

Supplementary Appendix 1. Feedback on individual colonoscopy quality indicators presented in a league table.

		Name and Surname	No.	ADR %	CIR %
ADR ≥ 30% and CIR ≥ 95%	1		62	53.2%	98.4%
	2		148	45.9%	99.3%
	3		153	44.4%	98.7%
	4	Xxxxx XXXXXXXXXXXXXXXXXXXX	53	41.5%	100.0%
	5		94	40.4%	95.7%
	6		219	39.3%	100.0%
	7		125	39.2%	97.6%
	8		75	38.7%	96.0%
	9		50	38.0%	98.0%
	10		383	35.8%	99.5%
	11		94	35.1%	97.9%
	12		120	35.0%	99.2%
	13		497	34.2%	99.6%
	14		204	32.4%	98.5%
	15		149	32.2%	100.0%
	16		53	32.1%	100.0%
	17		75	32.0%	96.0%
	18		93	31.2%	96.8%
	19		135	31.1%	97.0%
	20		295	30.8%	99.0%
	21		65	30.8%	98.5%
	22		108	30.6%	98.1%
	23		33	30.3%	97.0%
	24		124	29.8%	96.0%
	25		74	29.7%	97.3%
	26		307	29.6%	99.0%
ADR ≥ 25% < 30% and CIR ≥ 95%	27		148	29.1%	98.6%
	28		59	28.8%	94.9%
	29		87	28.7%	96.6%
	30		84	28.6%	98.8%
	31		303	28.4%	99.0%
	32		115	27.8%	98.3%
	33		36	27.8%	97.2%
	34		184	27.7%	97.8%
	35		65	27.7%	100.0%
	36		47	27.7%	100.0%
	37		120	27.5%	96.7%
	38		143	27.3%	96.5%
	39		77	27.3%	96.1%
	40		400	27.3%	97.8%
	41		182	26.9%	99.5%
	42		289	26.6%	99.3%
	43		214	26.6%	98.6%
	44		140	26.4%	97.9%
	45		145	26.2%	99.3%

	46		340	26.2%	99.1%
	47		100	26.0%	96.0%
	48		185	25.9%	98.9%
	49		336	25.3%	98.2%
	50		335	25.1%	99.4%
	51		96	25.0%	99.0%
	52		56	25.0%	100.0%
	53		36	25.0%	97.2%
	54		36	25.0%	100.0%
	55		399	24.6%	97.7%
ADR \geq 20% < 25% and CIR \geq 95%	56		298	24.5%	99.3%
	57		147	24.5%	97.3%
	58		78	24.4%	94.9%
	59		87	24.1%	96.6%
	60		258	24.0%	97.7%
	61		139	23.7%	97.1%
	62		297	23.6%	99.0%
	63		192	23.4%	97.9%
	64		94	23.4%	98.9%
	65		235	23.3%	97.4%
	66		165	23.0%	98.2%
	67		96	22.9%	100.0%
	68		599	22.9%	99.8%
	69		35	22.9%	100.0%
	70		66	22.7%	97.0%
	71		44	22.7%	100.0%
	72		304	22.7%	96.1%
	73		141	22.7%	95.0%
	74		115	22.6%	100.0%
	75		164	22.6%	100.0%
	76		240	22.5%	94.6%
	77		67	22.4%	95.5%
	78		282	22.3%	99.3%
	79		94	22.3%	98.9%
	80		239	22.2%	97.9%
	81		154	22.1%	96.8%
	82		436	22.0%	96.8%
	83		100	22.0%	98.0%
	84		91	22.0%	95.6%
	85		201	21.9%	100.0%
	86		32	21.9%	96.9%
	87		1026	21.7%	97.0%
	88		97	21.6%	97.9%
	89		125	21.6%	96.8%
	90		51	21.6%	96.1%
	91		158	21.5%	97.5%
	92		256	21.5%	98.8%

	93		177	21.5%	95.5%
	94		212	21.2%	97.6%
	95		408	20.8%	97.3%
	96		584	20.5%	97.3%
	97		258	20.5%	94.6%
	98		370	20.5%	95.7%
	99		386	20.2%	98.2%
	100		104	20.2%	98.1%
	101		139	20.1%	99.3%
	102		115	20.0%	99.1%
	103		100	20.0%	99.0%
	104		40	20.0%	97.5%
	105		35	42.9%	91.4%
	106		35	34.3%	91.4%
	107		121	32.2%	92.6%
	108		205	29.8%	92.2%
	109		34	29.4%	94.1%
	110		73	27.4%	93.2%
	111		60	26.7%	91.7%
	112		91	26.4%	92.3%
	113		90	25.6%	94.4%
	114		185	24.3%	91.9%
	115		99	24.2%	92.9%
	116		137	24.1%	89.8%
	117		218	22.9%	92.7%
	118		104	21.2%	91.3%
	119		134	20.9%	92.5%
	120		108	20.4%	94.4%
ADR ≥ 20% and CIR ≥ 90% < 95%	121		146	19.9%	98.6%
	122		106	19.8%	99.1%
	123		56	19.6%	96.4%
	124		214	19.6%	97.2%
	125		291	19.6%	99.7%
	126		216	19.4%	97.2%
	127		31	19.4%	96.8%
	128		146	19.2%	99.3%
	129		100	19.0%	96.0%
	130		143	18.9%	97.9%
	131		181	18.8%	100.0%
	132		80	18.8%	95.0%
	133		151	18.5%	96.7%
	134		81	18.5%	95.1%
	135		99	18.2%	98.0%
	136		66	18.2%	100.0%
	137		39	17.9%	94.9%
	138		212	17.9%	96.7%
	139		218	17.9%	98.2%
	140		181	17.7%	99.4%
	141		80	17.5%	100.0%

	142		373	17.4%	94.9%
	143		511	17.4%	98.8%
	144		58	17.2%	96.6%
	145		151	17.2%	97.4%
	146		282	17.0%	97.5%
	147		177	16.9%	97.7%
	148		83	16.9%	95.2%
	149		509	16.7%	97.6%
	150		204	16.7%	97.1%
	151		36	16.7%	100.0%
	152		200	16.5%	100.0%
	153		200	16.5%	99.5%
	154		68	16.2%	98.5%
	155		100	16.0%	99.0%
	156		152	15.8%	99.3%
	157		318	15.4%	94.7%
	158		59	15.3%	98.3%
	159		66	15.2%	95.5%
	160		60	15.0%	96.7%
ADR \geq 15% <20% and CIR \geq 90% < 95%	161		61	19.7%	93.4%
	162		87	19.5%	94.3%
	163		287	18.8%	91.3%
	164		138	18.1%	92.0%
	165		35	17.1%	94.3%
	166		71	16.9%	93.0%
	167		184	16.8%	90.8%
	168		102	16.7%	92.2%
	169		30	16.7%	93.3%
	170		31	16.1%	93.5%
	171		288	16.0%	93.4%
	172		39	15.4%	94.9%
	173		33	15.2%	90.9%
ADR \geq 10% <15% and CIR \geq 95%	174		114	14.9%	99.1%
	175		504	14.7%	97.6%
	176		377	14.6%	98.7%
	177		579	14.5%	97.6%
	178		211	14.2%	98.1%
	179		536	14.2%	99.3%
	180		270	14.1%	100.0%
	181		57	14.0%	96.5%
	182		100	14.0%	98.0%
	183		386	13.7%	97.9%
	184		73	13.7%	97.3%
	185		53	13.2%	100.0%
	186		422	13.0%	99.1%
	187		308	13.0%	99.7%
	188		155	12.9%	99.4%
	189		226	12.8%	100.0%
	190		48	12.5%	97.9%
	191		73	12.3%	100.0%
	192		131	12.2%	98.5%

	193		115	12.2%	98.3%
	194		500	12.0%	100.0%
	195		137	11.7%	96.4%
	196		179	11.2%	95.5%
	197		149	10.7%	96.6%
	198		212	10.4%	97.6%
	199		200	10.0%	99.5%
	200		50	10.0%	98.0%
ADR > 10% <15% and CIR ≥ 90% < 95%	201		67	14.9%	92.5%
	202		411	14.4%	94.2%
	203		151	12.6%	91.4%
	204		78	12.8%	93.6%
ADR ≥ 10% and CIR < 90%	205		134	27.6%	87.3%
	206		45	22.2%	73.3%
	207		68	22.1%	86.8%
	208		62	21.0%	85.5%
	209		146	19.9%	87.7%
	210		32	18.8%	62.5%
	211		33	18.2%	87.9%
	212		72	18.1%	88.9%
	213		110	16.4%	85.5%
	214		38	15.8%	89.5%
	215		102	14.7%	89.2%
	216		146	13.7%	88.4%
	217		61	13.1%	83.6%
	218		221	11.8%	88.7%
219		47	10.6%	87.2%	
220		39	10.3%	87.2%	
221		39	10.3%	87.2%	
ADR < 10% and CIR ≥ 90%	222		52	9.6%	100.0%
	223		42	9.5%	97.6%
	224		80	8.8%	96.3%
	225		237	8.4%	93.2%
	226		64	7.8%	100.0%
	227		48	6.3%	100.0%
	228		105	5.7%	94.3%
	229		63	4.8%	98.4%
	230		31	3.2%	96.8%
	231		51	2.0%	98.0%

Supplementary Appendix 2. The programme of the Train-the-Colonoscopy Leaders course.

1. Pre-training assessment at each leaders' screening center

- Screening centre leaders' questionnaire (demographics, specialty, colonoscopy experience, colonoscopy training, experience as a trainer, interest in training, self-reported measures of colonoscopy competence)
- Environmental assessment checklist (organization and workforce, endoscopic equipment and rooms, training, communication assessed by investigators; motivation self-assessed by screening center leader)
- Screening center leaders' withdrawal time and technique,¹⁸ and patients pain scores (100mm visual analog scale) assessed by a trained (at least 5 video cases done with investigators) endoscopy nurse (10 consecutive procedures assessed); sent back to the investigators
- Feedback on individual screening colonoscopy quality indicators; Supplementary Appendix 1.

2. Hands-on-training at the Maria Sklodowska-Curie Memorial Cancer Center and Institute on Oncology, Warsaw

a. Day 1

- Introduction (faculty, participants, set the agenda)
- Objective setting (delegate's background & aims)
- Close discussion on the high quality colonoscopy (patient and program perspective)
- Discussion on barriers and solutions to improve ADR
- Demonstration of colonoscopy withdrawal videos (inappropriate fold inspection, inadequate bowel distension, inappropriate suctioning technique): discussion on the points of disagreement

- The principles of Pendleton's rules and the idea of conscious competence

b. Day 2

- Close discussion on patients position changes on colonoscopy withdrawal
- Set (align agendas, ground rules, educational contract), dialogue (language, performance enhancing instruction, environment) and closure (summary, performance enhancing feedback, take home message) of the hands-on-training episode
- Each participant performs one colonoscopy withdrawal as an examiner and one colonoscopy withdrawal as a trainer
- Videocases: lesion recognition, assessment, delineation
- Videocases: discussion of basic polypectomy technique
- Feedback from faculty: summary and take home message

3. Post-training evaluation and feedback

- Screening center leaders' withdrawal time and technique,¹⁸ and patients pain scores (100mm visual analog scale) assessed by a trained endoscopy nurse (10 consecutive procedures assessed); sent back to the investigators
- Cecal intubation rate and adenoma detection rate assessed in the first 30 screening colonoscopies following training; extracted by investigators from the database
- Feedback on adenoma detection rate, cecal intubation rate, withdrawal technique and patients pain scores sent via email by the investigators

Supplementary Table S3. The detection rates of adenomas by endoscopist characteristics, randomization group in the pre-intervention and early post-intervention phase (procedures performed by screening centre leaders).

Variables	Number of patients (number of patients with adenomas, %)			
	The TCL group		The feedback group	
	Baseline phase	Post-intervention phase	Baseline phase	Post-intervention phase
Screening centre leader specialty				
Gastroenterology	3,285 (560, 17.0%)	1,879 (449, 23.9%)	3,453 (644, 18.7%)	2,371 (437, 18.4%)
General surgery or other	2,932 (463, 15.8%)	1,502 (363, 24.2%)	1,313 (254, 19.3%)	606 (137, 22.6%)
Colonoscopy experience (estimated number)*				
1000 – 4999 colonoscopies	503 (96, 19.1%)	240 (65, 27.1%)	396 (74, 18.7%)	353 (62, 17.6%)
5000 – 9999 colonoscopies	3,285 (507, 15.4%)	1,753 (372, 21.2%)	1,374 (275, 20.0%)	900 (164, 18.2%)
10 000 or more colonoscopies	2,429 (420, 17.3%)	1,388 (375, 27.0%)	2,857 (530, 18.6%)	1,697 (345, 20.3%)
Interested to undergo additional training				
Yes	3,906 (617, 15.8%)	2,200 (511, 23.2%)	3,331 (630, 18.9%)	2,353 (445, 18.9%)
No	821 (140, 17.1%)	474 (107, 22.6%)	1,217 (229, 18.8%)	554 (118, 21.3%)

Not sure/Not reported	1,490 (266, 17.9%)	707 (194, 27.4%)	218 (39, 17.9%)	70 (11, 15.7%)
Type of screening facility				
Public, academic	624 (104, 16.7%)	203 (51, 25.1%)	187 (37, 19.8%)	99 (21, 21.2%)
Public, non-academic	1,400 (244, 17.4%)	623 (150, 24.1%)	1,760 (297, 16.9%)	1,099 (177, 16.1%)
Private practice	4,193 (675, 16.1%)	2,555 (611, 23.9%)	2,819 (564, 20.0%)	1,779 (376, 21.1%)

* Data not available for one leader from the feedback group

Because of rounding, percentages may not total 100.

Supplementary Table S4. Expanded generalized linear mixed effects model for the change in screening centre leaders' ADR between the pre-intervention and early post-intervention phase.

Variables	Odds ratio (95% confidence intervals)	P value
Study group		
TCL vs. Feedback group	0.96 (0.81-1.13)	0.61
Study phase		
Post-intervention vs. Pre-intervention phase	1.00 (0.85-1.19)	0.97
Study group by phase interaction	1.66 (1.32-2.08)	<0.001
Screenees' characteristics		
Male vs. Female	2.11 (1.95-2.29)	<0.001
50-54 vs. 40-49 years	1.45 (1.21-1.73)	<0.001
55-59 vs. 40-49 years	1.89 (1.59-2.25)	<0.001
60-66 vs. 40-49 years	2.31 (1.95-2.75)	<0.001
Bowel preparation*		
Good vs. Very good	1.08 (0.97-1.21)	0.16

Moderate vs. Very good	0.98 (0.86-1.13)	0.81
Poor vs. Very good	1.03 (0.84-1.26)	0.79
Very poor vs. Very good	0.88 (0.48-1.60)	0.67
Type of screening facility		
Public, non-academic vs. Public, academic	0.97 (0.71-1.34)	0.87
Private practice vs. Public, academic	1.00 (0.74-1.36)	1.00
Screening centre leader specialty		
Internal medicine/Pediatrics vs. Gastroenterology	0.66 (0.38-1.14)	0.13
General surgery vs. Gastroenterology	0.96 (0.80-1.14)	0.64

* Assessed by endoscopists using Aronchick scale