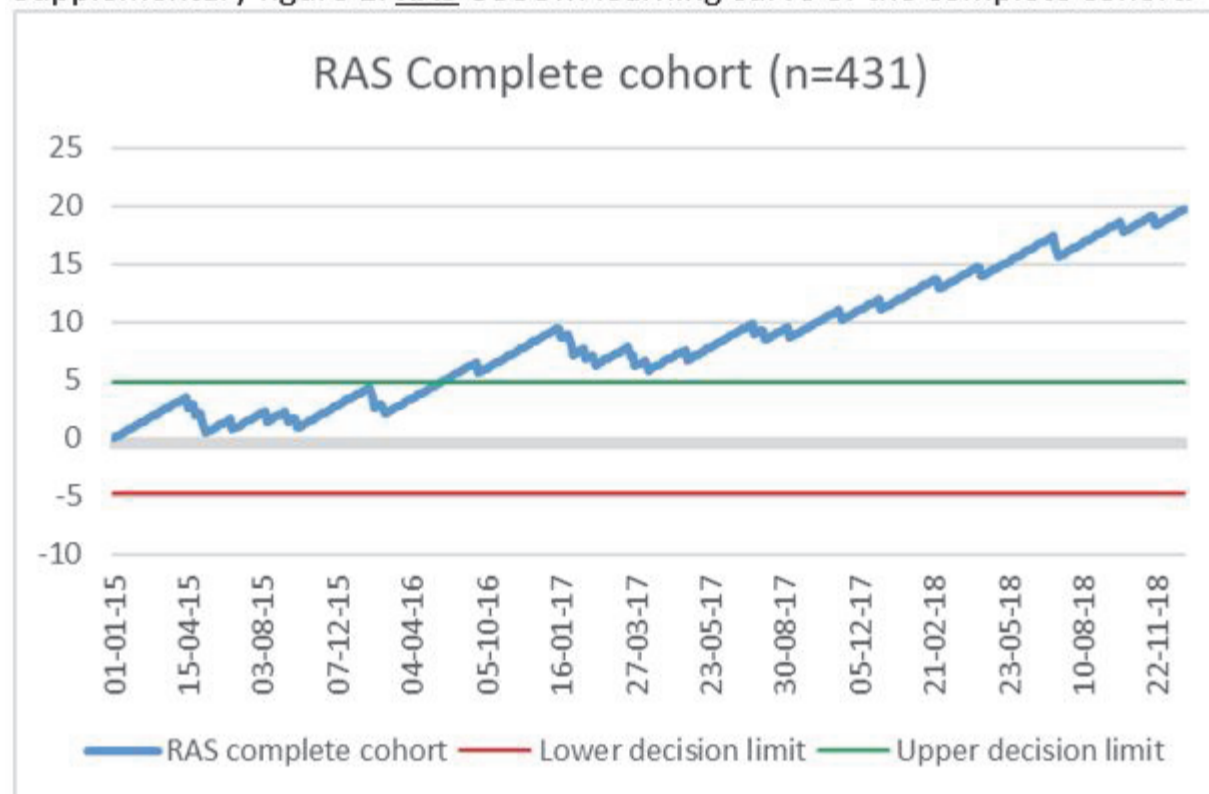
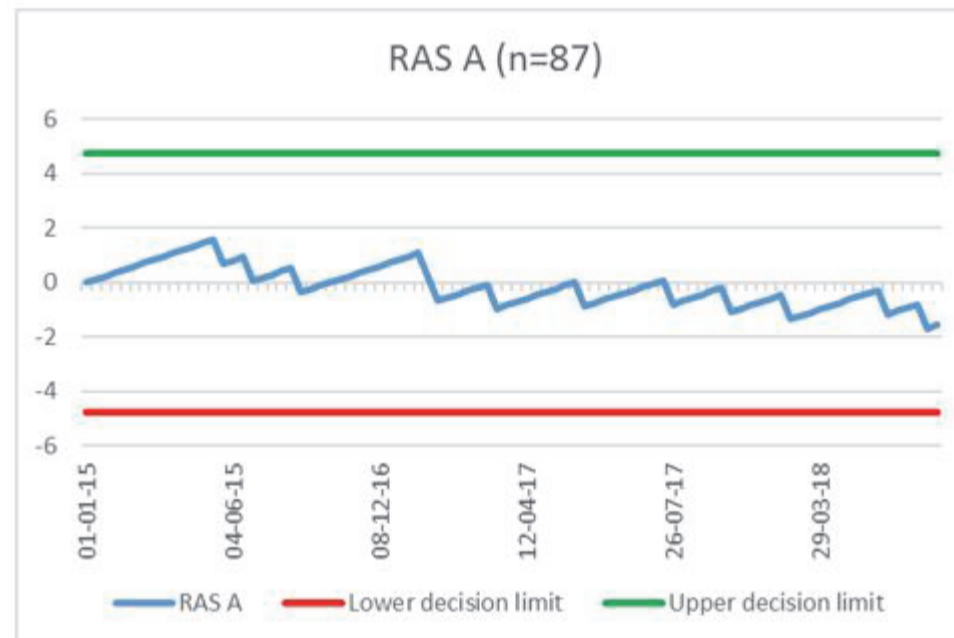


Supplementary material

Supplementary figure 1. **RAS** CUSUM learning curve of the complete cohort.

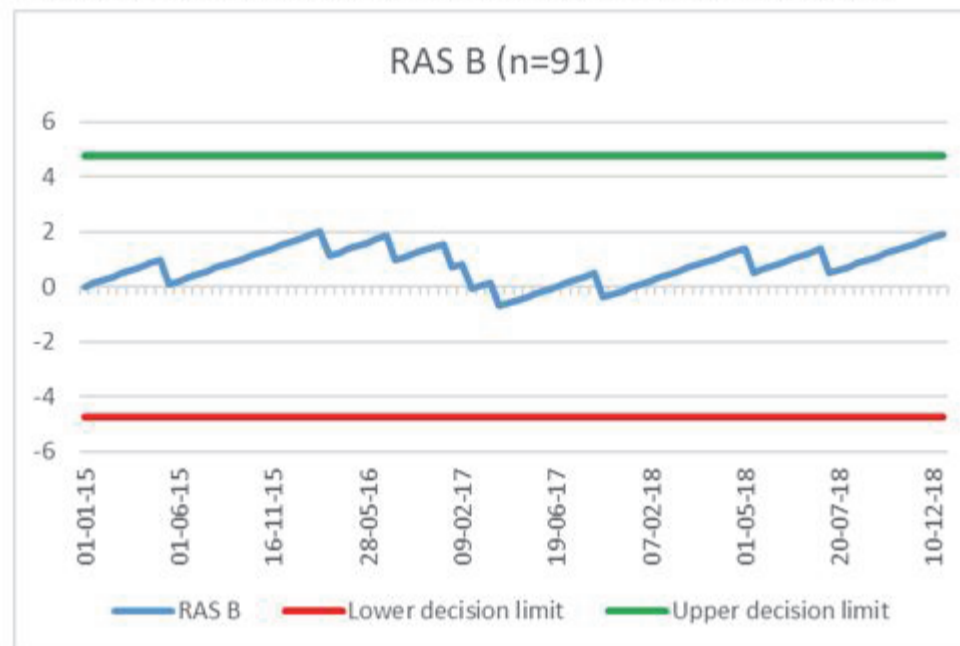
RAS: rate of adequate sample

Supplementary material

Supplementary figure 2. **RAS** CUSUM curve of hospital A.

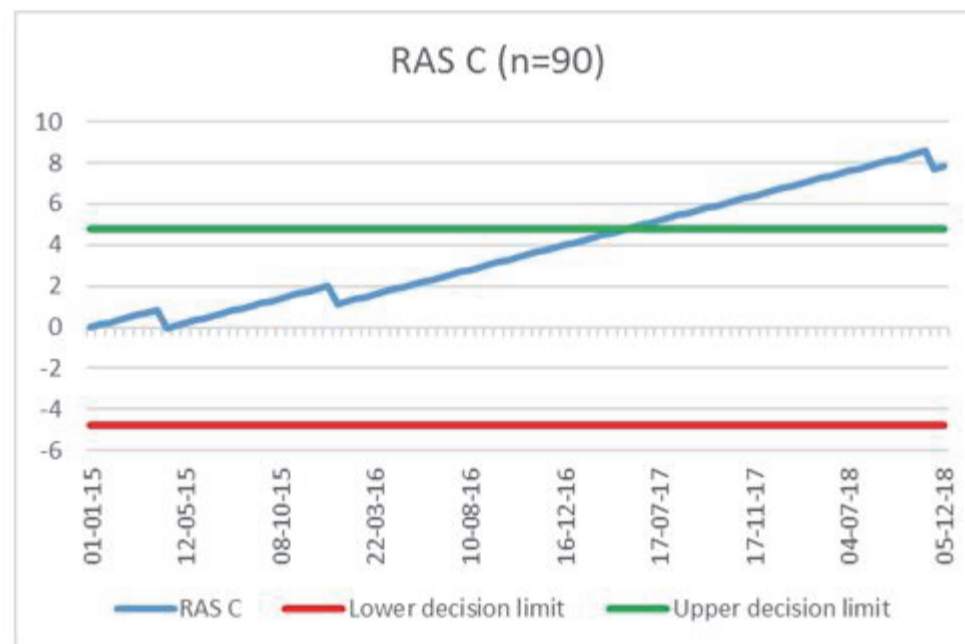
RAS: rate of adequate sample

Supplementary material

Supplementary figure 3. **RAS** CUSUM curve of hospital B.

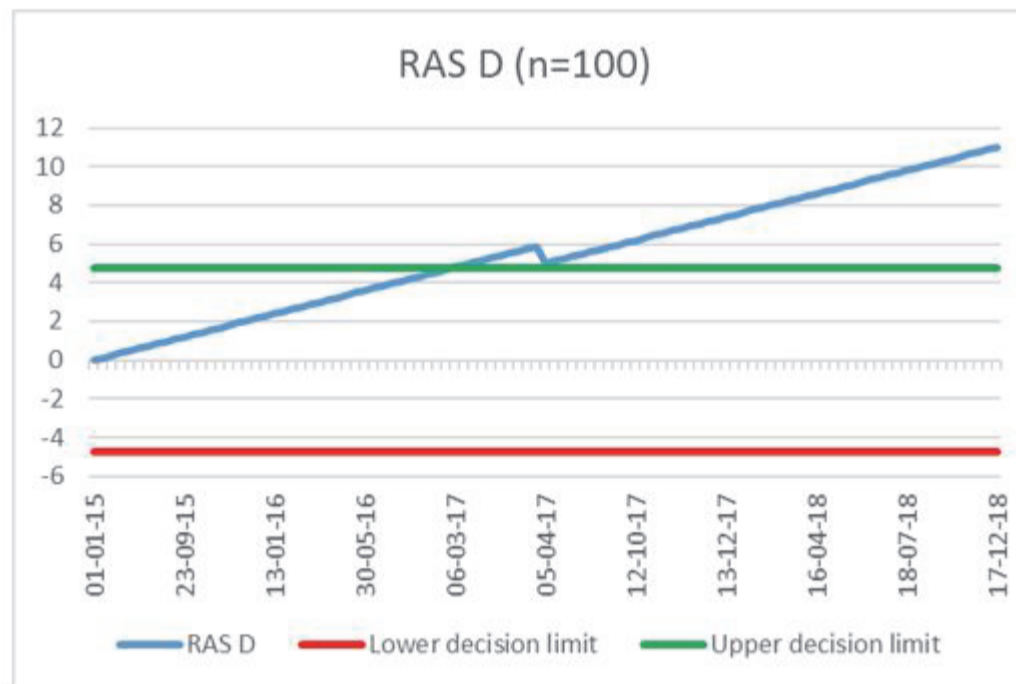
RAS: rate of adequate sample

Supplementary material

Supplementary figure 4. **RAS** CUSUM curve of hospital C.

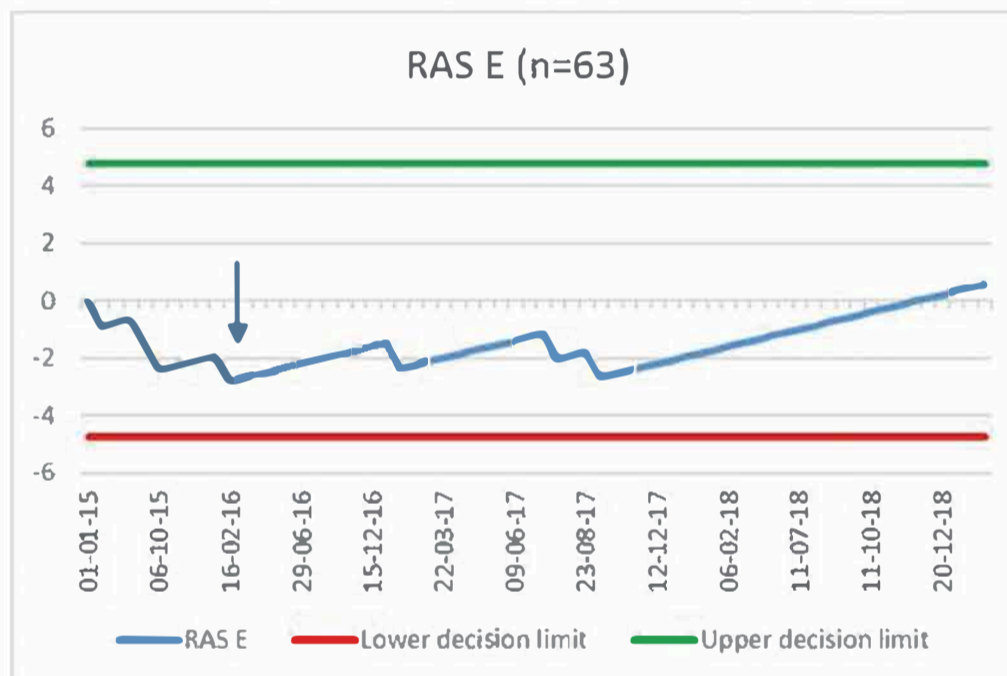
RAS: rate of adequate sample

Supplementary material

Supplementary figure 5. **RAS** CUSUM curve of hospital D.

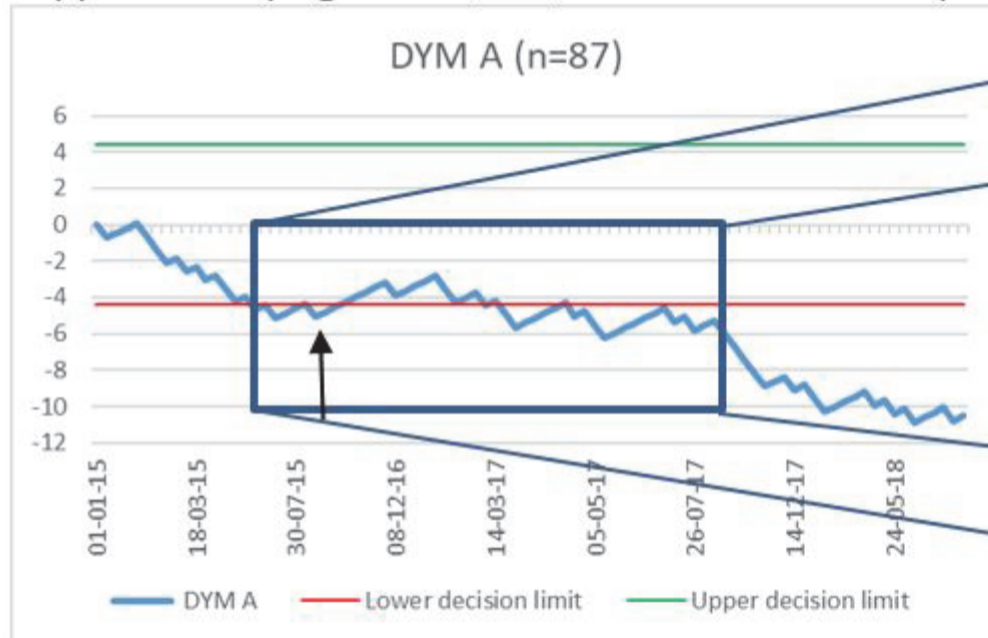
RAS: rate of adequate sample

Supplementary material

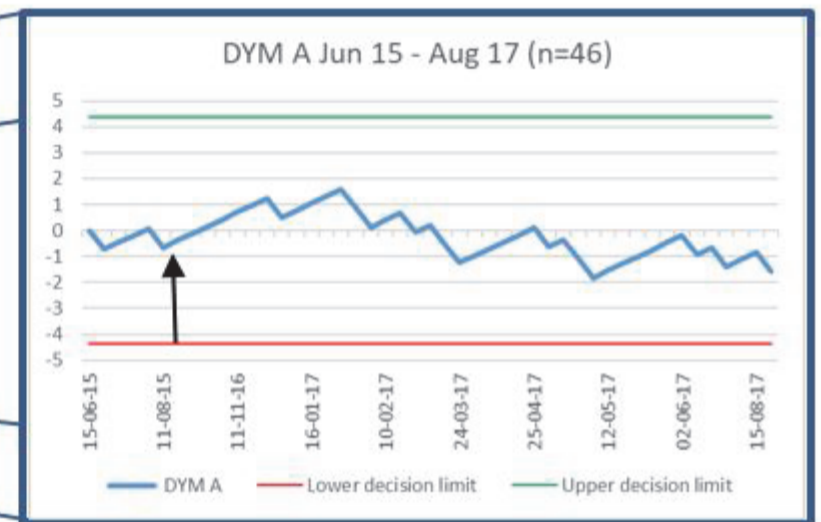
Supplementary figure 6. **RAS** CUSUM curve of hospital E.

Black arrow marks the introduction of ROSE regularly.
RAS: rate of adequate sample

Supplementary material

Supplementary figure 7a. **DYM** CUSUM curve of hospital A.

Supplementary figure 7b.



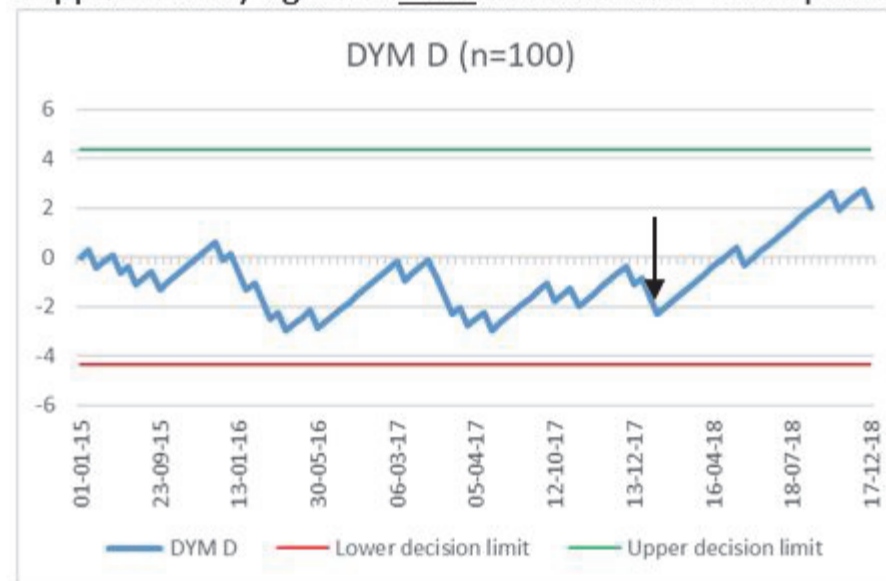
a: period Jan 2015 – Dec 2018

b: period June 2015 – Aug 2017

Black arrow marks the introduction of ROSE regularly.

DYM: diagnostic yield of malignancy

Supplementary material

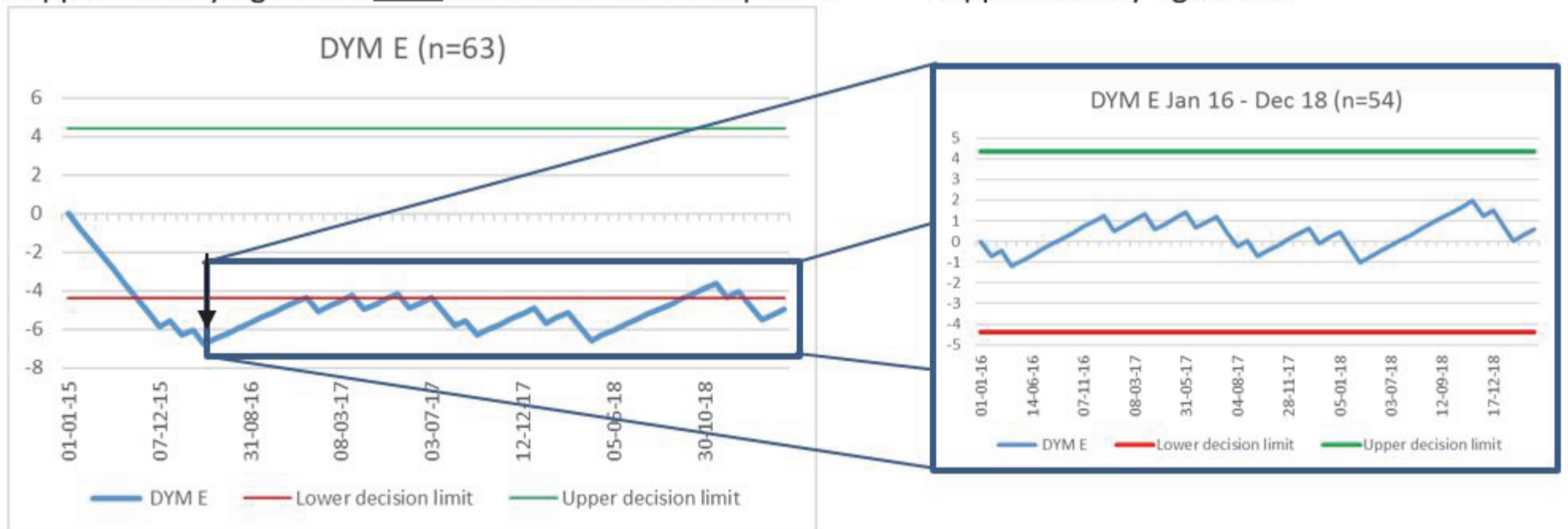
Supplementary figure 8. **DYM** CUSUM curve of hospital D.

Black arrow marks the introduction of ROSE regularly.
DYM: diagnostic yield of malignancy

Supplementary material

Supplementary figure 9a. **DYM** CUSUM curve of hospital E.

Supplementary figure 9b.



a: period Jan 2015 – Dec 2018

b: period Jan 2016 – Dec 2018

Black arrow marks the introduction of ROSE regularly

DYM: diagnostic yield of malignancy

Supplementary material

Supplementary tables

Supplementary table 1. RAS, rate of atypia, DYM and SFM before, during and after a period of absence of a senior pathologist in hospital C.

Period	RAS	Rate of atypia	DYM	SFM
Before 12-05-2017 (n=53)	51 (96%)	2 (4%)	38 (72%)	81%
Between 12-05-2017 and 12-09-2017 (n=10)	10 (100%)	4 (40%)	2 (20%)	40%
After 12-09-2017 (n=27)	26 (96%)	3 (11%)	19 (70%)	83%

RAS: rate of adequate sample

DYM: diagnostic yield of malignancy

SFM: sensitivity for malignancy

Supplementary material

Supplementary table 2. RAS, DYM en SFM per year, per hospital

Period	2015 - 2018				2015				2016				2017				2018			
Hospital	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM
A	87	<u>75</u> (86%)	53 (61%)	68%	23	<u>20</u> (87%)	12 (52%)	55%	8	<u>8</u> (100%)	<u>7</u> (88%)	88%	39	<u>33</u> (85%)	23 (59%)	70%	17	14 (82%)	11 (65%)	69%
B	91	<u>82</u> (90%)	57 (63%)	71%	24	<u>33</u> (96%)	12 (50%)	52%	13	<u>11</u> (85%)	7 (54%)	64%	18	14 (78%)	11 (61%)	73%	36	<u>34</u> (94%)	<u>27</u> (75%)	<u>87%</u>
C	90	<u>87</u> (97%)	59 (66%)	79%	24	<u>23</u> (96%)	<u>18</u> (75%)	<u>90%</u>	27	<u>26</u> (96%)	18 (67%)	72%	23	<u>23</u> (100%)	12 (52%)	75%	16	<u>15</u> (94%)	11 (69%)	79%
D	100	<u>99</u> (99%)	<u>75</u> (75%)	<u>87%</u>	18	<u>18</u> (100%)	<u>13</u> (72%)	<u>87%</u>	18	<u>18</u> (100%)	12 (67%)	80%	34	<u>33</u> (97%)	<u>25</u> (74%)	83%	30	<u>30</u> (100%)	<u>25</u> (83%)	<u>96%</u>
E	63	<u>56</u> (89%)	41 (65%)	73%	9	6 (67%)	1 (11%)	20%	12	<u>11</u> (92%)	<u>10</u> (83%)	83%	22	<u>19</u> (86%)	15 (68%)	71%	20	<u>20</u> (100%)	<u>15</u> (75%)	83%
Total cohort	431	<u>399</u> (93%)	285 (66%)	76%	98	<u>90</u> (92%)	56 (57%)	66%	78	<u>74</u> (95%)	54 (69%)	76%	136	<u>122</u> (90%)	86 (63%)	75%	119	<u>113</u> (95%)	<u>89</u> (75%)	<u>85%</u>

Italics and underlined: equal or above ASGE performance target.

RAS: rate of adequate sample

DYM: diagnostic yield of malignancy

SFM: sensitivity for malignancy

Supplementary material

Supplementary table 3. Key performance indicators for both FNA and FNB.

Needle type	Total				2015				2016				2017				2018			
	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM	Number of procedures	RAS	DYM	SFM
FNA	282	93%	67%	75%	57	95%	58%	60%	50	96%	72%	80%	93	87%	62%	73%	82	95%	74%	86%
FNB	127	95%	69%	82%	26	92%	73%	95%	27	96%	67%	72%	39	95%	62%	77%	35	94%	77%	84%

RAS: rate of adequate sample

DYM: diagnostic yield of malignancy

SFM: sensitivity for malignancy

FNA: fine needle aspiration

FNB: fine needle biopsy