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Priority and appropriateness of upper endoscopy out-patient referrals: Two-period comparison in an open-access unit

Alberto Meggio [a], Giuliano Mariotti [b,*], Maria Gentilini [c], Giovanni de Pretis [d]

[a] Department of Gastroenterology, Hospital of Rovereto, LHU APSS, Rovereto, Italy
[b] Department of Governance, LHU APSS, Trento, Italy
[c] Epidemiology Service, LHU APSS, Trento, Italy
[d] Department of Gastroenterology, LHU APSS, Trento, Italy

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ABSTRACT

Background: In the early 2000s we introduced a prioritization model for referrals based on involvement of primary care physicians (PCPs) and specialists.
Aims: Assess the application of that model of prioritisation, comparing gastroscopies performed 8 years apart, with respect to priority level, appropriateness and relevant endoscopic findings (REFs).
Methods: The studies included 247 and 354 out-patients, who had undergone gastroscopy in 2006 and in 2014, respectively. To reduce interspecialists variability, both studies were performed by the same specialist as investigator.
Results: In both years, most patients were assigned low-priority referral by PCPs (78.6% and 75.1% respectively). The agreement PCPs versus specialist on referral priority was moderate in 2006 (0.60, Landis–Koch scale 0.41–0.60) and high in 2014 (0.81, Landis–Koch scale 0.81–1.00). In both years we observed a similar rate of inappropriateness: 27.5% and 27.1%, respectively. Due to multiple logistic regression, the odds ratio (OR) for REF increased when: (i) very high-priority referral versus nopriority referral was indicated (8.813 OR, p = 0.0012), (ii) referral followed the guidelines (9.29 OR, p<0.0001), and (iii) agreement of priority occurred (1.911 OR, p = 0.0308).
Conclusions: Our findings highlighted that the issues of low-priority referrals should be addressed in order to discontinue gastroscopy overusing and reduce related operational costs.

1. Introduction

Like in the other countries [1,2], in Italy the demand of referrals for specialist visits and diagnostic procedures has been rising constantly, making access to these services quite difficult [3].

Clinical prioritisation for referrals is a form of time scheduling (ordering patients for diagnosis or determining how soon diagnosis should be given or the maximum time it may be delayed), based on the idea of setting shorter waiting times for patients with higher clinical needs, and longer waiting times for patients with lesser needs [4]. Prioritisation can improve both the effectiveness (patients who need a timely access to care reduce their risk of a health decay) and the equity of access to health care (patients' access is regulated according to the priority of their needs). This pattern of accessibility did not lead to an increase in outpatient services and the overall supply was maintained. As described in literature [5], priority, not the request for nor the supply of the services, is what directly affects the timeliness of the services.

Gastroenterologists are probably among the first specialists to suggest and apply prioritization, both locally and internationally [6,7]. In Italy, an original approach for prioritising referrals is giving rise to what are known as Homogeneous Waiting Groups (HWGs) [8,9]. The HWG approach improves the referral process through the use of protocols and other forms of close interaction between primary care physician (PCP) and specialist.

Supported by the interest of the gastroenterologists of our Local Health Unit (LHU), the first HWG worked on gastroscopy and colonoscopy in 2006 [10]. Since then, the HWG model in our LHU has been spreading [11].

The aim of this study was to assess the application of that model of prioritisation, comparing digestive endoscopy procedures performed 8 years apart, in particular with reference to: (i) PCP versus specialist priority agreement, (ii) referral appropriateness, and (iii) relevant endoscopic findings (REFs) detected. Using the results of

* Corresponding author.
E-mail address: giuliano.mariotti@apss.tn.it (G. Mariotti).

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Table 1
Clinical indications for each HWG in gastroscopy.

Homogeneous waiting group	Maximum wait	Indications or clinical key words
U (urgent)	First Aid	- Acute GI hemorrhage (hematemesis, melena). - Foreign bodies, caustic burns. - Other (10%).
HWG A	3 days	Not used
HWG B	10 days	- Non-urgent bleeding diarrhoea with bleeding without infection. - First evidence of iron-deficiency anaemia Hb < 10 d/dl. - "Alarm symptoms": persistent vomiting, dysphagia, odynophagia, relevant weight loss (10% in the last months), palpable abdominal mass. - Urgency to exclude GI lesions in order to undertake cardiological therapies. - Suspect cancer in imaging. - Other (10%).
HWG C	30 days	- Chronic iron-deficiency anaemia. - Dyspeptic symptoms," Minor abdominal pain" (in patients aged 45 years or older). - Suspicion of celiac disease. - Other (10%).
HWG E	No limit	Other indications: - Screening for esophageal varices. - Biopsy in celiac disease. - Other (10%).
HWG P	Follow-up time	Screening. Follow-up of banding or sclerotherapy varices or polypectomy. Follow-up of cancer, Barrett's esophagus.

HWG = Homogeneous Waiting Group.

a local research on gastritis conducted in recent years, we concentrated on the gastroscopy data of the two periods, excluding any data related to the colonoscopy retrieved from the first work.

2. Methods

The study was conducted in the LHU of the Autonomous Province of Trento, serving more than 530,000 people in North–Eastern Italy. For some time now digestive endoscopies have become open-access procedures in Italian LHUs, allowing PCPs to refer patients without prior specialist consultation. In our LHU, appointments were scheduled by a centralised booking service in one of the several facilities operating in the catchment area, depending on the patient's place of residence or choice. More than 430 PCPs work in the LHU (about 83% for the population aged ≥15 years and about 17% for the population aged <15). Complying with the Italian regulations, PCPs completed a standard referral form including the patient's clinical details and indicating all the diagnostic procedures required.

2.1. Development of homogeneous waiting groups (HWGs)

A medical director, appointed by the management board, set up a steering group composed of: (i) representatives of PCPs, (ii) one or more representatives of specialists from each department involved, and (iii) the head of the booking service. The steering group identified four categories of waiting times: A (the least waiting time, ≤3 days), B (≤10 days), C (≤30 days), E or no letter (later or without a maximum wait) [8]. For urgent (U) referrals, patients had to access the Accident and Emergency (A&E) department of the hospital and be given the standard referral form marked 'urgent'. In this case patients were examined by A&E doctors before being referred to the appropriate service or admitted. Each category was defined on the basis of consensus, provided that the time for diagnosis (considering a subsequent appropriate time for treatment) did not compromise prognosis [12]. The categories were called Homogeneous Waiting Groups (HWG) [*Raggruppamenti di Attesa Omogenea* or *RAO* in Italian]. Any available research evidence was used as guidelines. In the absence of any evidence, the guidelines were based solely on current, generally accepted clinical practice. The final local guidelines were similar to those created in New Zealand for digestive endoscopy in the 1990s.

PCPs were asked to assign an HWG category to each referral. The same category was entered by the booking centre at the time of booking. Specialists were also asked to assign an HWG category, which was later compared with that of PCPs. All PCPs and specialists working in the LHU were given a final operational manual with referral instructions and clinical guidelines (covering 84 diagnostic procedures to date), each with the same standardised waiting category [13].

2.2. Gastroscopy referrals

Gastroscopy was included in a diagnostic schedule (Table 1). Beyond the emergency/urgency level (U), the steering group decided to use only two HWGs for gastroscopy: B (≤10 days) and C (≤30). Any REF detected was defined by the specialists of the local endoscopic service.

2.3. Study variables

We collected data from two studies on consecutive out-patients who had undergone gastroscopy in 2006 (248 patients) and in 2014 (354 patients). The studies were both performed in the Gastroenterology department, and conducted by the same investigator (AM). On the day of the appointment, the patients and their referral forms were evaluated. The specialist gathered clinical information from patients and through a preliminary examination. He then assigned an HWG category before carrying out the procedure. Only then the PCP referral form was read. Criteria of appropriateness were based on the international clinical guidelines set out by the American Society for Gastrointestinal Endoscopy in 2006 [14] (2012 updated version) [15]. For both studies the following data were recorded for each patient: age, gender, date of booking, date of procedure, clinical diagnostic details, and the HWG category assigned by the PCP. In addition, the following data entered by the specialist were added: HWG category, REF, repeated gastroscopies, referral appropriateness based on clinical diagnostic details.

2.4. Statistical analysis

The proportions were compared using the Chi square test. To determine the level of priority agreement between PCPs and the specialist (concordance), the agreement coefficient GWET's AC_1 (Landis and Koch benchmark scale) [16] was used. A multiple logistic regression and adjusted odds ratio (OR) was calculated for examining effects of collected variables on predictivity of REF. SAS 9.1 (SAS Institute Inc.) was used for all analyses. All tests were two-tailed, and a p value of less than 0.05 was considered statistically significant.

3. Results

3.1. Patient variables and waiting times

Of the 248 out-patients undergoing a gastroscopy in 2006, 127 were female (average age: 56.1 years, range: 18–86) and 121 were male (average age: 57.5 years, range: 23–93). Of the 354 out-patients enrolled in 2014, 174 were female (average age: 54.0 years, range: 20–89) and 180 were male (average age: 55.1 years, range: 17–93). Patients were younger (six age ranges compared) in the second group ($X^2 = 11.72$, df 5, $p = 0.047$).

In 2006, the high-priority HWG categories assigned by PCPs were: 2 level A (although considered as a mistake and re-assigned as B) with waiting times of 1–5 days, 17 level B (median waiting time of 7 days), 18 level C (median waiting time of 18 days), and 16 patients with urgent referrals from the A&E Department.

In 2014, the high-priority HWG categories assigned by PCPs included: 3 urgent referrals from the A&E Department, 37 level B (median waiting time of 5 days), 48 level C (median waiting time of 13 days).

3.2. Clinical priority and agreement

In both periods, most referrals were considered low priority by PCPs with no maximum waiting time assigned: 195 (78.6%) out of 248 in 2006 and 266 (75.1%) out of 354 in 2014. Moreover, by 2014 the U category had reduced (from 16 out of 248 to 3 out of 354), whereas B and C categories had increased (from 37 out of 248 to 85 out of 354) ($X^2 = 21.25$, df 3, $p < .0001$). The level of agreement between PCP and specialist (Table 2) was moderate in 2006 (Gwet AC_1 was 0.61, Landis and Koch scale 0.41–0.60) and very high in 2014 (Gwet AC_1 was 0.81, Landis and Koch scale 0.81–1.00).

3.3. Appropriateness, low-priority HWGs and repeated gastroscopy

In 2006 and in 2014 we observed a similar rate of global inappropriateness: 68 (27.5%) out of 248 and 96 (27.1%) out of 354, respectively. Considering both periods together, inappropriate referrals were mostly requested for low-priority cases and over the concordance diagonal, i.e. the cases with a higher priority assigned by PCPs than specialists (Table 3). In 2006 inappropriateness ranged from 9 (6.9%) out of 131 on first examination, to 59 (50.4%) out of 117 in case of repeated gastroscopy ($X^2 = 58.9$, df 2, $p < .0001$). Similarly, in 2014 inappropriateness ranged from 10 (6.1%) out of 164 on first examination, to 86 (45.3%) out of 190 in case of repeated gastroscopy ($X^2 = 68.3$, df 2, $p < .0001$).

3.4. Significant endoscopic disorders

Table 4 shows the REFs detected in the two periods. In 2014 compared to 2006, a lower proportion of cases with REFs (17.5% vs 21.4%) is observed. However, the difference is not statistically significant.

Table 2
Comparison of the HWG assigned by primary care physicians (PCPs) and by gastroenterologist (GE) registered in 2006 and 2014. Absolute frequencies and percentages (in brackets).

Frequency (Freq. %)	HWG by PCPs		
	Year 2006	Year 2014	Total
U	16 (6.5)	3 (0.8)	19 (3.2)
B	19 (7.7)	37 (10.5)	56 (9.3)
C	18 (7.3)	48 (13.6)	66 (11.0)
E	195 (78.6)	266 (75.1)	461 (76.6)
Total	248 (100.0)	354 (100.0)	602 (100.0)
Frequency (Freq. %)	**HWG by GE**		
	Year 2006	Year 2014	Total
U	15 (6.0)	3 (0.8)	18 (3.0)
B	15 (6.0)	6 (1.7)	21 (3.5)
C	61 (24.6)	32 (9.0)	93 (15.4)
E	157 (63.3)	313 (88.4)	470 (78.1)
Total	248 (100.0)	354 (100.0)	602 (100.0)

Table 3
Concordance between the HWG assigned by primary care physicians (PCPs) and that attributed by gastroenterologist (GE) stratified by inappropriate referrals in both periods. Absolute frequencies and percentages (in *italics*).

Frequency, %	HWG by specialists				
	U	B	C	E	Total
HWG by PCPs					
U	*00.0*	*00.0*	*00.0*	0 *0.0*	0 *0.0*
B	*00.0*	*00.0*	*00.0*	15 *9.1*	15 *9.1*
C	*00.0*	*00.0*	*00.0*	15 *9.1*	15 *9.1*
E	*00.0*	*00.0*	*00.0*	134 *81.7*	134 *81.7*
Total	*00.0*	*00.0*	*00.0*	164*100.0*	164*100.0*

Taking the two periods together, the proportion of REFs in high priority referrals (U, B, C categories are 37 out of 141) is higher than in low priority referrals (78 out of 461) and the difference is significant ($X^2 = 6.07$, df 2, $p < .05$).

Due to multiple logistic regression (Table 5), the OR for REF increases: (i) when U referral versus a no-priority referral was indicated (8.813 OR, $p = 0.0012$), (ii) when referral fulfilled the guidelines (9.29 OR, $p < 0.0001$), and (iii) when specialist and PCP priority agrees (1.911 OR, $p = 0.0308$). Gender variable shows a higher significant risk ratio when a male patient was referred (OR 2.277, $p = 0.0004$).

4. Discussion

Clinical prioritisation in digestive endoscopy for avoiding delayed diagnosis of potentially severe diseases is not a recent issue [6,17]. Some studies have tried to demonstrate better strategies for obtaining timely referrals for patients waiting for gastrointestinal endoscopy [7,18–20]. Moreover, in absence of any information on prioritisation and related outcomes in an out-patient clinic setting, and without explicit criteria on the definition of 'priority' [4], the validation of priority criteria has generally been limited to assessing concordance with clinical judgments of urgency [12]. In a recent work on prioritisation approach in England, it was observed that

Table 4
Relevant endoscopic findings (REFs) comparingthe two periods.

	2006					2014				
	U	B	C	E	%	U	B	C	E	%
Without REFs	5	14	16	160	*78,6%*		30	39	223	*82,5%*
Esophagitis of ≥ B Los Angeles Grade	1	2	2	14	*7,7%*	2	2	5	23	*9,0%*
Peptic ulcer	4	1		12	*6,9%*		2		6	*2,3%*
Cancer	1	2		4	*2,8%*		2	1	2	*1,4%*
Celiac disease				4	*1,6%*			2	3	*1,4%*
Mallory–Weiss syndrome	3				*1,2%*					*0,0%*
Esophageal varices	2				*0,8%*					*0,0%*
Atrophic gastritis with low grade dysplasia				1	*0,4%*		1	1	8	*2,8%*
Barrett's esophagus					*0,0%*				1	*0,3%*
Obstruction					*0,0%*	1				*0,3%*
TOT	**16**	**19**	**18**	**195**	*100,0%*	**3**	**37**	**48**	**266**	*100,0%*

Table 5
Multiple logistic regression analysis. Outcome: relevant endoscopic findings (REFs).

Variables	Adjusted odds ratio (95% CI)	p-value
Patient gender (M versus F)	2.277 (1.441, 3.598)	0.0004
Patient age (10 years)	0.909 (0.788, 1.048)	0.1894
PCPs and specialist agree	1.911 (1.062, 3.44)	0.0308
Period (2014 versus 2006)	0.671 (0.397, 1.136)	0.1374
Repeated gastroscopy	1.274 (0.775, 2.094)	0.3394
PCP HWG U versus E	8.813 (2.783, 27.909)	0.0012
PCP HWG B versus E	1.904 (0.864, 4.194)	0.7076
PCP HWG C versus E	1.151 (0.546, 2.425)	0.3778
PCP HWG P versus E	0.595 (0.061, 5.784)	0.2809
Appropriate versus inappropriate	9.29 (3.535, 24.41)	<.0001

doctors prioritise patients according to severity even when no formal prioritization policy exists [21].

High-priority referral codes corresponded to different waiting times for each subgroup of patients. This pattern of accessibility did not lead to an increase in outpatient services and the overall supply was maintained. The major concern regarded the role played by the booking centre, since each appointment had to be scheduled at a time nearing the waiting time assigned. As a result, the centre intentionally disregarded the "first-come first-served" priority criterion, in order to meet the patient's real priority needs as indicated by the HWG, leading to an acceptable waiting time [11].

The global proportion of inappropriate referrals for gastroscopy (about 27% in both periods) was within the range of that reported in literature [7,20,22–24]. However, we observed a considerable different proportion of inappropriate referrals within the group of patients repeating gastroscopy (45–50%) compared to the group of patients performing gastroscopy for the first time (6–7%).

Although gastroscopy is a frequently repeated procedure [25,26], indications for follow-up examination are still to be ascertained [27]. In a recent retrospective study [26], as many as 43% of almost 86,000 repeat gastroscopies resulted inappropriately prescribed. Unfortunately, the authors did not evaluate appropriateness of the gastroscopies performed only once. These results highlight that repeated gastroscopies can increase inappropriate diagnostic examinations.

Our findings showed that the most inappropriate referrals were linked to low-priority cases and the cases which had been assigned a lower priority level by specialist than by PCPs.

Furthermore, the correlation between the lower proportion of patients with a higher priority HWGs assigned by PCPs than by the specialists in 2006, and the increase in HWG priority agreement in 2014 is not easy to explain. We could suppose that PCPs in 2006 were not as familiar with HWGs as in 2014, and they probably had more difficulty in managing clinical indications.

Unlike previous work on gastroscopy overuse, showing that patients examined "inappropriately" still had 37% of lesions [25], a recent review showed that prevalence of relevant findings was significantly higher in appropriate than in inappropriate gastroscopies [22]. Likewise, our data seemed to demonstrate that appropriateness was the main variable to predict the risk of REFs (OR 9.29, p < .0001), secondary to priority agreement between PCPs and the specialist (OR 1.911, p = 0.03).

Although the proportion of REFs in high priority referrals is higher than in low priority referrals, the result is probably due to the relative high number of A&E referrals, all with relevant findings, in 2006. This interpretation is sustained by logistic regression. Therefore, only when patients were admitted through the A&E Department, therefore at a later time than the disease onset, the risk factors for REF were higher (OR 8.813, p = 0.001). These findings are consistent with a previous work on timely-diagnosed upper gastrointestinal cancer through a two-week wait scheme in the UK [28], in which only one third of patients had been identified by a two-week wait scheme.

In our work, male gender is associated with an increased risk of REF, a factor associated with some endoscopic findings in literature [29,30].

Our work was based on small cohorts. However, with the aim to reduce the specialist's variability in priority assignment, both studies were performed in the same unit and by the same specialist (AM) as investigator.

Our findings highlighted that: (i) low priority referrals, (ii) referrals placed over the priority agreement diagonal (cases in which the specialist allocate a lower priority category than PCPs), and (iii) repeated gastroscopies are crucial for reducing gastroscopy overusing.

Another issue implicated in the use of this model was to guarantee timely high-priority referrals without affecting the normal supply of services.

Finally, we believe that such initiatives aiming at improving the communication between PCPs and specialists (e.g., PCPs' involvement in setting the criteria for priority categories, joint meetings, one-to-one communication, data feedback) will benefit PCPs in becoming more aware of appropriateness and of correct timing in endoscopy, and, at the same time, will benefit specialists in becoming more aware of limiting their tendency to over prescribe gastroscopies.

Conflicts of interest
None declared.

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