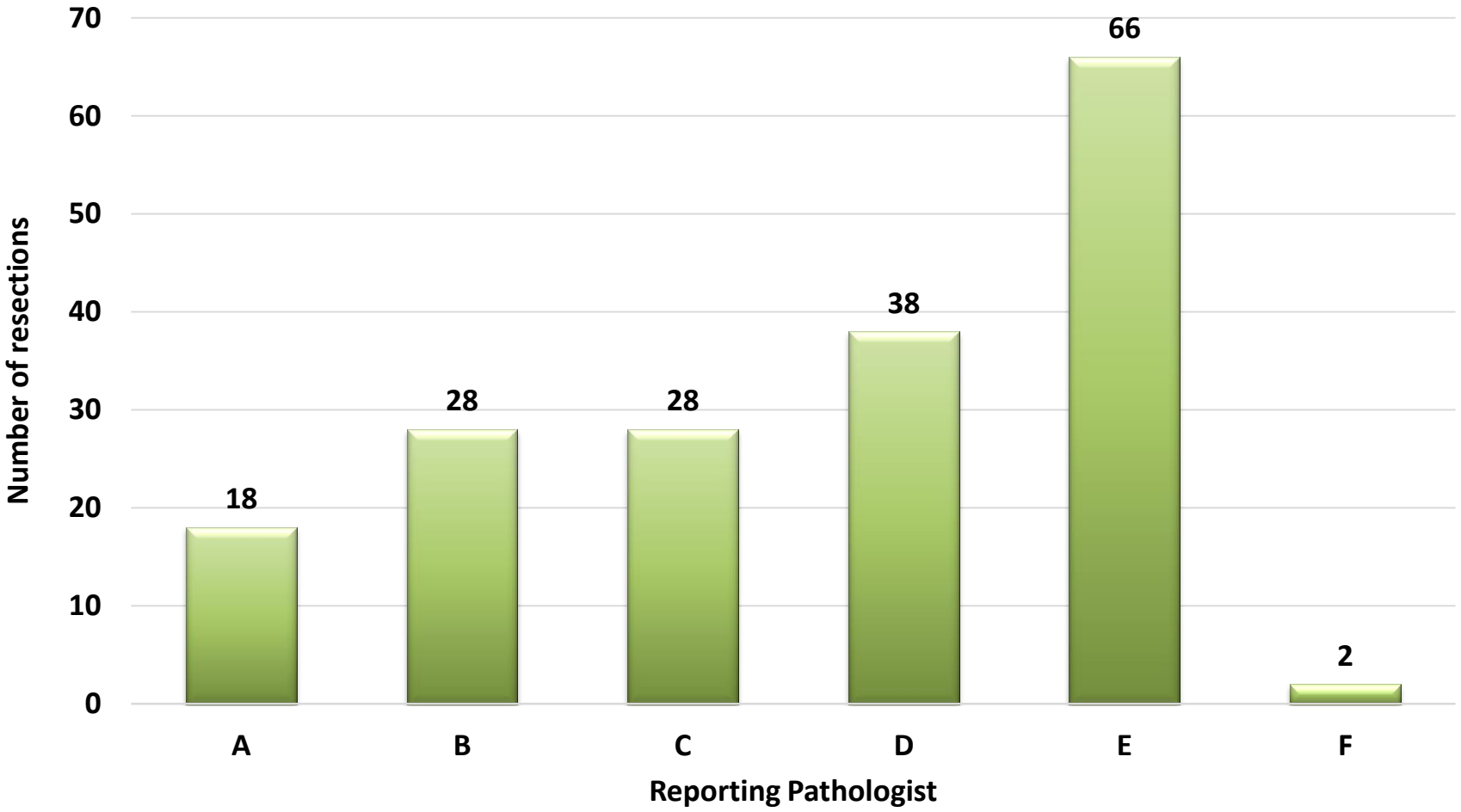


Colorectal cancer Resection Audit 2017-2018

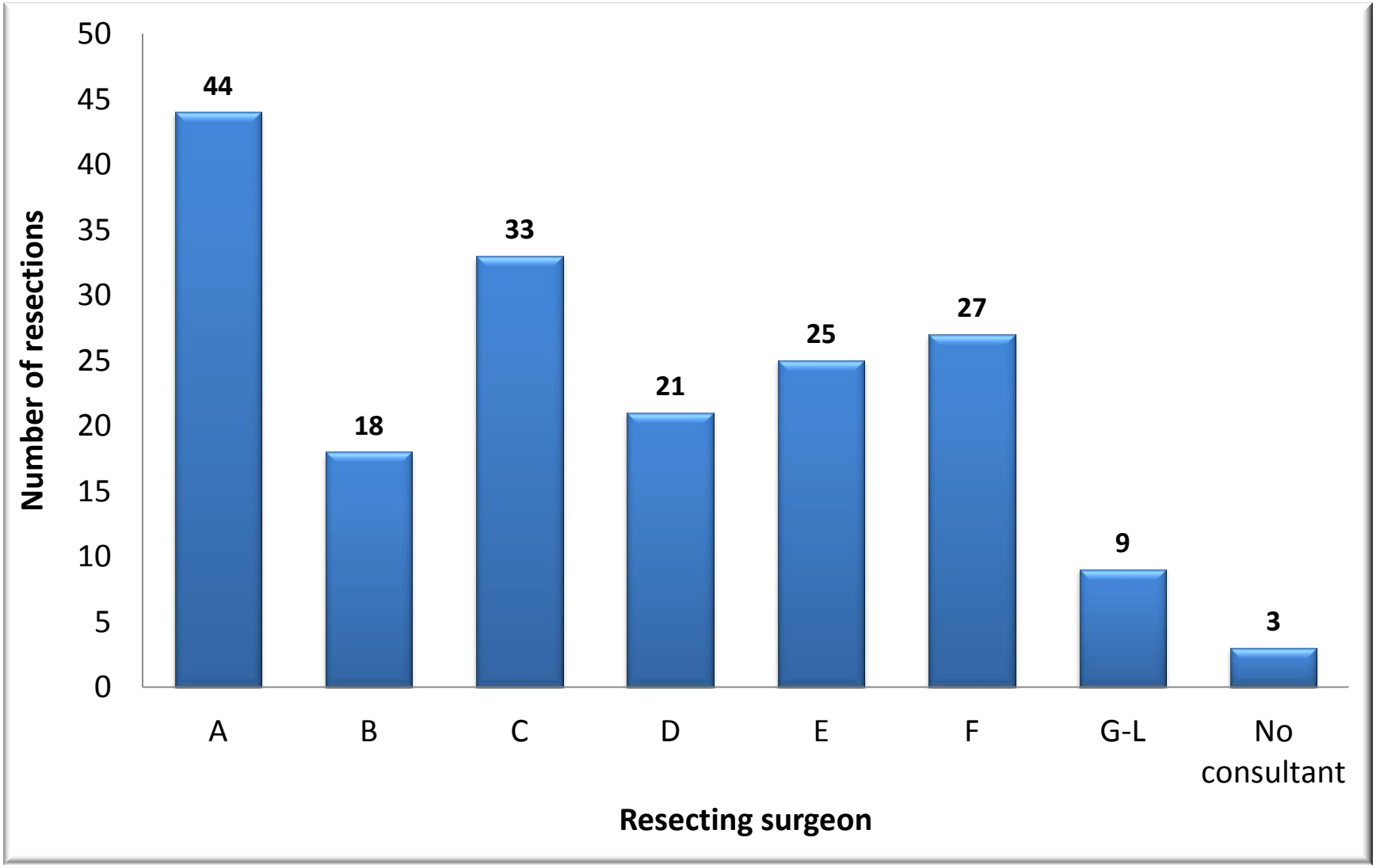
- ***Time period:*** 1st April 2017 to 31st March 2018
- ***Method / Source:*** Pathology computer system – Apex, using SNOMED codes and pathology reports.
- ***Inclusion criteria:*** All local colorectal cancer resections performed for adenocarcinoma or variant carcinoma.
- ***Exclusion:*** neuroendocrine tumours, squamous cell carcinoma, metastatic carcinoma, referred cases (for MSI testing or MDTM review), Transanal Endoscopic Microsurgery (TEMS) specimens, and EMRs.
- Total of **180** cases are included.



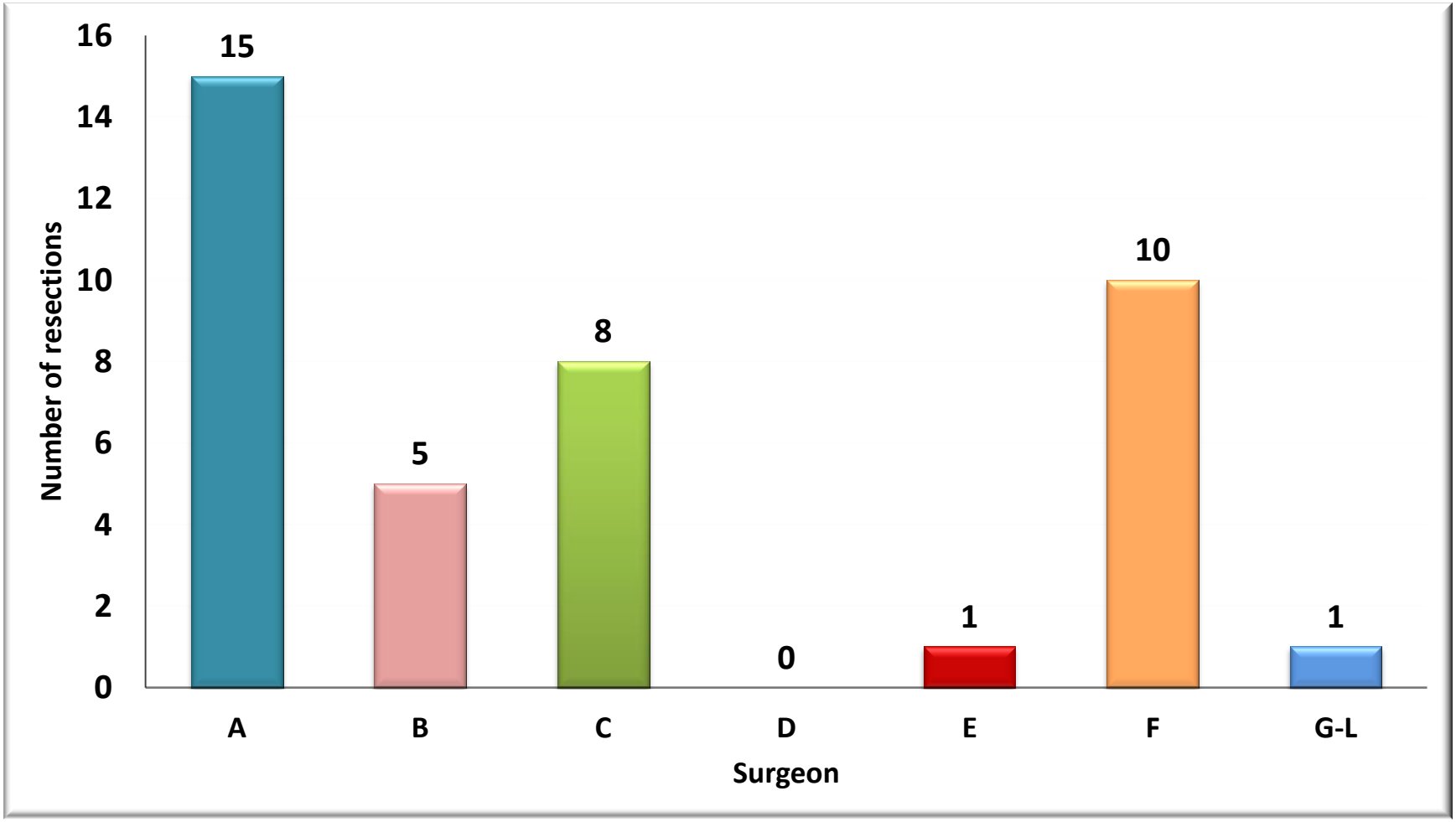
Number of Resections by Reporting Pathologist, n=180



Number of Resections by Surgeon, n=180



Number of complex resections by Surgeon, n=40



TNM staging

RCPath issued new dataset for reporting CRC in December 2017 (implemented from 1st Jan 2018)
TNM8th edition is used instead of TNM5.

Main differences:

- Subdivision of stage T4 tumours:

T4a - tumour with serosal involvement (previous T4b)
T4b – tumour with involvement of adjacent organs (previous T4a)

- Subdivision of Lymph node (N) stage for N1 tumours:

pN1a Metastasis in 1 regional lymph node

pN1b Metastases in 2 - 3 regional lymph nodes

pN1c Tumour deposit(s), i.e. satellites (node negative)

- Duke's staging and overall stage are not included in reports anymore.

TNM stage

TNM 5: 126 cases

TNM 8: 54 case

Type of resection:

TNM5

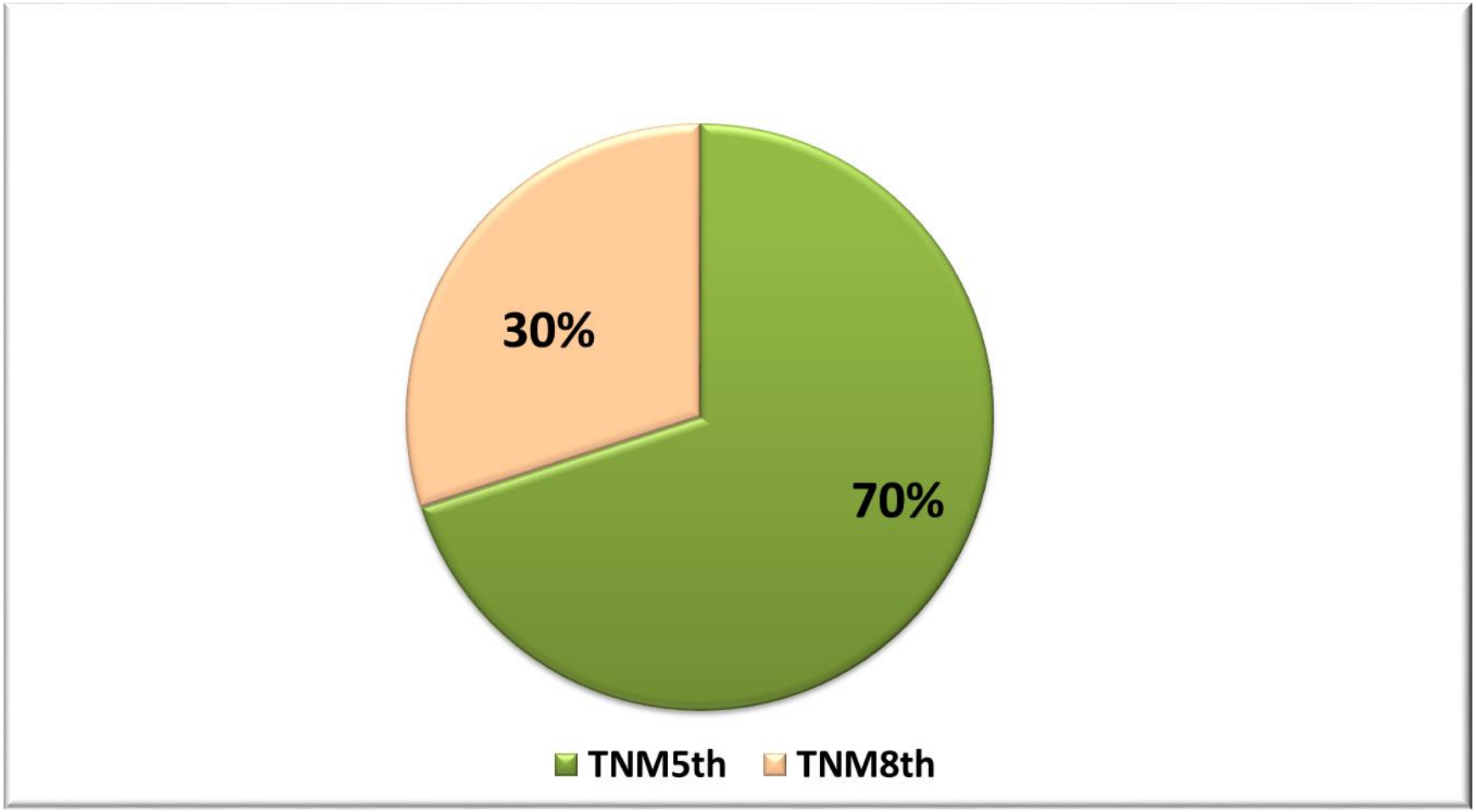
- Rectal 37 cases
- Colonic (non-rectal) 89 cases

TNM8

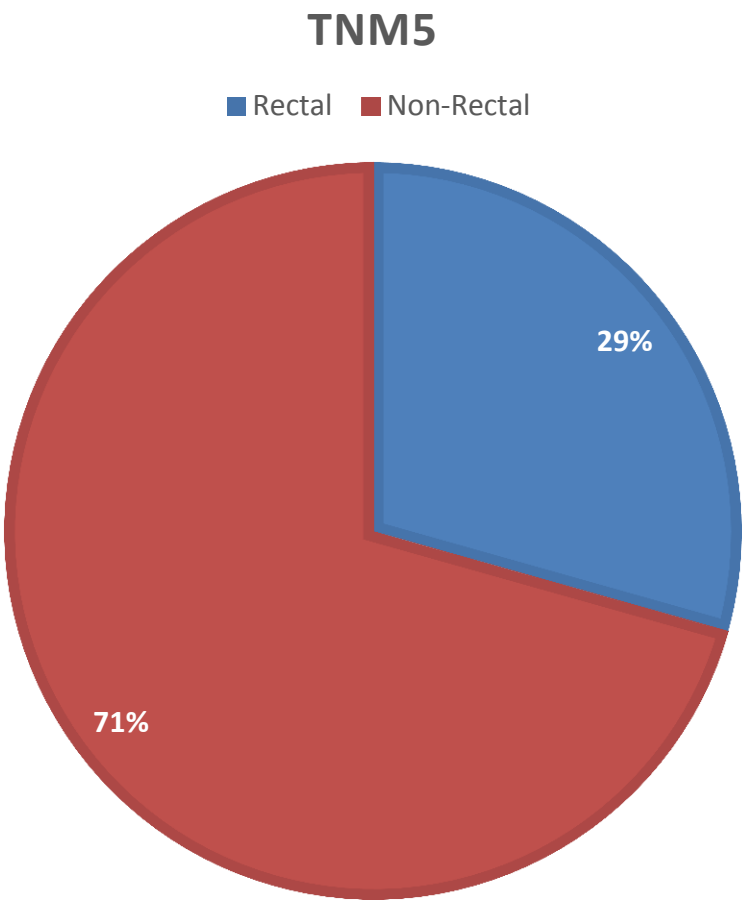
- Rectal 25 cases
- Colonic (non-rectal) 29 cases

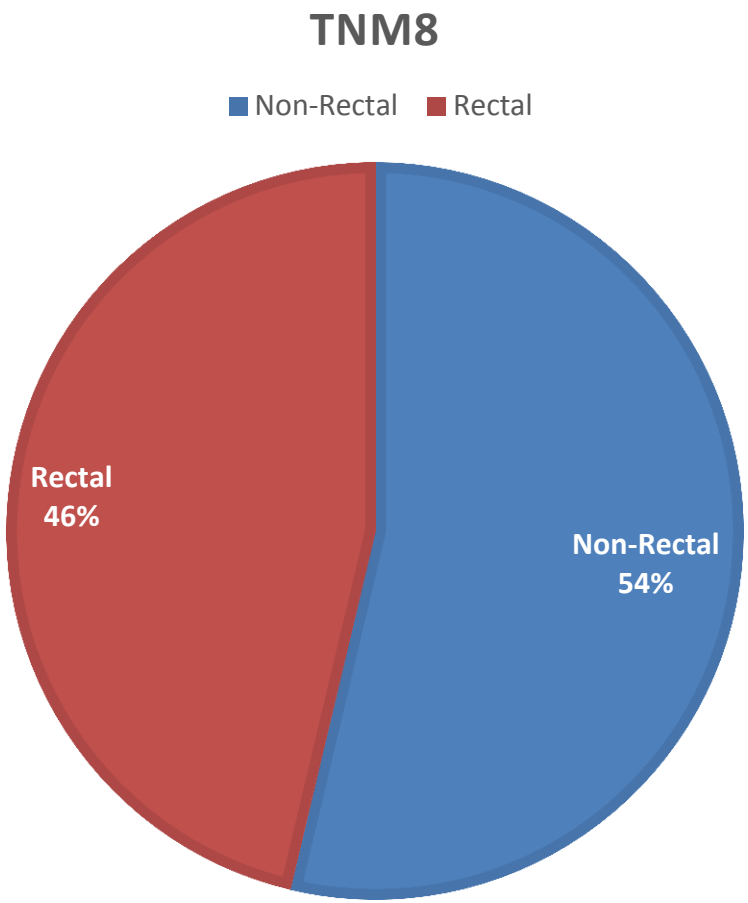
RESULTS

Percentage of Cases According to TNM edition

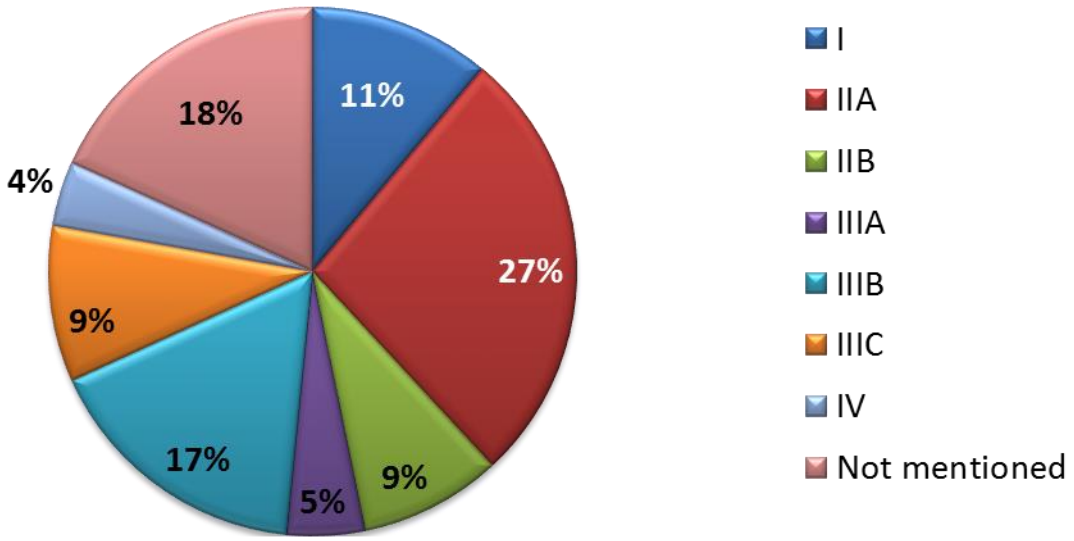


Type of Resection

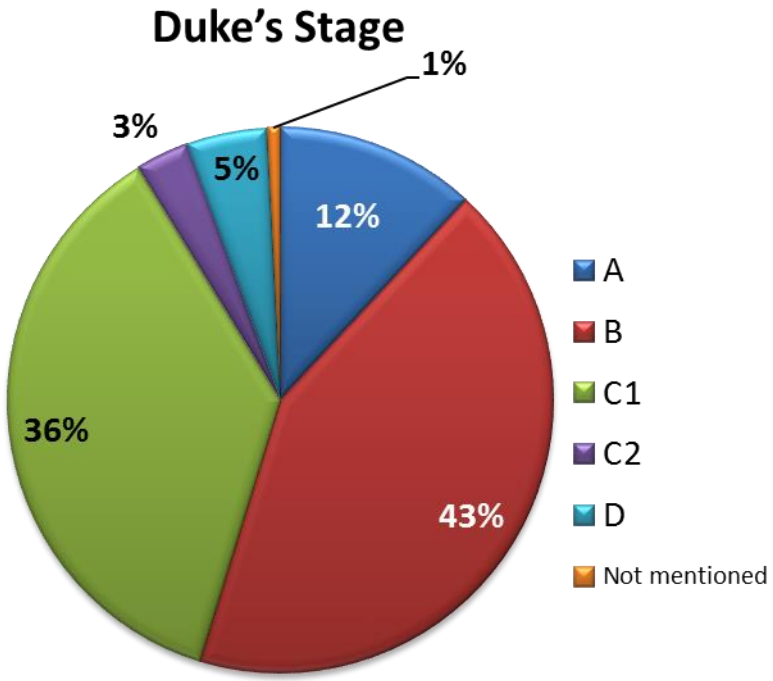




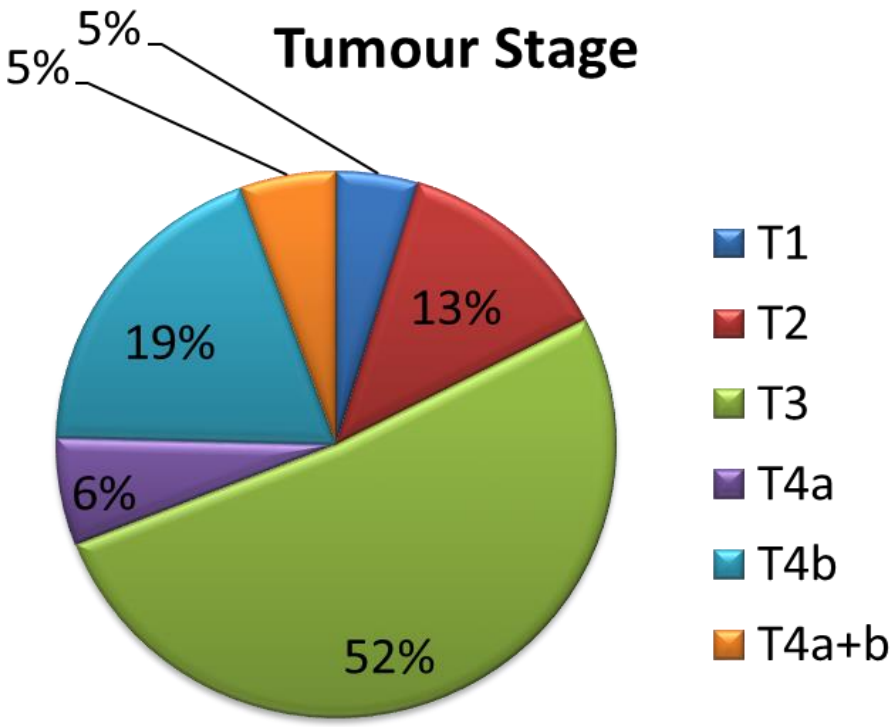
Clinical Stage (TNM5)



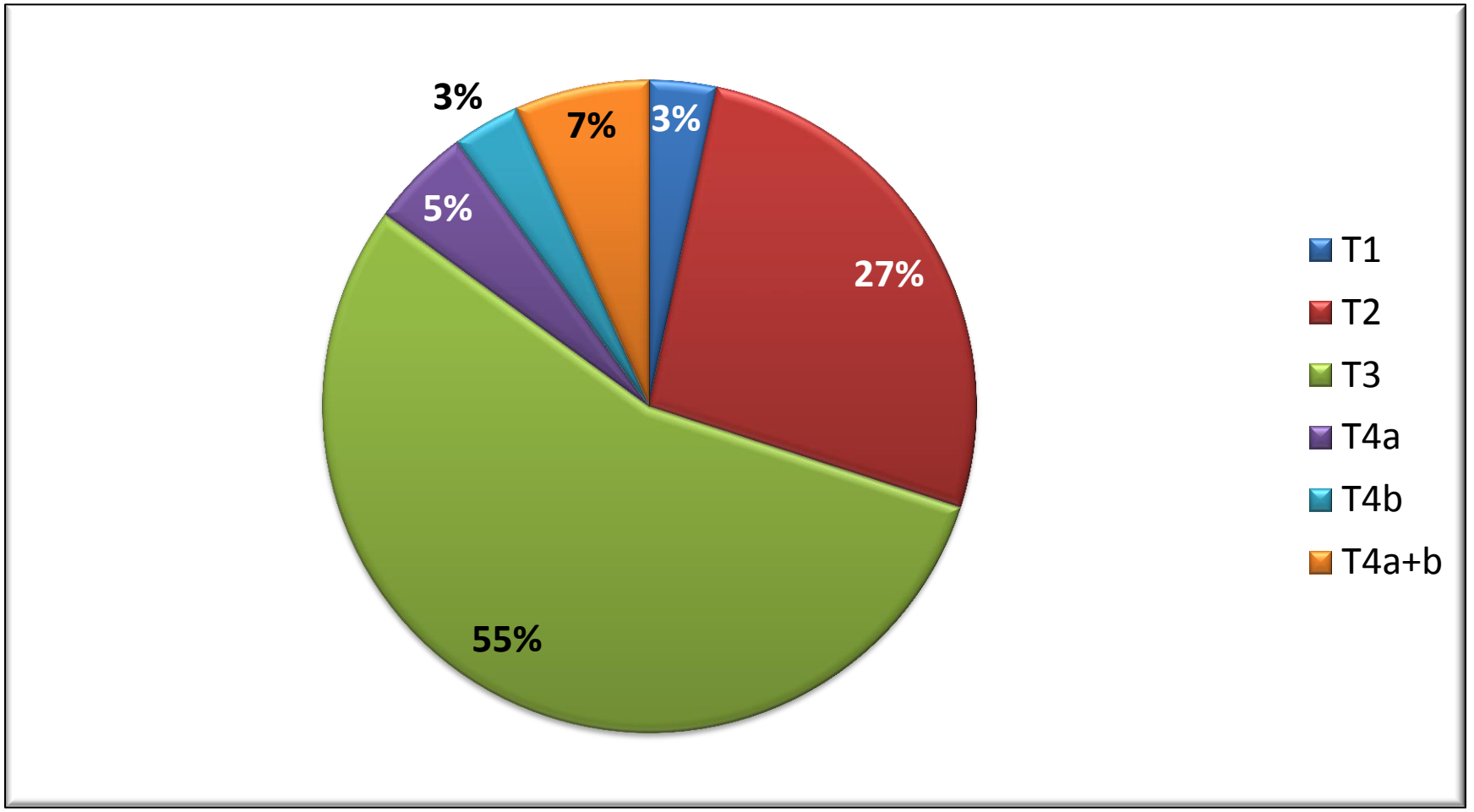
Duke's Stage (TNM5)



Tumour Stage (TNM5)



Tumour Stage (TNM8)

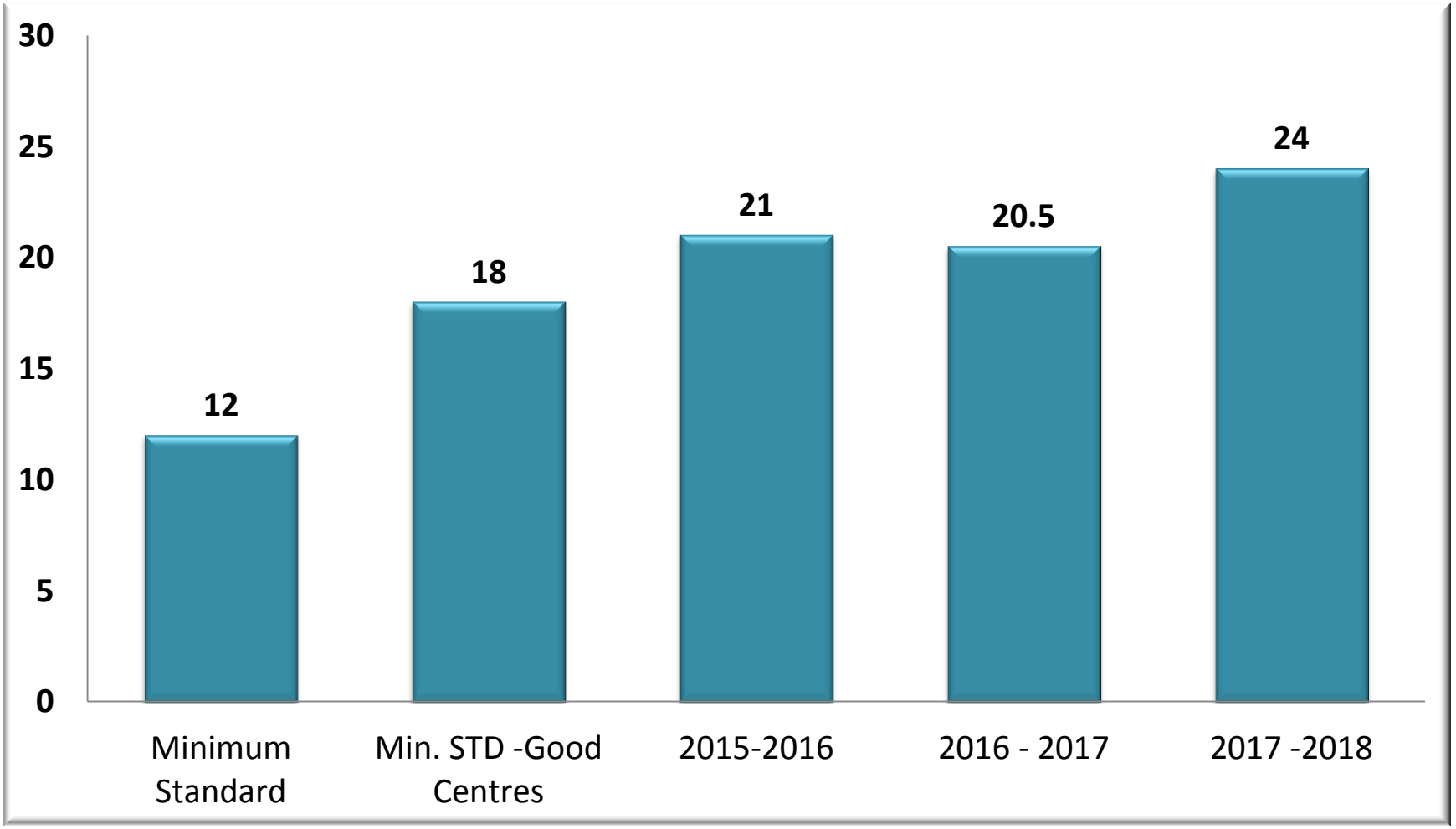


Lymph node yield

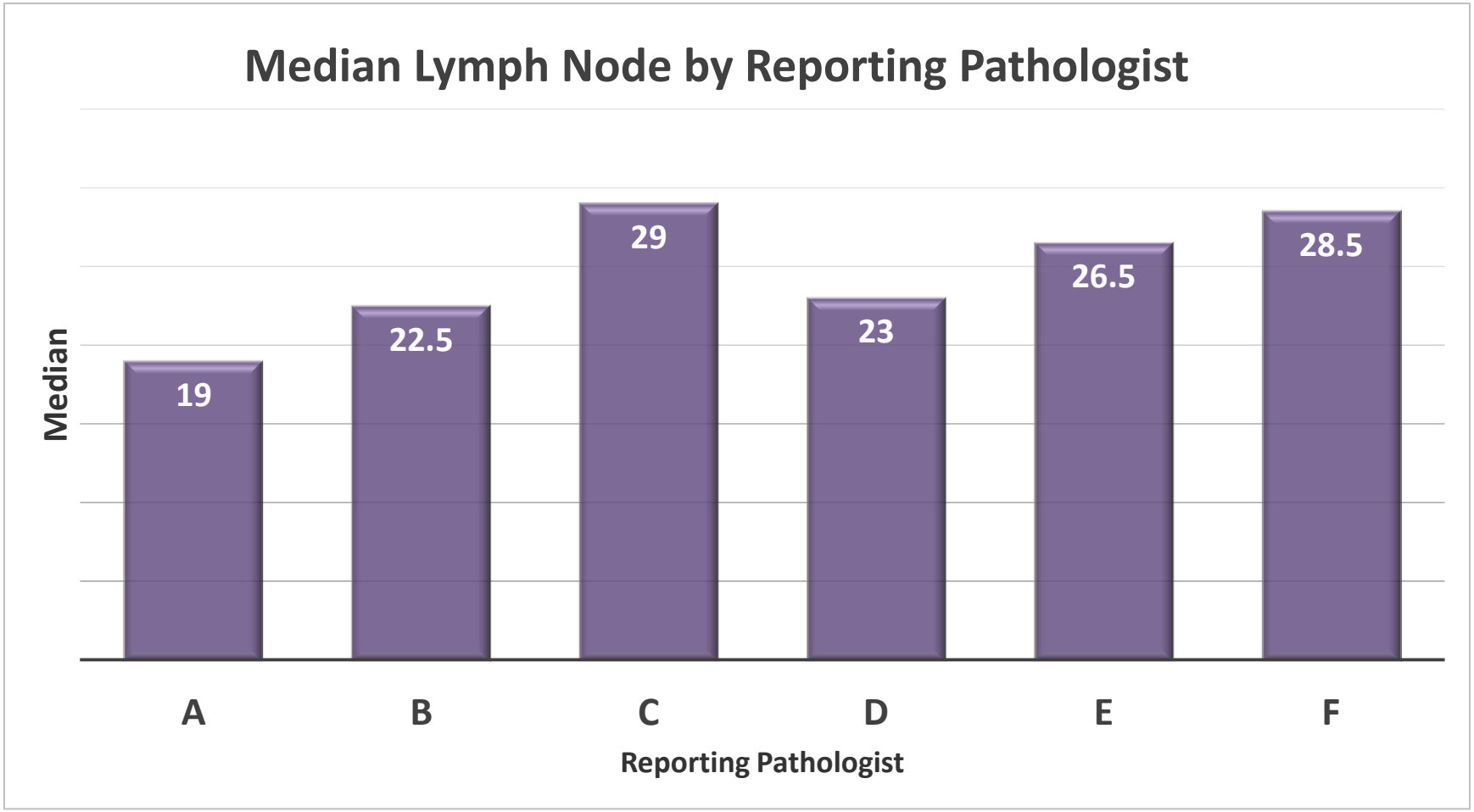
- The median number of lymph nodes examined should be greater than 12 (RCPath standard).
- This is a minimum standard with good centres in the UK finding 18 lymph nodes as a median count (15 -25) per case.
- Median number of lymph node examined in this audit is 24.
- **Range:** 1 -103 lymph nodes

Lymph node yield

Lymph Node Median Results Against Minimum RCPath Standards

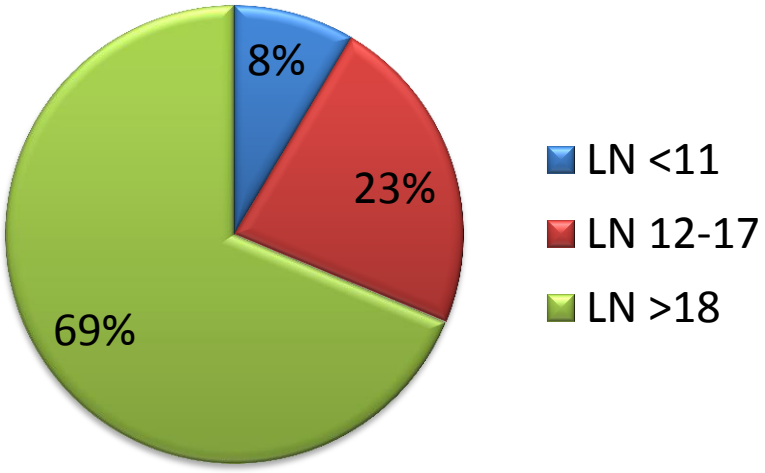


Lymph Node Yield

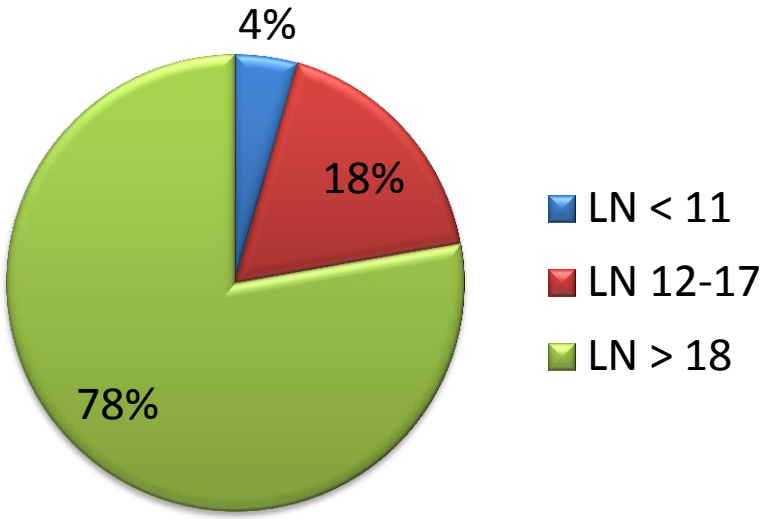


Lymph node yield in specific groups compared to previous year:

2016-2017



2017 -2018



Lymph Node Yield -Discussion

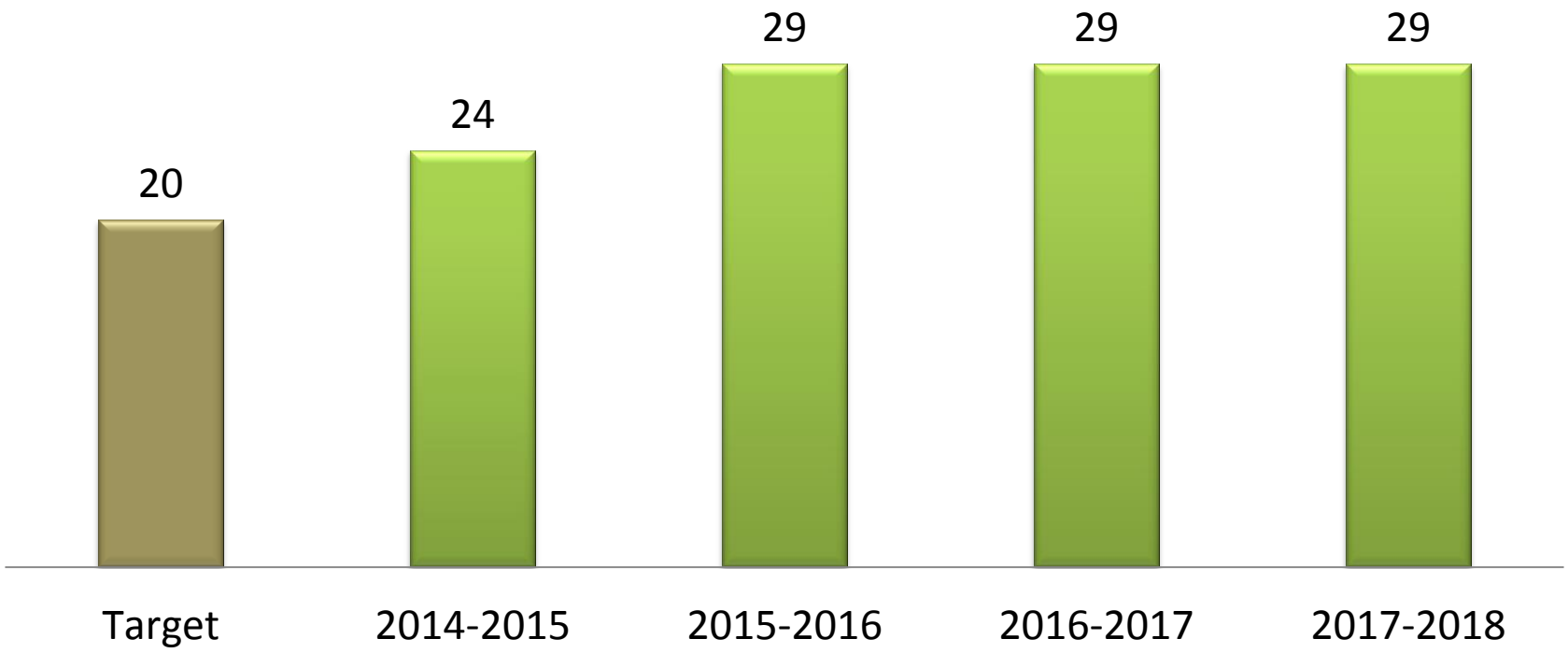
- Cases with low lymph node yield 11 or less: 8 cases (4%).
- These cases were further analysed to see the reason behind low yield
- 6/8 cases (75%) were either recurrent, or received preoperative therapy, or both. It is known that cases with neoadjuvant therapy and recurrent cases tend to show lower lymph node yield.
- The remaining two cases did not receive preoperative therapy but both showed poor prognostic features, therefore lymph node yield was not critical to influence management: namely peritoneal nodal and mesenteric nodal metastasis along with EMVI, involvement of serosa and adjacent organs in one case and tumour perforation in the other case
- Poor prognostic features were present in many of these tumour.

Serosal Involvement

- Frequency of peritoneal involvement should be at least 20% for colonic cancers (RCPath standard)
- This is minimum standard with many centres in the UK finding a frequency of peritoneal involvement of 30 - 40%.
- Assessment of percentage of rectal cases with peritoneal infiltration has been removed as quality standard, given increased use of preoperative therapy (influences rates of serosal involvement).
- Serosal involvement in colonic resections in this audit is 29% (well above minimum RCPath standard)

Serosal Involvement

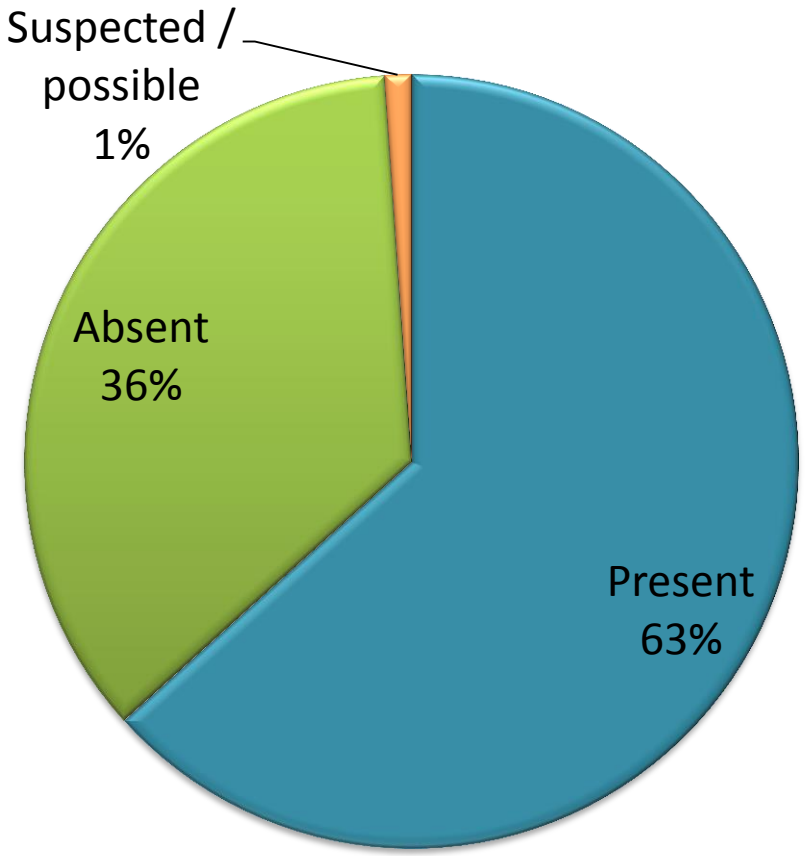
Percentage of Serosal involvement in Colonic Resections Compared to RCPath Target and Previous Years



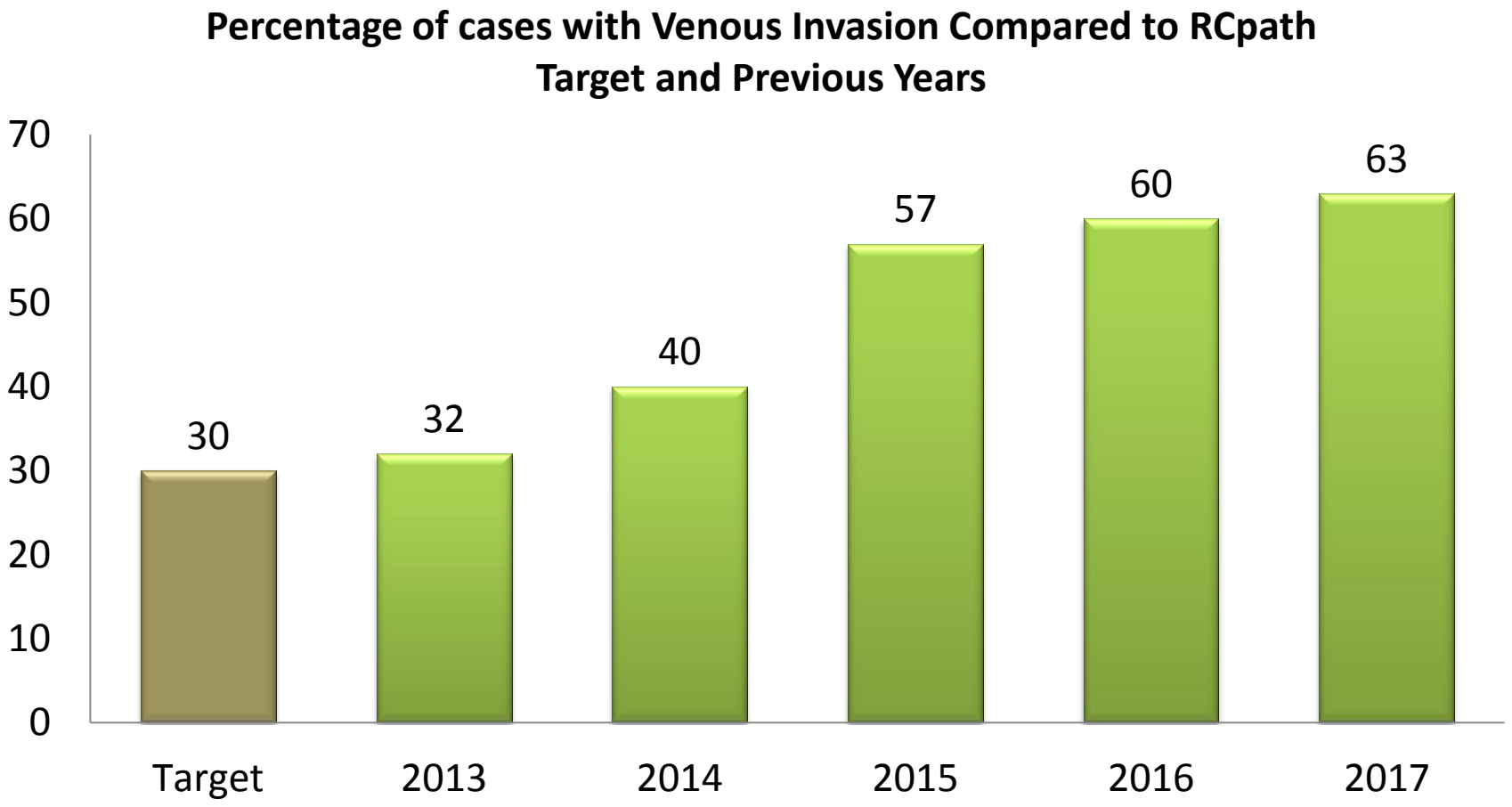
Venous Invasion

- RCPath standard: The frequency of venous invasion including intramural (submucosal and intramuscular) and extramural should be at least 30%.
- This is a minimum standard with many centres in the UK finding venous invasion over 40%.
- Venous invasion was identified in 63% of cases this year. (almost double RCPath standard).
- This has slightly increased compared to previous audit (60% in 2016).
- Deepest level of venous invasion is reported as above.

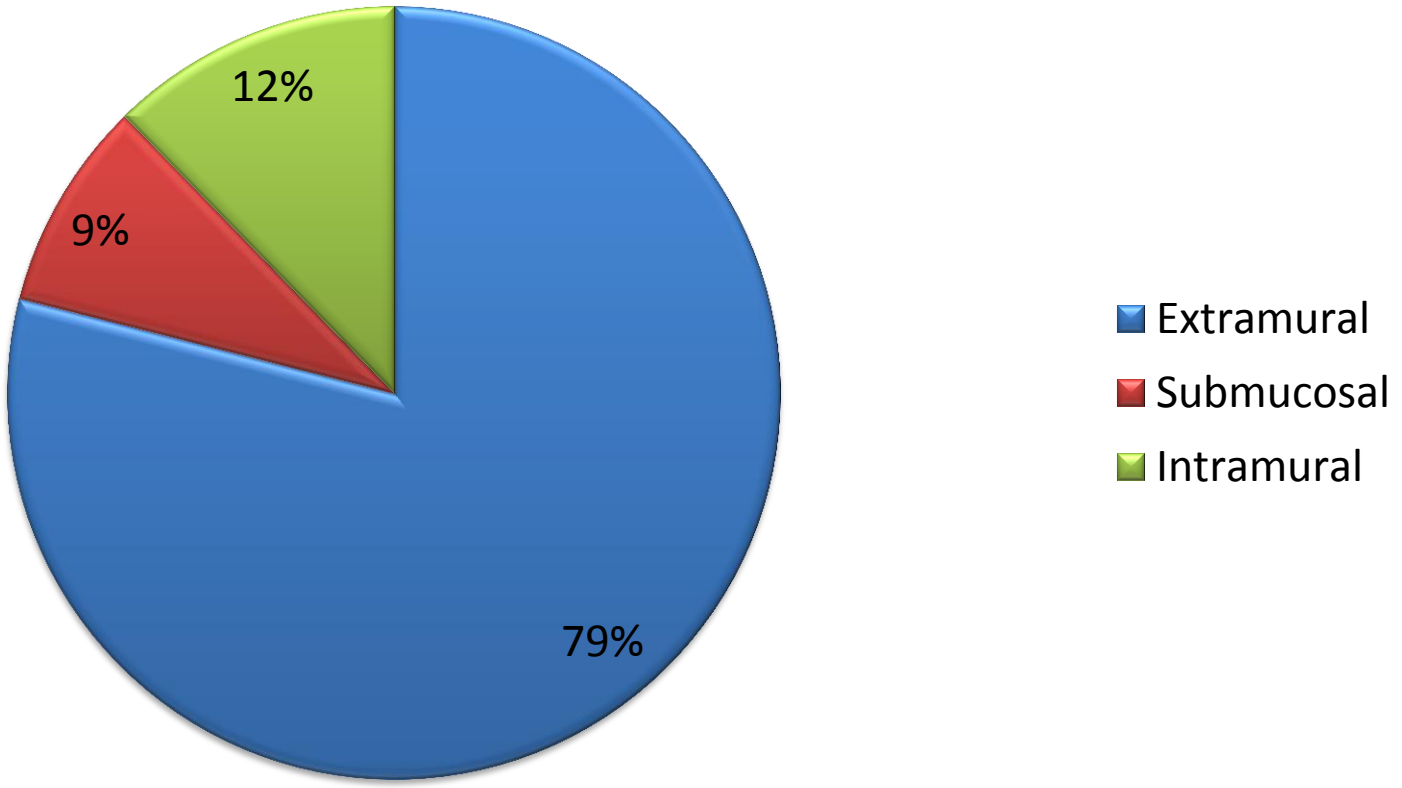
Venous Invasion 2017 -2018



Venous Invasion



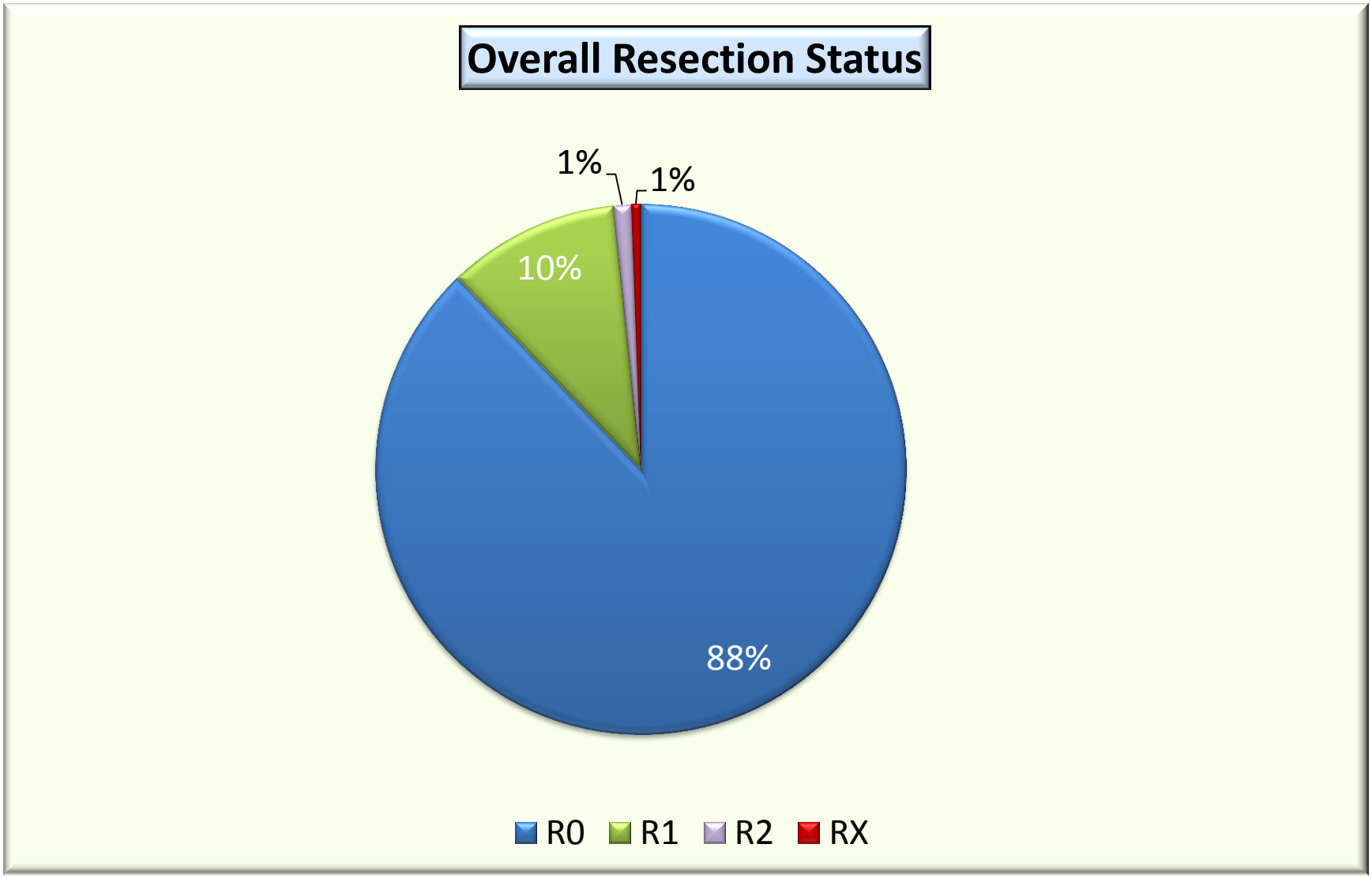
Venous Invasion



Completeness of surgical excision (R status)

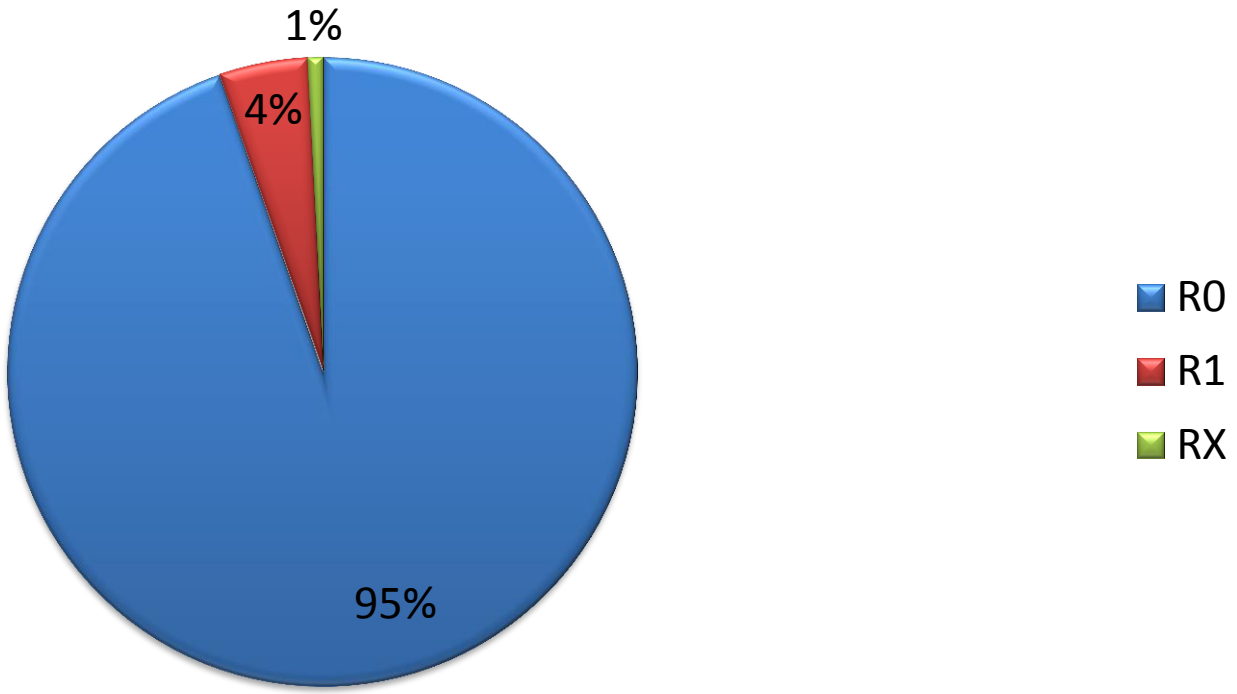
- Complete excision (R0) rates for standard cancer resections ideally should be close to 100%.
- For locally advanced or recurrent cancer international/national rates of R0 are around 60-70% in best centres.
- Overall 88% of cases are R0 (95% for standard, non locally advanced resections) this year. This is more or less similar to previous year (overall 87%, and 94% for standard in previous year)
- For locally advanced colorectal cancer resections: 69% are completely excised.

Completeness of Excision

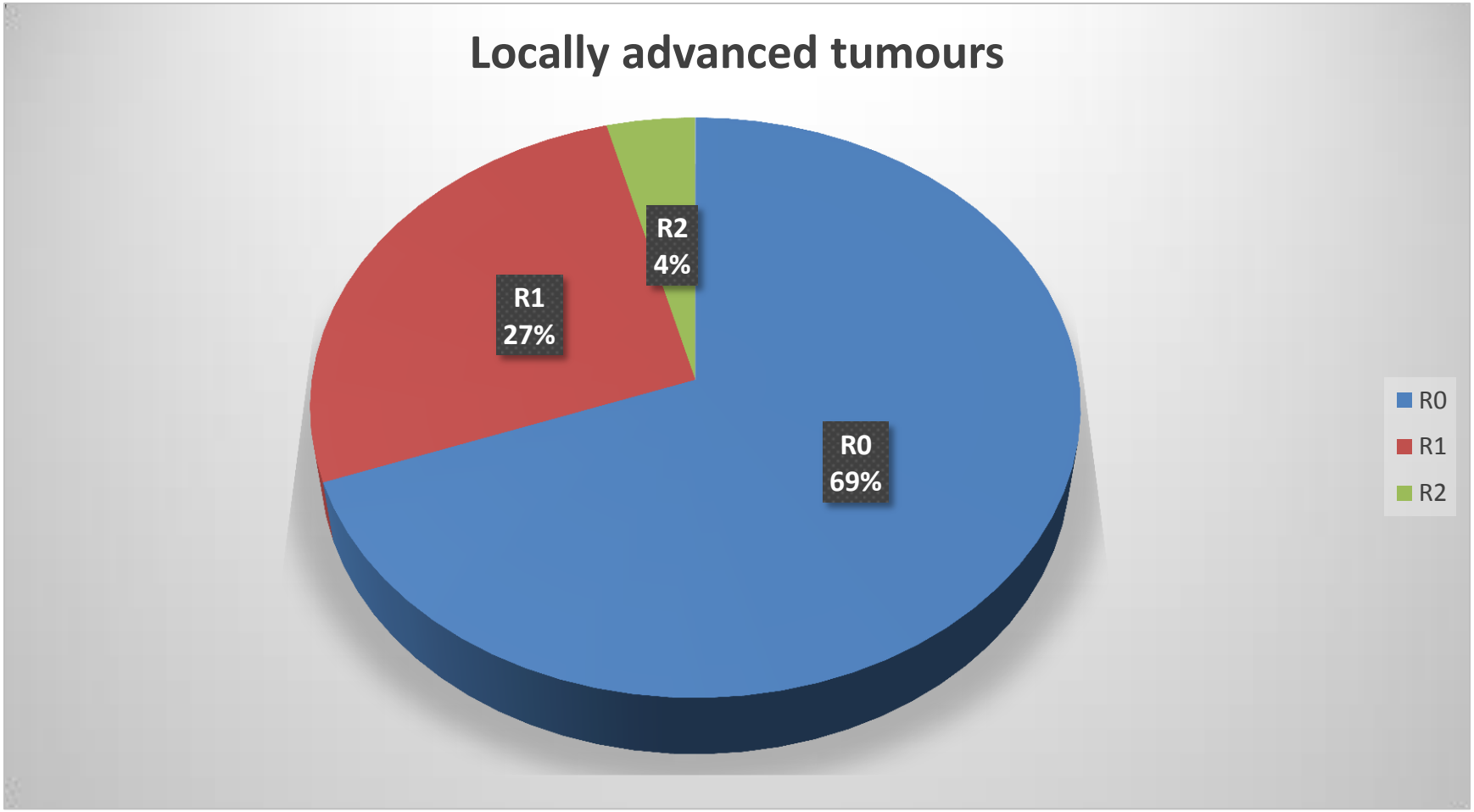


Completeness of surgical excision

Resection status after excluding perforated / locally advanced tumours (T4a and T4b)

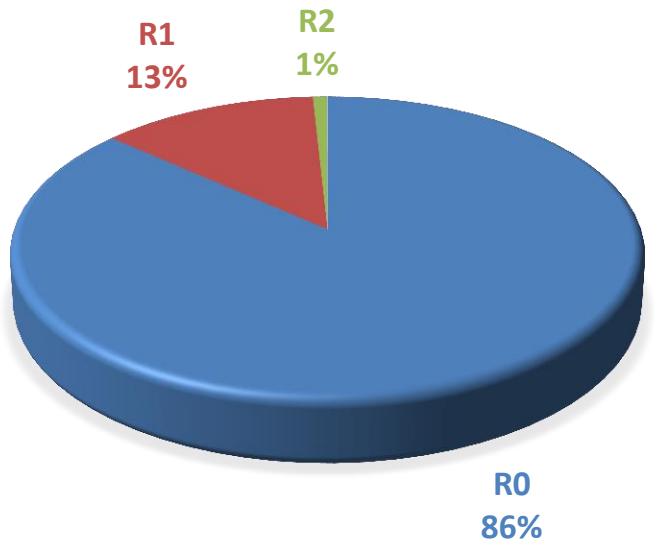


Completeness of surgical excision

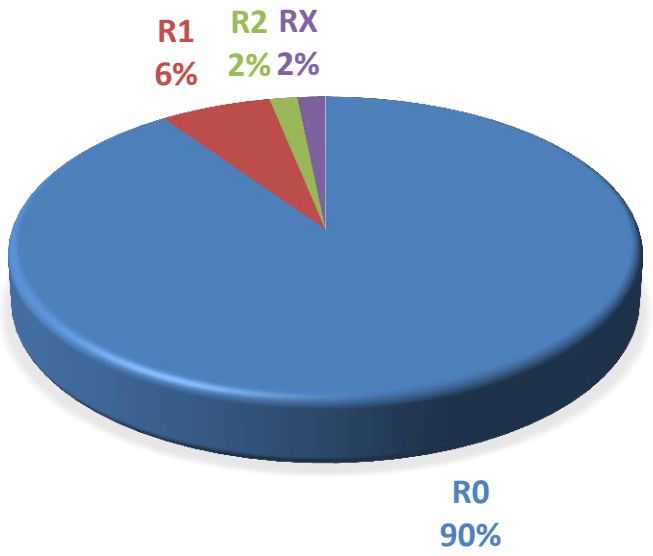


Completeness of surgical excision

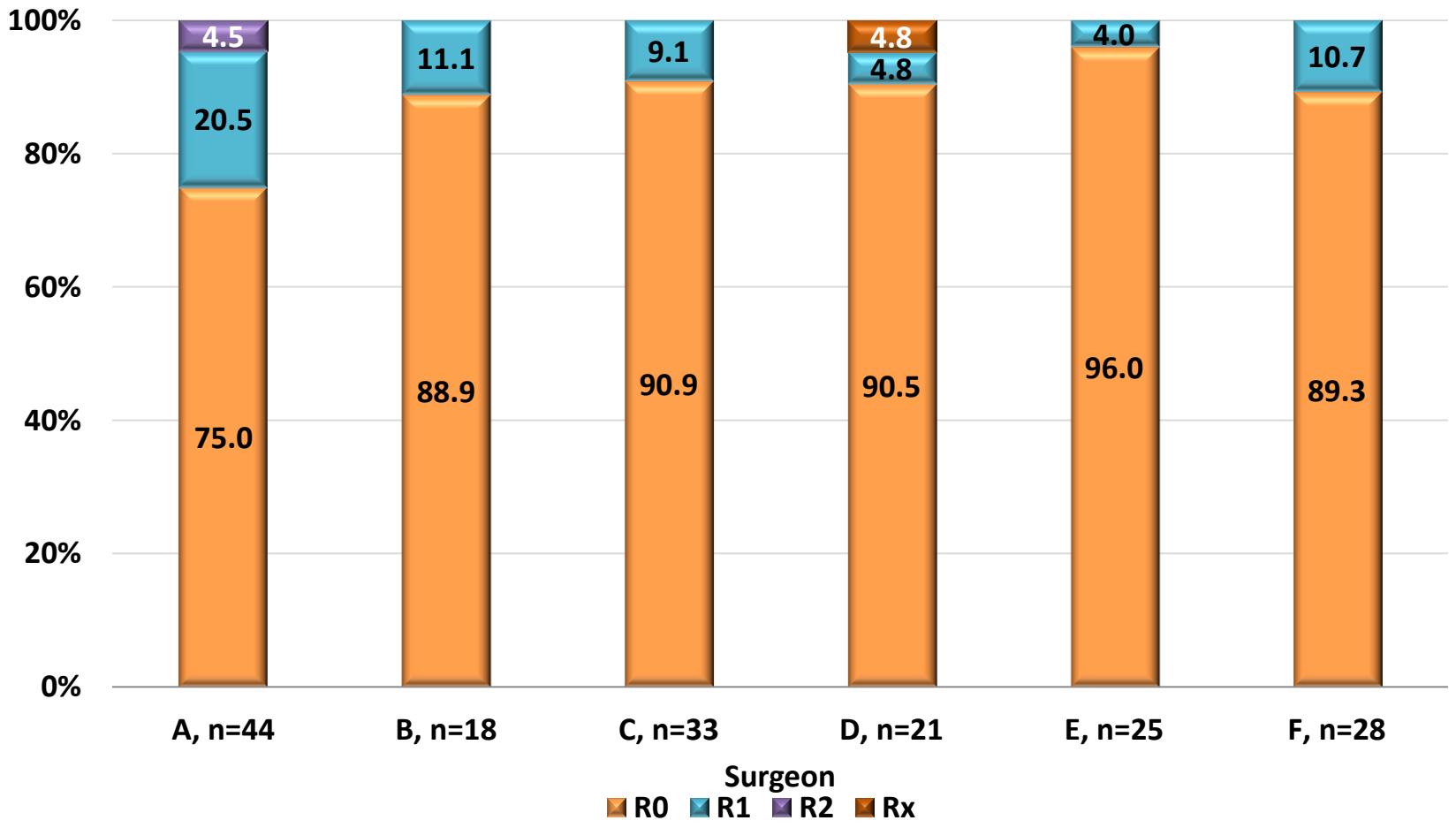
COLONIC RESECTIONS



RECTAL RESECTIONS



Completeness of surgical resection



Completeness of Excision: Discussion

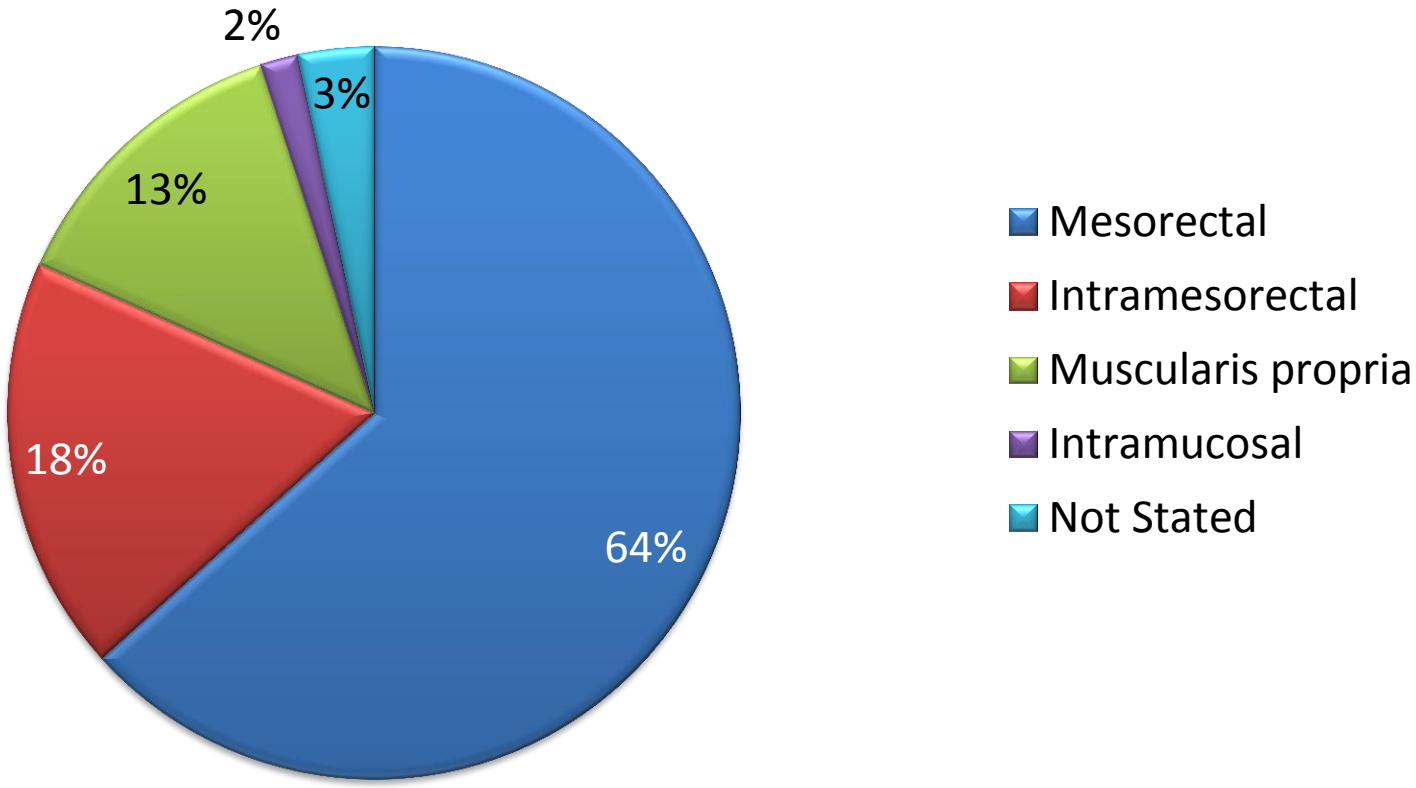
- All surgeons: R0 75% and above.
- All surgeons have R1 (one surgeon has also two R2) cases, so incomplete excision not related to specific surgeon.
- Surgeon A has highest % of R1 resections, but performed largest number of all resections and of complex surgeries (24% of all resections).
- All incompletely excised cases (19 R1 cases and 2 R2 cases) showed one or more of the following: preoperative therapy, recurrent tumour, palliative resection, lymph node or mesenteric deposit at margin, or advanced (perforation, or invading adjacent organs) cancers.

Plane of mesorectal excision in rectal resections

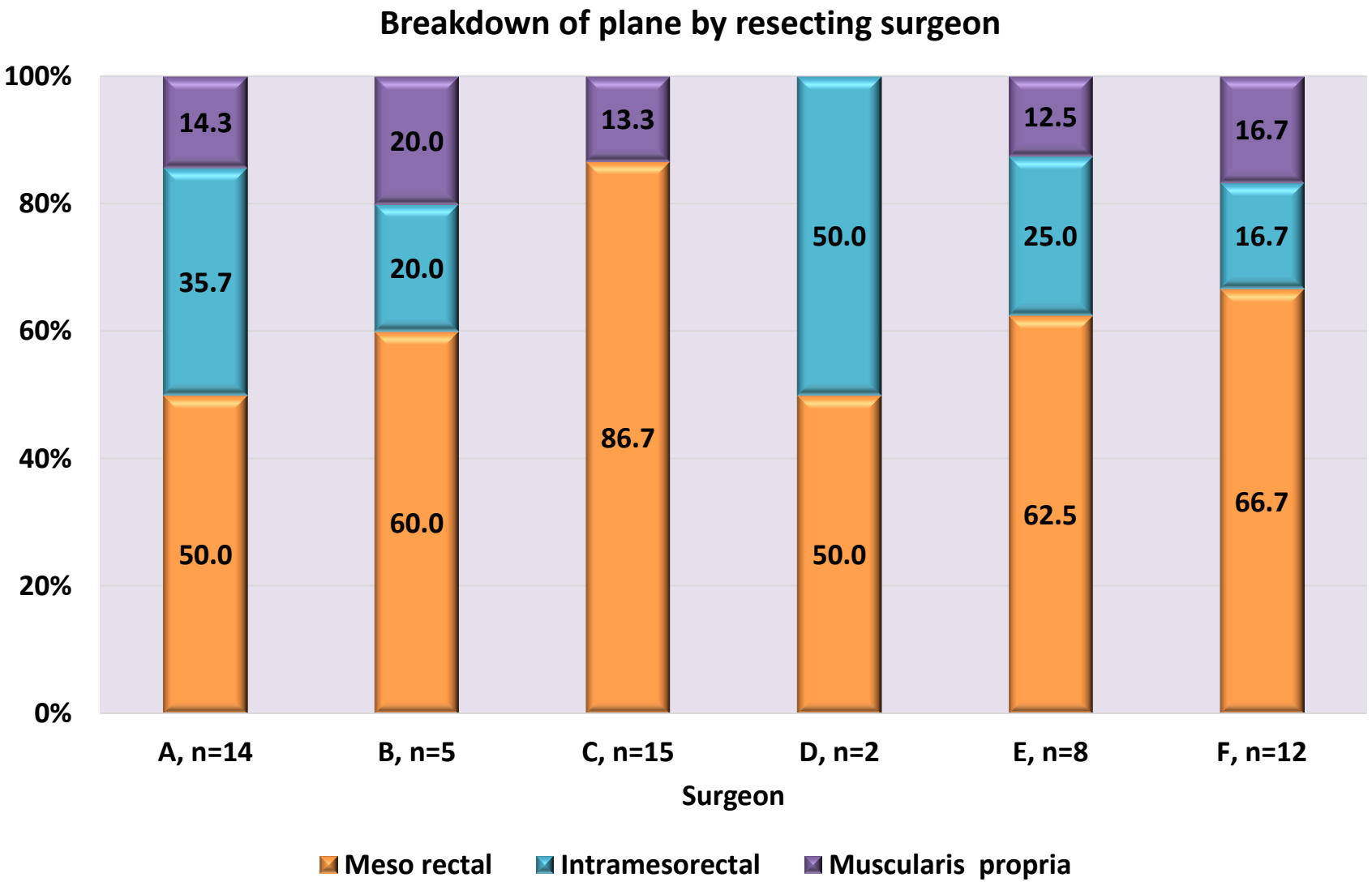
- Macroscopic assessment of the plane of excision (mesorectal, intramesorectal, and muscularis propria) of rectal cancers predicts not only margin involvement, but also local recurrence and survival.
- Excision in the mesorectal plane has the best outcome while that extending into the muscularis propria has the worst.
- Ideally all cases should have mesorectal plane of excision.

Plane of excision of rectal resections

Percentage plane of Excision in Rectal Resections (*where applicable)*



Plane of excision of rectal resections



Plane of mesorectal excision in rectal resections

Discussion

- **Mesorectal**: 38 cases. 64% of resections where plane is applicable. All surgeons: mesorectal plane 50% or above (range 50 -87%).
- **Intramesorectal:** 18% (11 cases. 5/11 – Focal)
- **Muscularis propria plane**: 13% of resections, where plane is applicable (8 cases. 7/8 - Focal). Range of 0 - 20% per surgeon. Not related to a specific surgeon. *Out of 8 cases,* 3 cases received preoperative therapy, 1 case is a recurrent cancer, and 1 described as difficult operation due to scarring.
- **Intramucosal**: 1 case. 2%
- NS/NA: 4 cases. 3%

Plane of mesorectal excision in rectal resections: Discussion

Completeness of Excision & Plane of Resection (All Rectal N=62)

Plane of Excision	Number of cases	Excision Status
Mesorectal	38	R0: 38 cases (ALL) R1,R2, and Rx: None
Intramesorectal	11	R0: 6 cases R1: 4 cases R2: 0 RX: 1 case
Muscularis propria	8	R0: 8 cases (ALL) R1,R2, and Rx: None
Intramucosal	1	R2: 1 case (R0, R1,RX: none)
NS/NA	4	R0: 4 cases (ALL)

Plane of mesorectal excision in rectal resections: Discussion

Completeness of Excision and Plane of Resection (Advanced Rectal. N=10):

Plane of Excision	Number of cases	Excision status
Mesorectal	5	R0: 5 cases (ALL) R1, R2, and Rx: None
Intramesorectal	4	R0: 1 case R1: 3 cases R2 and Rx: None
Muscularis propria	0	
Intramucosal	1	R2:1 case (All) R0,R1, and Rx: None
NS/NA	0	

MSI/MMR testing

- MMR status is important for clinical management and prognosis.
- There is now strong evidence that MMR-deficient tumours have a better prognosis than MMR-proficient tumours and metastasise less than MMR-proficient tumours.
- They frequently demonstrate mucinous differentiation or medullary features.
- MMR deficiency is found in approximately 15% of all colorectal cancers, most commonly sporadic and occasionally as a manifestation of a germline MMR gene mutation in patients with Lynch syndrome (around 3% of all colorectal cancers. usually in patients aged < 50 year)

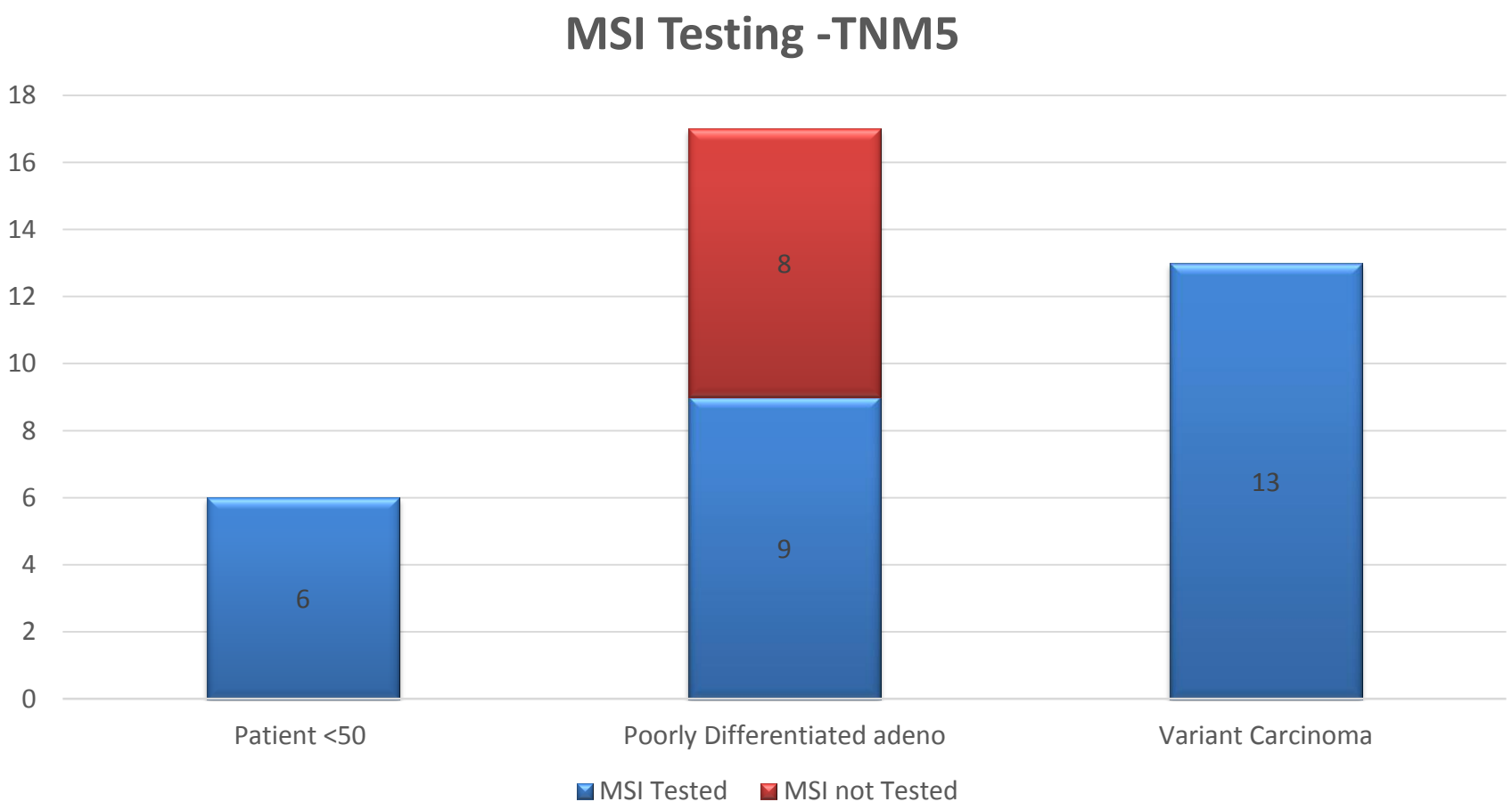
MSI/MMR testing

- Testing used to be performed ideally in all cases where patient is younger than 50 years old and/or with poorly differentiated morphology or special variants and/or with possible Lynch Syndrome.
- The RCPath guidance now recommends routine testing of tumour tissue at the time of diagnosis for deficient MMR status
- MSI IHC is done in all cases and if abnormal, tissue is sent for molecular testing: PCR for MMR and BRAF mutations.
- MSI/MMR tumour status, with an indication if the patient needs to undergo further testing for Lynch syndrome is part of RCPath core data items.

MSI Testing

- TNM5 78% of target cases were tested (cases send for testing according to certain criteria)
- TNM8 87% of cases were tested (ideally all cases should be tested). Expected to rise.

MSI Reporting

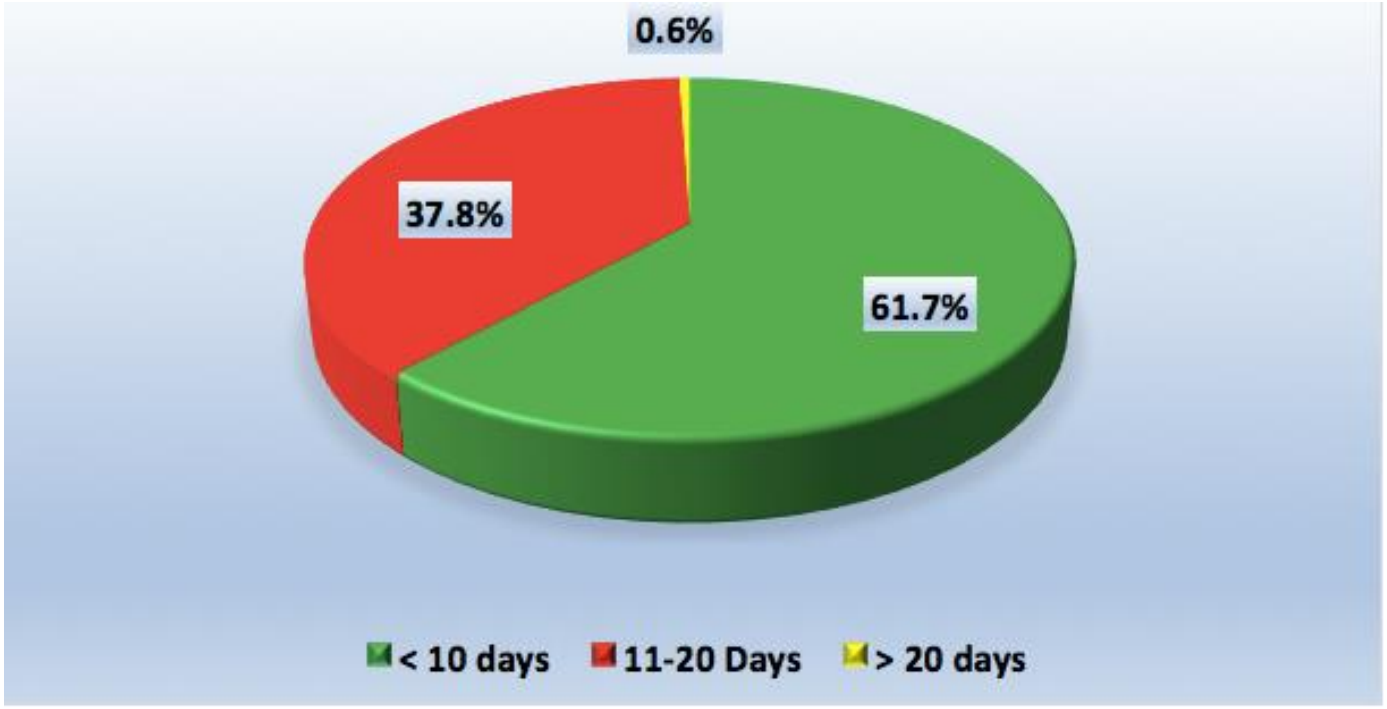


Turnaround Times

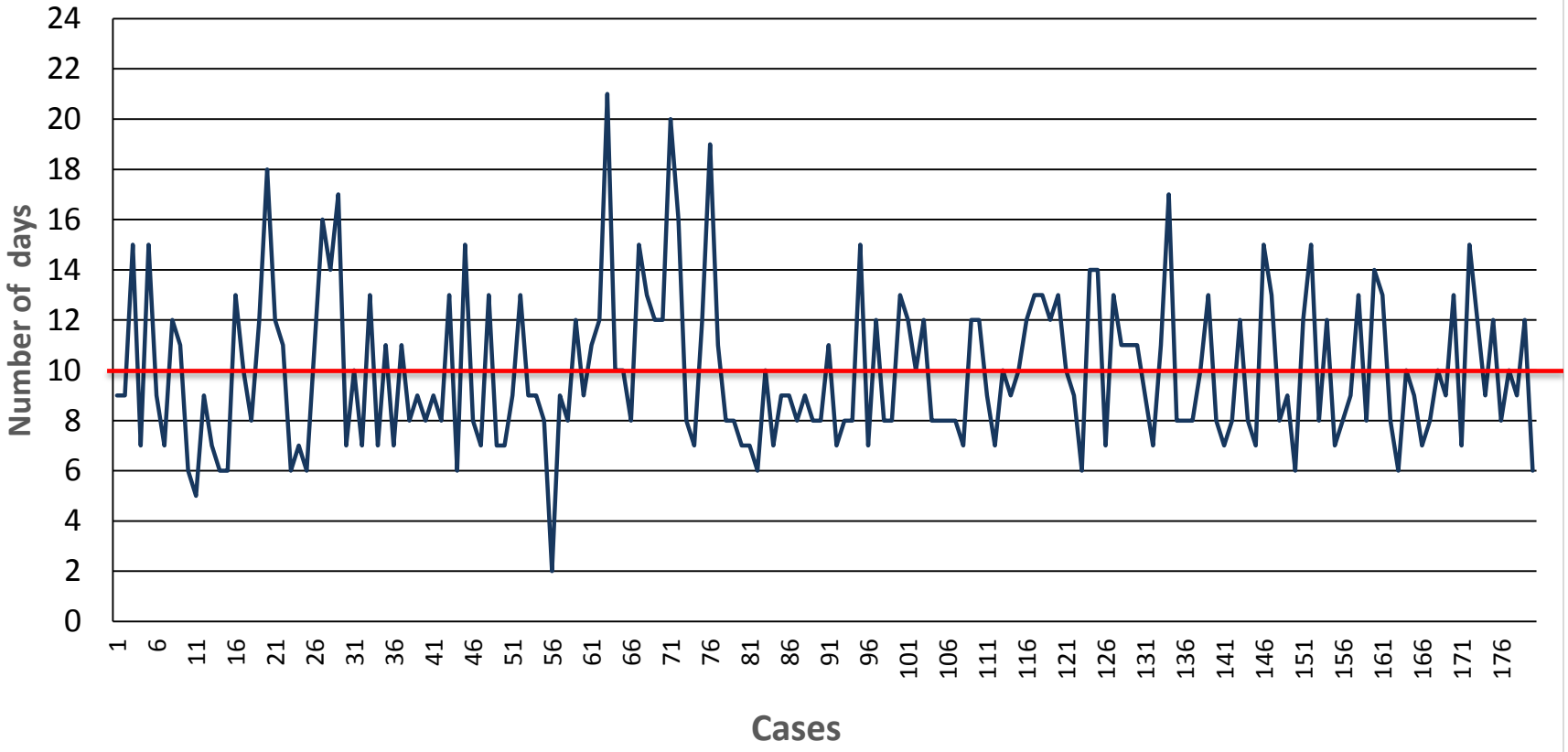
- The recommended minimum standard for surgical resection case is **90%** authorised within **10** working days (from date of receipt in laboratory - day zero).
- Local turnaround agreements for **cancer resections is within 20 days**. (require long time for fixation, trimming etc).

Turnaround times

Range: 2-21 days (3-63 previous year). Median 9 days (1 days less than previous year)
Cases authorised within 10 days: 61.7%
Cases authorised within 20 days: 99.5% nearly all (one remaining case authorised in 21 days)



Turnaround times



Proforma Compliance

All cases (100%) were reported using proforma (standard: 95% of reports should contain structured data)

There was some errors / omissions:

- Three cases with incorrected SNOMED T code (rectum vs colon).
- 23 cases where overall clinical stage was not stated (was a local agreement for all colorectal cases before new dataset/ TNM5)
- Duke's stage was not stated in 1 case (previously required -TNM5)
- Two cases with incorrect staging (typo? / New TNM staging)
- Macroscopic assessment of tumour perforation was not clear in some cases (confused with serosal involvement)

- This audit shows that all RCPath standard requirements are met (lymph node yield, serosal and venous invasion rates), mostly well above the minimum requirement and at the level expected at good UK centres.
- 95% of standard (non-locally advanced) colorectal resections are completely excised (R0). 69% of advanced cancer cases are R0; hence in line with national and international standards in best centres.
- *MSI testing :* 78% (TNM5), 87% (TNM8) of cases before and after new datasets were tested, respectively. Expected to increase dramatically. Aim for all cases to be tested and implement measures to ensure that.
- *Proforma: used in 100% cases.* Aim for better definition of perforated tumour in macroscopic proforma.

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References:

- RCPath Dataset for colorectal cancer histopathology reports, December 2017. Document number G049