

Gastrointestinal endoscopy in a low budget context: delegating EGD to non-physician clinicians in Malawi can be feasible and safe

Authors

T. J. Wilhelm^{1,2}, H. Mothes^{1,3}, D. Chiwewe¹, B. Mwatibu¹, G. Kähler⁴

Institutions

¹ Department of Surgery and Orthopaedics, Zomba Central Hospital, Zomba, Malawi

² Department of Surgery, University Hospital Mannheim, University of Heidelberg, Mannheim, Germany

³ Department of Surgery, University Hospital Jena, Jena, Germany

⁴ Department of Endoscopy, University Hospital Mannheim, University of Heidelberg, Mannheim, Germany

Bibliography

DOI <http://dx.doi.org/10.1055/s-0031-1291446>
Published online: 2011
Endoscopy
© Georg Thieme Verlag KG
Stuttgart · New York
ISSN 0013-726X

Corresponding author

T. J. Wilhelm, MD
Department of Surgery
University Hospital Mannheim
Theodor-Kutzer-Ufer 1-3
68167 Mannheim
Germany
Fax: +49-621-3833809
tjwilhelm@web.de

Gastrointestinal endoscopy is rarely performed in low-income countries in sub-Saharan Africa. One reason is the lack of available medical doctors and specialists in these countries. At Zomba Central Hospital in Malawi, clinical officers (non-physician clinicians with 4 years of formal training) were trained in upper gastrointestinal endoscopy. Prospectively recorded details of 1732 consecutive esophagogastroduodenoscopies (EGDs) performed between September 2001 and August 2010 were analyzed to evaluate whether upper gastrointestinal endoscopy can be performed safely and accurately by clinical officers. A total of 1059 (61.1%) EGDs were performed by clinical officers alone and 673 (38.9%) were carried out

with a medical doctor present who performed or assisted in the procedure. Failure and complication rates were similar in both groups ($P=0.105$). Endoscopic diagnoses for frequent indications were generally evenly distributed across the two groups. The main difference was a higher proportion of normal findings and a lower proportion of esophagitis in the group with a doctor present, although this was significant only in patients who had presented with epigastric/abdominal pain ($P<0.001$). In conclusion, delegating upper gastrointestinal endoscopy to clinical officers can be feasible and safe in a setting with a shortage of medical doctors when adequate training and supervision are provided.

Introduction

In Malawi and many other sub-Saharan African countries, gastrointestinal symptoms are predominantly treated according to clinical symptoms alone. Although this symptomatic approach is rational in resource-poor settings it does result in a high proportion of unnecessary, inappropriate, or delayed treatment [1].

Few health institutions offer gastrointestinal endoscopy. As well as the cost constraints and lack of equipment, the short supply of medical doctors plays an important role. In hospitals in Malawi most clinical work is performed by non-physician clinicians (NPCs), while the few medical doctors run the hospital and health district and can only oversee some of the clinical work [2]. Even where functioning endoscopy equipment is available, the shortage of medical doctors and specialists contributes to low volumes of endoscopic activity. In some industrialized countries, gastrointestinal endoscopy is delegated to specifically trained nurses in an attempt to save costs and to keep up with the increasing demands in an aging population [3,4]. Studies have shown that nurses can effectively perform diagnostic gastrointestinal en-

doscopy [4–7]. However, the debate about which investigations they should do and how they should be trained is ongoing [8,9].

At Zomba Central Hospital – one of four central hospitals in Malawi – a similar strategy has been applied with the delegation of upper gastrointestinal endoscopy to clinical officers. Clinical officers are NPCs with 3 years of pre-service education followed by a 1-year internship.

The aim of this study was to evaluate whether upper gastrointestinal endoscopy can be safely delegated to NPCs when there are no medical doctors available. This task shifting could be one method of increasing endoscopy services in sub-Saharan Africa.

Methods

Selected clinical officers underwent an 8-week training attachment at the endoscopy unit of the Jena University Hospital, Germany, which included training on endoscopy simulators. Upon their return they performed a minimum of 50 esophagogastroduodenoscopies (EGDs) under the supervision of experienced medical doctors. Once they

	Clinical officer alone (n=1059)		Medical doctor present (n=673)	
	n	%	n	%
Failure				
Patient not fasted	5	0.5	1	0.1
Endoscopy not tolerated	13	1.2	7	1.0
Major complications				
Diagnostic	0/1033	0	0/583	0
Interventional	0/26	0	3/90	3.3

Table 1 Adverse events and complications during upper gastrointestinal endoscopy ($P=0.105$).

	Clinical officer alone (n=419)		Medical doctor present (n=346)	
	n	%	n	%
Esophageal cancer	286	68.3	266	76.9
Candidiasis	38	9.1	28	8.1
Normal findings	31	7.4	24	6.9
Benign stenosis/achalasia	25	6.0	21	6.1
Gastritis/ulcer	12	2.9	7	2.0
Esophagitis (non-fungal)	10	2.4	3	0.9
Other	26	6.2	22	6.4
Total number of diagnoses	428		371	

Table 2 Endoscopic diagnoses in patients with dysphagia ($P=0.514$).

	Clinical officer alone (n=496)		Medical doctor present (n=231)	
	n	%	n	%
Normal findings	177	35.7	112	48.5
Gastritis/ulcer	178	35.9	75	32.5
Esophagitis (non-fungal)	69	13.9	15	6.5
Candidiasis	58	11.7	6	2.6
Stomach tumor	11	2.2	8	3.5
Gastric outlet obstruction	10	2.0	10	4.3
Other	14	2.8	16	6.9
Total number of diagnoses	517		242	

Table 3 Endoscopic diagnoses in patients with epigastric/abdominal pain ($P<0.001$).

were considered to be competent they performed EGDs unsupervised. However, a senior endoscopist was available for consultation if required. This introductory training was an institution-based activity as there is no formal education in endoscopy in Malawi. Equipment was provided to the Zomba Central Hospital by the Jena University Hospital and University Hospital Mannheim, Germany. Olympus GIF-Q20 endoscopes (Olympus, Tokyo, Japan) were used, and were cleaned and disinfected manually using glutaraldehyde according to the manufacturer's recommendations. All patients referred to the Zomba Central Hospital for upper gastrointestinal endoscopy were reviewed by one of the endoscopists. If the endoscopist confirmed the indication then the patient was booked onto his EGD list. Patients with a high suspicion for esophageal cancer who were suitable for immediate stenting were allocated to the group with a medical doctor present. Endoscopies were performed under lignocaine spray without sedation after a fasting period of at least 6 hours.

The following details were prospectively recorded: patient sex, age, and chief complaint, qualification of endoscopist, diagnoses, interventions, complications, and recommendations.

Data were analyzed using SPSS 12.0 (SPSS, Chicago, Illinois, USA). The chi-squared test was used to test for significance of any differences. A difference was considered significant when $P<0.05$. The study did not require ethical approval because it was a descriptive analysis and did not involve interventions for study purposes:

the delegation of clinical tasks to clinical officers is performed countrywide in Malawi in accordance with local regulations.

Results

A total of 1732 upper gastrointestinal endoscopies were performed between September 2001 and August 2010, from which 1812 diagnoses were obtained. A total of 1059 endoscopies (61.1%) were performed by clinical officers alone and 673 (38.9%) in the presence of a medical doctor who attended as an endoscopist or an assistant to the clinical officer.

Patient characteristics were similar in both groups. The most frequent diagnoses were esophageal cancer (32.9%), normal findings (22.4%), gastritis (11.8%), candidiasis (11.2%), and non-fungal esophagitis (6.6%).

There were 116 interventions, predominantly for esophageal cancer. In 101 patients dilation was performed using Savary–Gilliard bougies, and 69 of these patients received a self-expanding metal stent (SEMS). Interventions were predominantly performed during procedures where a doctor was present.

Complication rates were low in both groups ($P=0.105$; **Table 1**). There were three esophageal perforations in patients with eso-

phageal carcinoma, one of whom died; the other two patients recovered following conservative treatment.

There were two predominant indications for EGD: dysphagia (765 patients, 44.2% of all EGDs) and epigastric/abdominal pain (727, 42.0%). Distribution of endoscopic diagnoses for patients with dysphagia was very similar in both groups ($P=0.514$; **Table 2**). In patients presenting with pain, however, doctors diagnosed “normal findings” more frequently than clinical officers (48.5% vs. 35.7%), and “candidiasis” (2.6% vs. 11.7%) and “non-fungal esophagitis” (6.5% vs. 13.9%) less frequently than clinical officers (**Table 3**). This difference was statistically significant ($P<0.001$).

Discussion

Shifting of tasks to NPCs in resource-poor countries is considered one possible option to overcome the short supply of medical doctors and to increase access to health services for the rural population.

A total of 25 of the 47 countries in sub-Saharan Africa employ NPCs [10]. There is increasing evidence that NPCs can safely perform responsible tasks such as major surgery, and several authors have recommended further research in this field [11–15]. This is the first study to explore a possible role of NPCs in endoscopy in resource-poor countries.

Regarding adverse events and complication rates, the present data indicate that the clinical officers' performance was safe. In both groups, 1% of endoscopies were aborted due to poor patient tolerance and compliance. This proportion seems low considering that investigations and interventions were performed under lignocaine spray without sedation [16].

During procedures in five patients in the clinical officer group it became apparent that the patients had not fasted prior to the procedure. This indicates some shortcoming in patient preparation by staff and could easily be overcome by the implementation of a simple mandatory checklist.

Findings for patients who presented with dysphagia were similar in both groups. However, some differences in the distribution of findings were observed in patients who presented with epigastric/abdominal pain: doctors more frequently diagnosed a normal finding whereas the clinical officers more frequently diagnosed candidiasis and other esophagitis. There are several possible explanations for this difference. First, there might be some selection bias, as patients were not randomized to investigator groups. Secondly, clinical officers might have been more thorough than doctors. Thirdly, clinical judgement could have been superior in one group or the other. Fourthly, cultural differences in perception of disease and treatment could have played a role because all clinical officers were Malawians, but three out of the four doctors were expatriates. Interestingly, nurses have also been found to report fewer endoscopies as “normal” compared with medical doctors in industrialized countries [5].

In our series most diagnoses were made according to macroscopic appearance because histology services were limited. However, the accordance of macroscopic and microscopic diagnoses would be expected to be high. For suspected esophageal cancer, for example, the accordance between endoscopic and histological diagnosis was 93% in 45 consecutive patients for whom histological services were available.

Weaknesses of the study are possible selection bias due to lack of randomization to groups and possible diagnostic inaccuracy due to inconsistent histological confirmation. Strengths are the large

number of endoscopies from a setting with few existing available data, completeness of data, and uniqueness of the study with respect to study aim and question.

The present study focuses on feasibility and safety of NPCs performing upper gastrointestinal endoscopy; however, it does not examine duration and intensity of training and supervision. Without doubt, it would be crucial to investigate training and supervision needs and to introduce measures to assess NPCs for competence.

In summary, delegating upper gastrointestinal endoscopy to NPCs in Malawi can be feasible and safe when training and supervision are provided. It can be one tool to increase endoscopic services. We recommend further research, which should include objective investigator evaluation and should focus on duration and form of training and supervision.

Competing interests: None

Acknowledgment

The authors acknowledge the contribution of Dr. Joachim Brade, Department of Medical Statistics, Medical Faculty Mannheim, University of Heidelberg, Mannheim, who performed the statistical analysis.

References

- 1 Mothes H, Chagaluka G, Chiwewe D et al. Do patients in rural Malawi benefit from upper gastrointestinal endoscopy? *Trop Doct* 2009; 39: 73–76
- 2 Lavy C, Tindall A, Steinlechner C et al. Surgery in Malawi – a national survey of activity in rural and urban hospitals. *Ann R Coll Surg Engl* 2007; 89: 722–724
- 3 Ganz RA. Nurses working in gastroenterology: what should be the scope of practice? *Gastrointest Endosc* 2007; 65: 480–482
- 4 Verschuur EML, Kuipers EJ, Siersema PD et al. Nurses working in GI and endoscopic practice: a review. *Gastrointest Endosc* 2007; 65: 469–479
- 5 Smale S, Bjarnason I, Forgacs I et al. Upper gastrointestinal endoscopy performed by nurses: scope for the future? *Gut* 2003; 52: 1090–1094
- 6 Meaden C, Joshi M, Hollis S et al. A randomized controlled trial comparing the accuracy of general diagnostic upper gastrointestinal endoscopy performed by nurse or medical endoscopists. *Endoscopy* 2006; 38: 553–560
- 7 Williams J, Russell I, Durai D et al. Effectiveness of nurse delivered endoscopy: findings from randomised multi-institution nurse endoscopy trial (MINuET). *BMJ* 2009; 338: b231
- 8 Ikenberry SO, Anderson MA, Banerjee S et al. Endoscopy by nonphysicians. *Gastrointest Endosc* 2009; 69: 767–770
- 9 Wu K, Soetikno R, Triadafilopoulos G. Studies of nurses performing colonoscopy have been performed. *Gastrointest Endosc* 2010; 71: 1336
- 10 Mullan F, Frehywot S. Non-physician clinicians in 47 sub-Saharan African countries. *Lancet* 2008; 370: 2158–2163
- 11 Chu K, Rosseel P, Gielis P et al. Surgical task shifting in sub-Saharan Africa. *PLoS Med* 2009; 6: e1000078
- 12 Luboga S, Macfarlane SB, von Schreeb J et al. Increasing access to surgical services in sub-Saharan Africa: priorities for national and international agencies recommended by the Bellagio Essential Surgery Group. *PLoS Medicine* 2009; 6: e1000200
- 13 Lavy C, Sauven K, Mkandawire N et al. State of surgery in tropical Africa: a review. *World J Surg* 2011; 35: 262–271
- 14 Chilopora G, Pereira C, Kamwendo F et al. Postoperative outcome of caesarean sections and other major emergency obstetric surgery by clinical officers and medical officers in Malawi. *Hum Resour Health* 2007; 5: 17
- 15 Wilhelm TJ, Thawe IK, Mwatibu B et al. Efficacy of major general surgery performed by non-physician clinicians at a central hospital in Malawi. *Trop Doct* 2011; 41: 71–75
- 16 Benson AA, Cohen LB, Wayne JB et al. Endoscopic sedation in developing and developed countries. *Gut Liver* 2008; 2: 105–112