

Evaluating the process of care in nonvariceal upper gastrointestinal haemorrhage: a survey of expert vs. non-expert gastroenterologists

E. ESRAILIAN^{†,‡}, I. M. GRALNEK^{‡,‡}, D. JENSEN^{*,†}, L. LAINES, G. S. DULAI[¶], G. EISEN^{**}
 & B. M. R. SPIEGEL^{*,†,‡,‡}

*VA Greater Los Angeles Healthcare System, Los Angeles, California;
 †David Geffen School of Medicine at UCLA, Los Angeles, California;
 ‡UCLA/VA Center for Outcomes Research and Education (CORE), Los Angeles, California; §Keck School of Medicine, University of Southern California, Los Angeles, California;
 ¶Kaiser Southern California; **Oregon Health Sciences University, Portland, Oregon; ††UCLA School of Public Health, Los Angeles, California, USA;
 ‡‡Ramban Medical Center, Haifa, Israel

Correspondence to:
 Dr B. M. R. Spiegel, 11301 Wilshire Blvd, Bldg 115, Room 215, Los Angeles, CA 90073, USA.
 E-mail: bspiegel@mednet.ucla.edu

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SUMMARY

Background

When faced with the same facts, physicians often make different decisions.

Aim

To perform a survey to measure the process of care and variations in decision-making in nonvariceal upper gastrointestinal tract haemorrhage (NVUGIH) and compare results between experts and non-experts.

Methods

We administered a vignette survey to elicit knowledge and beliefs about NVUGIH, including 13 'best practice' guidelines. We compared guideline compliance between experts and non-experts.

Results

One hundred and eighty-eight gastroenterologists responded (46%). Experts endorsed more 'best practices' than non-experts (93% vs. 85%; $P = 0.002$). Non-experts were more likely to endorse incorrectly bolus dosing vs. continuous infusion of intravenous proton pump inhibitors (PPIs; 92% vs. 64%; $P = 0.005$) and to select standard-channel vs. large-channel endoscopes in high-risk bleeding (100% vs. 85%; $P = 0.04$). There were wide variations within groups regarding the timing of nasogastric lavage, use of promotility agents, use of hemoclips and appropriateness of snaring clots overlying ulcers.

Conclusions

Experts are more likely to comply with NVUGIH guidelines. Non-experts diverge from experts in the dosing of PPIs and choice of endoscope in high-risk bleeding. Moreover, there are wide variations in key practices even within groups. This suggests that best practices have been generally well disseminated, but that persistent disconnects exist that should be further investigated.

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INTRODUCTION

'Process of care' refers to the dynamic exchange of events that drive health care including the doctor-patient relationship, patient preferences and provider decision-making, among others.¹ Measuring provider decision-making, in particular, is a critical component to assessing the quality of care. Ideally, providers should make decisions that are supported by the available literature, are consistent with published 'best practice' consensus guidelines and that are cost-effective. However, when faced with the same facts, different healthcare providers employ a wide range of diagnostic tests, prescribe disparate therapies and implement varying management principles.² Although minor variations in the process of care are an expected byproduct of modern medicine, frequent digressions from evidence-based recommendations denote poor quality of care.² Despite the wide dissemination of practice guidelines, clinical care pathways and utilization review protocols, extreme variation continues to exist throughout all fields of medicine. For example, we recently described such variation in the diagnosis and management of Crohn's Disease.³

In the field of nonvariceal upper gastrointestinal tract haemorrhage (NVUGIH), there is now extensive evidence supporting best practices pertaining to risk assessment and triage, endoscopic haemostasis, pharmacotherapy and postendoscopic care.⁴ These best practices have been summarized and disseminated in published consensus guidelines.^{4, 5} However, it remains unclear whether providers follow these guidelines. Demonstrating wide variations in NVUGIH process of care would indicate a need to disseminate better the available information. Furthermore, identifying specific factors that predict extremes in decision-making may allow for improved targeting of areas where provider knowledge or education may be inadequate. It is important to identify first the specific disconnects between guidelines and practice and to understand physician-level predictors of practice-patterns. By collecting these data, clinical investigators may be better equipped to implement future quality improvement measures aimed at reducing extreme variations in resource utilization, streamlining decision-making towards best practice guidelines, increasing appropriateness of care and ultimately improving the quality and cost-effectiveness of care.

However, there are many areas in NVUGIH where best practices cannot yet be established because of inadequate data or conflicting opinions. Four areas, in particular, have been the subject of debate and practice variations: (i) pre-endoscopic management and disposition of patients; (ii) management of adherent ulcer clots; (iii) use of hemoclips in active bleeding; and (iv) the optimal dosage, timing and mode of administration of antisecretory therapies in high-risk bleeding.

We conducted a national survey to compare adherence with NVUGIH best practices between a group of NVUGIH experts and non-expert gastroenterologists. We further measured beliefs about areas of controversy in NVUGIH and compared these beliefs between experts and non-experts.

METHODS

Overview of clinical vignette survey methodology

Vignette survey design. We developed an online questionnaire that comprised three clinical vignettes to evaluate specific scenarios in the diagnosis and management of NVUGIH. We developed the vignettes in concert with recognized content experts in NVUGIH and survey design specialists to ensure face validity, comprehensibility and comprehensiveness. Each vignette began with a standardized patient history and physical examination and was followed by management questions pertaining to pre-endoscopic triage, pre-endoscopic management, endoscopic therapy, and postendoscopic management. The questions included vertical single best answers, horizontal matrix items and open-ended items. Upon endoscopy, respondents viewed a standardized endoscopic image. The first vignette was of a high-risk patient ultimately found to have an actively spurting vessel in a duodenal ulcer. The second vignette depicted a low-risk patient found to have a clean-based ulcer. The third vignette revealed an adherent clot over a non-bleeding ulcer base. Refer to the Appendix (Supporting information available on line) for the full vignettes. The survey was iteratively tested for clarity with a series of pilot trials in a group of 16 subjects including a range of private, academic and research gastroenterologists. The selected images of ulcer stigmata were provided to a group of five thought leaders in NVUGIH (authors D.J., L.L., G.D., I.G., and G.E.)

and the inter-rater reliability for accurate interpretation was perfect ($\kappa = 1.0$).

Sampling frame. We surveyed two groups of physicians:

Sample of NVUGIH key opinion leaders ('Experts'): We surveyed a sample ($n = 40$) of experts in NVUGIB. We identified these key opinion leaders on the basis of their publication records over the past 5 years, their membership in practice guideline committees and their participation in advisory councils for the American Gastroenterological Association, the American College of Gastroenterology and the American Society of Gastrointestinal Endoscopy. We use the term 'expert' in reference to this group throughout the remainder of this article. The authors were not included in this list, nor did any authors complete the survey.

Simple random sample of 'non-expert' gastroenterologists: We surveyed a random sample of 360 gastroenterologists from the membership directory of the American Gastroenterological Association. In case the random selection process identified an NVUGIH expert already included in the first group of providers, we repeated the random selection process to identify a second individual to avoid duplicates between samples. We use the term 'non-expert' in reference to this group throughout the remainder of this article.

Sample size considerations. Assuming 15 subjects for each of 10 potential independent predictors in multivariable regression analysis (see 'Analyses', below), we required a minimum of 150 to complete the survey to avoid overmatching of the regression models. Assuming a 40% response rate, we required 380 physicians to survey in the sampling frame.

Survey distribution and follow-up procedures. Respondents initially received the survey electronically using an online questionnaire platform ('Survey Monkey' software, <http://www.surveymonkey.com>). Physicians received emails with cover letters and a link to online survey. Participants completing the survey were eligible to receive a one-time honorarium of \$10. Nonresponders after 2 weeks received a follow-up email. Finally, 1 week after the second email

correspondence, a printed version of the questionnaire was mailed to nonresponders.

Analyses

Measuring adherence to best practices. We designed the survey to include a sub-set of specific questions that address adherence vs. non-adherence to 'best practices' in NVUGIH management. Each answer choice to this sub-set of questions was coded as 'appropriate' or 'inappropriate' as determined by published practice guidelines.^{4, 5} For example, guidelines state that it is inappropriate to perform endoscopic haemostasis in the setting of a clean-based peptic ulcer. Therefore, if a respondent opted to perform endoscopic haemostasis in clinical vignette no. 2 (clean-based ulcer), then the response was classified as inappropriate. Similarly, guidelines state that it is appropriate to use an initial intravenous (IV) bolus followed by continuous-infusion proton pump inhibitor (PPI) therapy in patients who have received successful endoscopic haemostasis. Therefore, if a respondent opted to employ bolus dosing instead of continuous infusion PPI therapy, then the response was classified as inappropriate.

There were 13 best practices embedded in the survey (Table 1). These practices were culled from the literature including published consensus recommendations. For example, Barkun *et al.* published NVUGIH guidelines based on evidence-based recommendations from a multi-national panel of 25 experts in the field.⁴ We adopted several of these previously established best practices⁴ and included other evidence-based recommendations.⁵ Before including a candidate best practice into the survey, each of five authors, all of whom are experts in NVUGIH (D.J., L.L., G.D., I.G., G.E.), independently assessed the suitability of each practice for inclusion. To remain conservative, we only included candidate best practices that all five authors believed were appropriate and sufficiently evidence-based. The full list of best practices is provided in Table 1.

We conducted bivariate analyses to compare adherence to best practices between expert and non-expert groups. We compared adherence using a chi-squared test and employed a P -value of <0.05 as evidence for statistical significance. We then performed multivariable linear regression analysis to determine if any provider or practice-type characteristics (e.g. provider age, gender, practice setting, geographical location,

Table 1. Pre-endoscopic, endoscopic, and postendoscopic 'best practices' for nonvariceal upper gastrointestinal tract haemorrhage (NVUGIH)

Best practice	Experts (%)	Non-experts (%)	P-value
Pre-endoscopic practices			
High-risk bleed needs admission and monitored bed	92	95	0.72
If use pre-EGD IV PPI, use bolus dose followed by continuous infusion	88	63	0.01
Octreotide not indicated in NVUGIH	88	75	0.15
Ice lavage not indicated in NVUGIH	88	77	0.2
Perform EGD prior to discharge	96	95	0.84
Patients with clinical evidence of NVUGIH should not be discharged prior to diagnostic EGD	96	95	0.84
Endoscopic practices			
Early EGD (within 24 h) is indicated in high-risk bleeder	100	99	0.7
Use therapeutic and/or double channel scope if high-risk bleeder	100	85	0.04
Monotherapy not indicated in spurting vessel (unless clip)	96	96	0.84
Clean based ulcers should not receive haemostasis	92	94	0.72
Postendoscopic practices			
If use post-EGD IV PPI, use bolus followed by continuous infusion	92	64	0.005
Routine second-look endoscopy is not indicated	100	91	0.12
In ulcer bleed must have some plan to check <i>Helicobacter pylori</i> status	92	98	0.08

The data compare level of adherence with each of the best practices between experts and non-expert gastroenterologists. Bold values are statistically significant.

EGD, endoscopy; IV, intravenous; PPI, proton pump inhibitor.

society memberships, case load of NVUGIH patients per month and years of practice) were associated with endorsement of best practices. In addition, we measured the relationship between provider knowledge and guideline adherence. We operationalized provider knowledge level with a 'knowledge index', which was a composite score representing the proportion of six embedded knowledge questions answered correctly by each respondent. To avoid circularity, the knowledge questions did not overlap with the guidelines themselves. The questions instead pertained to each respondent's ability to classify correctly the stigmata on the endoscopic images and their knowledge about risk of rebleeding for various stigmata of recent haemorrhage.

Measuring agreement in areas of uncertainty. In addition to items regarding established best practices, the survey included items pertaining to areas of uncertainty. For pre-endoscopic management, we evaluated beliefs in five areas regarding high-risk NVUGIH: (i) appropriateness of nasogastric lavage; (ii) appropriateness of gastric motility agents prior to endoscopy (i.e. erythromycin and metoclopramide); (iii) appropriateness of prophylactic intubation prior to endoscopy; (iv) use and mode of administration

of pre-endoscopic antisecretory therapy; and (v) optimal pre-endoscopic disposition [e.g. transfer to gastrointestinal (GI) suite for immediate endoscopy; initial transfer to intensive care unit; remain in emergency department for endoscopy; transfer to monitored floor bed; transfer to nonmonitored bed]. For endoscopic management, we evaluated provider beliefs in two areas: (i) snaring adherent clots overlying ulcers; and (ii) using mechanical therapy (e.g. hemoclips) in active bleeding.

For 'appropriateness' assessments pertaining to nasogastric lavage, motility agents and prophylactic intubation, we asked respondents to rate appropriateness using a standard nine-point RAND Appropriateness Scale (RAS) with the following interpretation: scores 1–3 = 'generally inappropriate'; scores 4–6 = 'unsure'; scores 7–9 = 'generally appropriate'.⁶ We compared mean RAS scores between experts and non-experts using a two-sided *t*-test and employing a *P*-value <0.05 as significant. To quantify the level of agreement, we also calculated the RAND 'Disagreement Index' (DI) for each factor.⁷ The DI is based on the distribution and symmetry of the scores across the nine-point RAS and has been externally validated as a measure of variation in

provider beliefs. A higher DI indicates wider spread across the nine-point scale and lower values indicate increasing consensus. If the DI exceeds 1.0, then the distribution meets criteria for 'extreme variation' in ratings. If the DI is ≤ 1.0 , then there is no extreme variation. The DI is calculated using a standard published equation.⁷

RESULTS

Sample characteristics

Table 2 displays the characteristics of the survey respondents. One hundred and eighty-eight respondents returned their surveys including 25 of 40 NVUGIH experts (63% response rate) and 163 of 369

Table 2. Demographic and practice-pattern information of respondents

Variable	Mean \pm s.d. experts <i>n</i> = 25	Mean \pm s.d. non-experts <i>n</i> = 163	<i>P</i> -value
Age (mean years)	50.0 \pm 6.5	49.0 \pm 9.4	0.60
Male gender (%)	100	89	0.08
Years in practice	24.2 \pm 7	23.1 \pm 9.6	0.56
Clinical GI practice (%)	70.0	85.0	0.006
Clinical research practice (%)	18.4	8.1	0.002
Primary practice setting (%)			
Private community practice	16%	76%	<0.001
University clinical faculty	76%	12%	<0.001
Health Maintenance Organization	0%	5%	0.23
Other	8%	7%	0.9
Number of GI bleed patients seen per month (%)			
None	0	6	
1–5	44	46	
6–10	24	40	
11–20	24	7	
>20	8	3	0.02
Geographic location (%)			
West	13	36	
Midwest	26	19	
South	19	28	
Northeast	31	17	
International	5	0	<0.001

Bold values are statistically significant.
GI, gastrointestinal.

non-experts (44% response rate). The expert group was significantly more likely to be engaged in conducting research, but had a smaller proportion of time dedicated to clinical care. Nonetheless, experts reported evaluating more patients with NVUGIH per month than non-experts.

Adherence to NVUGIH best practices

Table 1 provides the results of expert and non-expert adherence to pre-endoscopic, endoscopic and postendoscopic best practices. Overall, experts endorsed more 'best practices' than non-experts (93% vs. 84%; $\Delta = 9\%$; 95% CI = 2–10%; $P = 0.002$) and had higher 'knowledge index' scores than non-experts (86% vs. 70% correct; $\Delta = 16\%$; 95% CI = 4–28%; $P = 0.008$). In those respondents selecting pre-endoscopy PPI therapy, experts were more likely than non-experts (88% to 63%, $P = 0.01$) to dose IV PPI according to evidence-based practice (i.e. bolus followed by continuous infusion), whereas non-experts were more likely to endorse bolus dosing without continuous infusion. All respondents endorsed PPI use posthaemostasis, although experts were more likely to correctly endorse infusion (92% vs. 64%; $P = 0.005$), whereas non-experts were more likely to endorse twice-daily or thrice-daily bolus dosing. In multivariable regression adjusting for provider demographics, practice setting, gastroenterology society membership, years in practice, NVUGIH cases per month and 'knowledge index' scores, experts remained over four times more likely to use IV PPIs 'correctly' (initial bolus, then infusion) vs. non-experts (OR = 4.2; 95% CI = 1.5–11.7). For endoscopy-related practices, experts were more likely than non-experts to use a therapeutic and/or double channel endoscope in high risk NVUGIH (100% vs. 85%; $P = 0.04$). There were no significant differences between expert and non-expert endorsement for any of the other best practices (Table 1).

In multivariable regression analysis adjusting for a range of covariates, experts adhered to 5% more guidelines than non-experts ($\beta = 0.16$; $P = 0.02$) and answered 13% more questions correctly in the 'knowledge index' ($\beta = 0.13$; $P = 0.02$). Other independent predictors of guideline adherence included age <50 years ($\beta = 0.04$; $P = 0.05$), clinical activity >50% of time ($\beta = 0.06$; $P = 0.02$) and being in top half of 'knowledge index' scores ($\beta = 16\%$; $P < 0.001$).

Provider beliefs regarding areas of uncertainty in NVUGIH

Pre-endoscopic management in high-risk NVUGIH. The survey elicited provider beliefs about the appropriateness of various measures to enhance triage and subsequent endoscopic success including pre-endoscopic nasogastric lavage, use of pro-motility agents (i.e. erythromycin and metoclopramide) and prophylactic intubation in the high-risk bleeding vignette. The mean RAS and DI scores for these practices are provided in Table 3. Both the expert and non-expert groups were generally 'unsure' about the appropriateness of nasogastric lavage (Expert RAS = 5.8; Non-Expert RAS = 5.7; $P = 0.84$). However, both groups were internally polarized regarding nasogastric lavage and thus exhibited 'extreme variation' in their beliefs about this practice [DI for both expert and non-expert groups >1.0 (e.g. 'extreme variation')]. Both groups rated metoclopramide as generally inappropriate, but rated erythromycin as more appropriate. However, both groups exhibited extreme variation regarding use of erythromycin. Finally, both groups believed that prophylactic intubation is generally inappropriate, even in high-risk bleeding (i.e. Vignette no. 1).

The survey measured beliefs about the use of pre-endoscopic antisecretory therapy in high-risk NVUGIH. Overall, 80% of respondents endorsed IV PPI use prior to endoscopy, whereas only 3% and 1% endorsed PO PPI and IV Histamine-2 Receptor Antagonist (H2RA), respectively. More experts than non-experts chose to use no pre-endoscopic antisecretory therapy (24% vs. 11%; $P = 0.03$). Among respondents endorsing pre-endoscopic IV PPI therapy, the most commonly cited reason for using the IV route was a belief that it is

more effective than PO PPI or IV H2RA (34%), followed by the belief that IV and PO PPI are equally effective, but that IV has other advantages (e.g. safety, route and patient preference) not shared by the PO route (28%). Sixteen per cent of IV PPI users believed that PO therapy can negatively impact endoscopic success because of retained pills and cited this as their primary rationale for using IV vs. PO routes. Table 4 provides the breakdown of all results regarding pre-endoscopic dosing practices.

In addition to initial therapeutic and diagnostic manoeuvres, the survey asked about optimal disposition after initial Emergency Department assessment. The most common disposition in the high-risk NVUGIH vignette was to transfer to a GI endoscopy suite for immediate endoscopy (31%), followed by transfer to an intensive care unit (29%), remain in the Emergency Department for endoscopy (15%), transfer to a monitored floor bed (14%) and transfer to a nonmonitored bed (6%). Experts and non-experts did not vary in their beliefs about site of initial disposition.

Endoscopic management in high-risk NVUGIH. The clinical vignettes included a high-risk patient with an actively 'spurting' vessel and a patient found to have an adherent clot (Vignette no. 3). Table 5 summarizes the key results with respect to practice patterns in the management of clots, use of mechanical therapy and use of epinephrine monotherapy vs. combination therapy between expert and non-expert groups.

In the adherent clot vignette, 88% of experts opted to snare the clot and treat the underlying stigmata, whereas 60% of non-experts endorsed this method (group $\Delta = 28\%$; 95% CI of $\Delta = 11-52\%$; $P = 0.02$). In

Pre-EGD manoeuvre	Expert group		Non-expert group		P-value
	Mean RAS (median)	DI	Mean RAS (median)	DI	
Perform nasogastric lavage	5.8 (5.5)	4.7	5.7 (6.0)	4.7	0.84
Administer metoclopramide	3.5 (3)	0.7	3.3 (3.0)	0.8	0.7
Administer erythromycin	5.4 (6)	2.3	4.1 (4.0)	1.6	0.02
Endotracheal intubation	2 (2)	0.21	2.2 (2)	0.29	0.65

Table 3. Expert vs. non-expert beliefs about appropriateness of various pre-endoscopic manoeuvres in high-risk NVUGIH

Appropriateness is measured on a 9-point RAND Appropriateness Scale (RAS), where 1-3 = 'generally inappropriate', 4-6 = 'unsure', and 7-9 = 'generally appropriate'. Variation within group is measured using the RAND Disagreement Index (DI), where a $DI \geq 1.0$ indicates 'extreme variation' in ratings. Bold values are statistically significant.

Table 4. Practice patterns of antisecretory use in high-risk nonvariceal upper gastrointestinal tract haemorrhage

	Experts (%)	Non-experts (%)	P-value
Pre-EGD antisecretory use			
Therapy			
PO H2RA	0	0	N/A
IV H2RA	0	1.20	0.6
PO PPI	4	3	0.8
IV PPI	72	81	0.3
No antisecretory therapy	24	9	0.03
Providers endorsing pre-EGD IV PPI: reasons use IV over PO			
Rationale			
Patients prefer IV vs. PO	4	3.00	0.65
Easier to administer IV	0	2.00	0.49
IV safer than PO	0	1	0.7
IV more effective than PO	32	36	0.72
PO negatively impacts EGD	16	16	0.99
Equal, but other advantages	28	33	0.65
Dose IV PPI endorsed pre-EGD			
Dose			
Infusion without bolus	4	4	0.95
Bolus, then infusion	60	44	0.1
Bolus, no infusion	4	15	0.14
b.d. boluses	0	13	0.05
t.d.s. boluses	0.00	1	0.57
Post-EGD antisecretory use			
Dose			
IV continuous 24 h	24	17	0.4
IV continuous 48 h	28	21	0.46
IV PPI continuous 72 h	40	19	0.02
IV PPI b.d. boluses	4	14	0.16
PO PPI q.d.s.	0	6	0.2
PO PPI b.d.	4	16	0.11
Any PO PPI (q.d.s. or b.d.)	4	22	0.03
IV H2RA 24 h	0	0	N/A
IV H2RA 48 h	0	0	N/A
No antisecretory	0	0	N/A

Bold values are statistically significant.

IV, intravenous, PPI, proton pump inhibitor, EGD, endoscopy.

Table 5. Practice patterns in the management of clots, use of hemoclips and use of epinephrine monotherapy vs. combination therapy between experts and 'non-expert' community providers

Endoscopic practice	Combined groups (%)	Experts (%)	Non-experts (%)	P-value
Snare clot overlying vessel?	60	88	56	0.02
Use hemoclip on actively spurting vessel?	33	32	33	0.91
Use combination therapy (vs. monotherapy) on spurting vessel?	84	84	84	1.0

Bold values are statistically significant.

multivariable regression, experts were six times more likely to snare vs. non-experts (OR = 5.99; CI = 1.6–22.3; $P = 0.001$). Among the 15% of respondents who did not

correctly identify the image as a clot ($n = 23$), 48% used epinephrine injection in addition to heater probe treatment, while the rest used one of seven alternatives.

In the 'spurting vessel' vignette, 33% of respondents used a hemoclip, either alone (7%) or with epinephrine injection (27%). There was no difference in the use of hemoclip between experts and non-experts ($P = 0.91$). Eighty-seven per cent of respondents used combination therapy for the spurting vessel (60% epinephrine injection plus probe haemostasis, 27% epinephrine injection plus hemoclip placement). There was no difference in the use of dual therapy between experts and non-experts ($P = 1.0$).

DISCUSSION

We found that experts are more likely than non-experts to comply with best practices in NVUGIH, although adherence is high in both groups. We found that non-experts diverge from experts in the dosing of IV PPIs and choice of endoscope in high-risk bleeding. Overall, we found that best practices have been generally well disseminated, but that persistent disconnects exist that should be addressed.

On the basis of these data, future educational interventions should focus on appropriate dosing of IV PPI therapy and should emphasize the importance of selecting large-channel therapeutic scopes in the setting of high-risk NVUGIH. This can occur through several avenues including society-sponsored guideline updates and monographs, directed review articles, continuing medical educational programmes and emphasis on GI training programme core lecture series. In addition, future efforts should be made to ensure that providers can reliably interpret varying stigmata of recent haemorrhage, as we found that misinterpretation predicts poor adherence to guidelines. Although the experts in our survey were in agreement on interpretation of the pictured stigmata, published literature suggests that there is generally only fair to good agreement in classifying peptic ulcer stigmata.⁸ Future steps may include formal ulcer stigmata picture tests in training programmes and distribution of CME photo-quizzes in multiple media including journals, home mailings and online sites.

In contrast to the established best practices assessed in this survey, there is less certainty about the role of pre-endoscopic antisecretory therapy. Recent data suggest that high-dose PPI therapy, in particular, can downgrade ulcer stigmata at the time of subsequent endoscopy.⁹ However, employing routine pre-endoscopic antisecretory therapy is not standardized and has not yet become a formal best practice.

We found that compared with non-experts, experts are more likely to withhold antisecretory therapy prior to endoscopy. This suggests that further data are necessary before adopting this practice more widely. Among those using pre-endoscopic antisecretory therapy, experts were more likely than non-experts to endorse IV vs. oral PPI therapy. This selection was largely based on the belief that IV therapy is more effective than oral therapy, although, to date, there have been no head-to-head clinical trials to support this contention.

Another area of uncertainty is the appropriateness of routine pre-endoscopic nasogastric lavage in high-risk patients. The use of nasogastric lavage by emergency room physicians is variable and, in some centres, routine lavage is not performed in suspected NVUGIH unless requested by a gastroenterologist. Despite the reluctance of many emergency physicians to perform routine nasogastric lavage, there are some data suggesting that this practice may provide important information for risk stratification.¹⁰ However, the benefits of nasogastric lavage for other outcomes, such as minimizing aspiration risk¹¹ or improving endoscopic visualization⁷ remain controversial. Our survey reflects this controversy, as both expert and non-expert groups exhibited wide variations in their beliefs about using routine nasogastric lavage. This suggests that it is potentially premature to advocate routine nasogastric lavage as a best practice quality indicator. Future research should further define the value of routine nasogastric lavage, not only for predicting endoscopic findings, but also for impacting outcomes.

Providers were similarly at conflict about the appropriateness of pre-endoscopic promotility agents. Both experts and non-experts rated erythromycin as more appropriate than metoclopramide prior to endoscopy. This may reflect recent data from a randomized controlled trial that erythromycin yields superior endoscopic visualization, but does not impact patient outcomes vs. placebo in a (metoclopramide was not an arm in that study).¹² However, despite these data about erythromycin, both expert and non-expert groups exhibited 'extreme variation' regarding the use of erythromycin. To help with decision making, future studies should evaluate the impact of these agents not only on endoscopic visualization, but also on overall patient outcomes.

Our survey revealed large variation in opinions about the optimal disposition of high-risk NVUGIH patients. Although most providers maintained

high-risk patients in a monitored setting, there was large variation in the site of monitoring. Perhaps surprisingly, most respondents endorsed transferring high-risk patients directly to a dedicated endoscopy suite. Yet others preferred to transfer directly to an intensive care unit. Still others maintain that endoscopy in the emergency department is optimal. These differences may be more reflective of variations in institutional resources, policies and culture and less reflective of evidence that any one setting is optimal to another. Nonetheless, this variation suggests that future research should better define the impact of initial disposition on overall patient outcomes.

In addition to pre-endoscopic areas of uncertainty, our survey also elicited beliefs about areas of controversy in endoscopic therapy NVUGIH. One area of practice variation is the use of hemoclips in active bleeding. Data indicate that hemoclips may be more effective than epinephrine injection alone, but similar to thermocoagulation in achieving definitive haemostasis.¹³ We found that one-third of providers in this survey endorse the use of hemoclips in active bleeding, with most of using it in combination with epinephrine. Thus, although the use of hemoclips is gaining traction, most respondents in this survey prefer other alternatives suggesting that further research or dissemination of existing research may be necessary to clarify the role of hemoclips in active ulcer bleeding.

Another area of uncertainty is the optimal endoscopic approach to adherent clots. Although still controversial in clinical practice, data suggest that snaring adherent clots and identifying underlying major stigmata may be superior to medical therapy alone for preventing recurrent bleeding.¹⁴ We found that experts are more likely than non-experts to snare an overlying clot suggesting a relative lack of buy-in, familiarity or comfort of non-expert GIs with this technique.

This study has several limitations. First, the ideal method of measuring process of care is to observe physicians in actual everyday clinical practice – not with survey vignettes. However, this approach is also limited because of the ‘Hawthorne effect’ in which providers artificially alter their practice when they are knowingly observed. Standardized patients¹⁵ and medical record data abstraction¹⁶ are alternatives. Notably, survey-based clinical vignettes have been validated as an accurate surrogate for both chart abstraction and standardized patients.¹⁷ Second, our clinical vignettes do not represent all possible scenarios in NVUGIH. For example, we do not include patients already on a PPI

at the time of haemorrhage. However, we followed several steps to ensure adequate content validity of our vignettes, including consultation with key opinion leaders in NVUGIH, review by experts in survey design and administration and pilot testing for comprehensibility. Third, our definition of ‘best practices’ is largely based on a guideline that is now 5 years old.⁴ However, these guidelines are comprehensive in their content and thorough in their consensus-building methods. Although updated guidelines are inevitable, the major societies have not published similarly comprehensive guidelines over the last several years. Finally, our distinction of expert vs. non-expert, although based on explicit criteria, may fail to acknowledge the fact that many ‘non-expert’ providers who perform endoscopy on a daily basis might have more clinical experience than academic thought leaders. Nevertheless, even after adjusting for clinical loads, we found that experts remained more likely to follow guidelines than non-experts. Notably, clinical patient load was also an independent predictor of compliance suggesting that busy clinicians most certainly ‘learn on the job’, regardless of whether they are ‘experts’ or ‘non-experts’.

In conclusion, we found that best practices in NVUGIH have been well disseminated and that both experts and non-experts adhere to most established best practices. However, persistent disconnects exist that should be addressed, particularly those pertaining to PPI dosing and use of therapeutic scopes in high-risk bleeding. In addition, we found wide variations in beliefs about nasogastric lavage, pre-endoscopic use of pro-motility agents and snaring of adherent clots. These variations indicate that ‘best practices’ in these areas remain uncertain and should be subjected to further research and guideline development.

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DISCLAIMER

The opinions and assertions contained herein are the sole views of the authors and are not to be construed

as official or as reflecting the views of the Department of Veteran Affairs.

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Evaluating the process of care in acute, nonvariceal upper gastrointestinal haemorrhage

Please note: Wiley-Blackwell are not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

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