Quality Improvement of Gastrointestinal Endoscopy in Korea: Past, Present, and Future

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The motivation for improving quality of gastrointestinal endoscopy begins with the desire to provide patients with the best possible care. Gastrointestinal endoscopy is an excellent area for quality improvement because of its high volume, significant associated risk and expense, and variability in its performance affecting outcomes. Therefore, the assurance that high-quality endoscopic procedures are performed has taken increased importance. The ‘Korean Gastrointestinal Endoscopy Research Foundation’ and ‘Korean Society of Gastrointestinal Endoscopy’, as ladders in promoting the highest quality patient care, formed endoscopy quality evaluation in ‘National Cancer Screening Program’ and ‘Endoscopy Unit Accreditation’ in Korea. However, both new systems have not settled down despite efforts of many years and support by the government. In this article, the past and present of quality improvement of gastrointestinal endoscopy will be reviewed, and the future of quality improvement of gastrointestinal endoscopy will be illuminated. (Korean J Gastroenterol 2014;64:320-332)

Key Words: Endoscopy; Endoscopy, digestive system; Colonoscopy; Quality improvement; Accreditation
찰에 대한 관심이 더욱 고조되었다. Chen과 Rex는 1999년부터 2004년까지 이타야나 대학병원에서 시행된 10,034건의 대장내시경 검사를 분석한 결과, 내시경 검사를 수행하는 내시경 의료진 간에 생성 발전율은 유의한 차이(15.4-41.1%)가 있다고 보고하였다. 내시경 성공률 내시경 수련 과정에 따라 서도 차이가 있었는데, 소화기내과 수련의들이 외과 수련의들에 비해 대장내시경 산업 공정, 플립 발전율, 생성 발전율이 우수하였다. 이 연구에서 소화기내과 수련의들의 생성 발전율은 14%였던 반면 외과 수련의들의 생성 발전율은 9%에 불과하였다. 하지만, 내시경 의료진의 양상 진료에서 내시경 질 향상에 대한 관심은 부족했던 것이 사실이다. 독일의 12개 의료기관에서 수집된 4,800건의 대장내시경 검사 결과를 분석한 결과, 대장내시경 검사에 대한 기록과 행장삽입의 시기 기록이 각각 62%와 71%에 불과할 정도로 임상 진료는 표준이 많이 못 미치고 있었다. 또 다른 연구도 내시경 질 지표의 기록이 병원 간에 심한 격차가 있다는 것을 확인할 수 있었다. 따라서, 개인 간, 기관 간 내시경 수준의 변화를 줄이기 위해서 내시경 질 향상 프로그램과 교육이 필요하다.

이러한 현상은 국내에서도 비슷할 것이라고 추측할 수 있다. 국내에서도 의료의 질에 대한 관심이 부족히 증가하고 있으며, 정부 주도의 병원 인증 평가 사업과 학회 주도의 인증사업이 다양하게 전개되고 있다. 정부는 2006년부터 국가 암검진 사업의 질 향상을 위하여 추진한 노력이 있었고, 대한소화기내시경학회에서도 2012년부터 우리나라 내시경질 인증제 사업을 시행하여 내시경 질 향상을 목표하고 있다. 하지만, 정부와 학회의 이러한 노력에도 불구하고 국내 내시경 질 향상 사업은 아직 제대로 정립되지 못하고 있는 것이 현실이다. 이 글에서는 국내 내시경 질 향상 사업의 과거와 현재를 다루고, 앞으로 나아가야 할 방향에 대해 고민해보고자 한다.

본론
1. 국내 내시경 질 향상 사업의 과거와 현재

현재 국내의 내시경 질 향상 사업은 국가 암검진 내시경질 향상 사업과 우수내시경실 인증제 사업이 시행되고 있다. 국가 암검진 내시경 질 향상 사업은 정부 주도의 대규모 질향상사업이 반면, 우수내시경실 인증제 사업은 대한소화기내시경 연구재단에서 회원들의 자발적인 참여를 바탕으로 시행되고 있으며, 보다 세밀한 평가를 시행하고 있다.

1) 국가 암검진 내시경 질 향상 사업의 과거와 현재

정부는 1996년부터 ‘암 전후 10개년 계획’을 수립하고, 2006년부터 ‘암 전후 20개년 계획’을 수립하여 추진하고 있으며, 그 일환으로 1999년부터 ‘국가암검진사업’을 실시하고 있다. 하지만, 국가 암검진 사업에서 관찰되는 암 발현율은 일반적으로 소화기내과 전문가 직접 찾는 암 전문 기관의 암 발현율에 비해 현저하게 낮아, 국가 암검진 사업의 질에 대한 국민의 불만이 증가하였다. 이러한 배경으로 정부 주도의 국가 암검진 평가 사업이 도입되었으며, 보건복지부측, 국립암센터, 대한소화기내시경연구재단이 연계하여 2008년부터 국가 암검진 내시경질평가 사업을 수행하였다. 국가 암검진 내시경질평가 사업은 1주기 사업과 2주기 사업으로 분류할 수 있는데, 2008년부터 2010년까지 시행된 1주기 사업에서는 암검진 기관을 대상으로 내시경질평가에 대한 인식 확산과 동기 부여를 시키고, 암 검진 현황을 파악한 후 향후 목표 설정에 필요한 기초 자료를 확보하는 것이 목표였다. 2012년부터 2013년까지 시행된 2주기 사업에서는 국가 건강검진 기관 평가와 통합모델 구축, 평가도구의 안정화, 평가결과의 실질적 활용을 목표로 진행되었다.

2) 우수내시경실 인증제 사업의 과거와 현재

국가 암검진 내시경 질 평가 사업은 정부 주도의 사업비로 진행되었지만, 질 향상 사업은 내내로서서 실질적으로 발생되어야 한다는 지식과 정부 주도의 사업비 지속성에 대한 불안감이 있어 왔다. 또한, 국가 암검진 내시경 질 평가 사업은 국가 암검진 내시경 검사를 시행하는 기관뿐만 아니라, 정부 주도의 사업비에 국한되어 있기 때문에 내시경 실습의 전반적인 질 향상을 도모하기에는 제도적인 부족이 있었다. 게다가, 국가 암검진 내시경 평가항목들은 암검진 감사에 대한 최소 기준을 평가하므로 전반적인 내시경질 향상을 촉진하는 데 미흡했지만, 최근 국민의 의식이 상승되고 내시경 소독 문제 및 내시경 관련 법적 문제를 근본적으로 향상시킨다는 인식이 증가하면서 우수내시경실 인증제 사업이 전개되었다. 2011년 우수내시경실 인증제 준비 워크숍 두 차례 시행하고 서구의 내시경실 인증제를 참고하여 인증 기준에 대한 조언을 마련한 후, 2011년 6월에 비로소 우수내시경실 인증제 백서를 발간하였다. 2011년 추계 대한소화기내시경학회 세미나와 대한소화기내시경학회 홈페이지를 통해 홍보와 안내를 시작하며, 2012년에 대학병원과 수련병원을 대상으로 우수내시경실 인증제 시범사업을 시작하였다.

우수내시경실 인증제의 목표는 소화기내시경 분야에서 최선의 질 향상을 추구함으로써 환자 진료와 국민 건강을 증진시키는 것이며, 우수내시경실 인증제는 해당 의료기관이 내시경과 관련된 일련의 의료 서비스를 제공하는 과정에서 환자안전보장과 정교한 수준의 질을 달성했음을 의미한다. 이를 위해, 내시경 시행 기관이 내시경 질 관리

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프로그램에 자발적으로 참여하고 질 관리 지침을 준수하도록 유도하였다. 우수내시경실 인증제의 중요한 한가지 조건은 1) 내시경 시행 의사의 자격, 2) 대한소화기내시경정부에서 권장하는 지침 준수 및 환자 안전에 관련된 지시 및 장비, 3) 표준 내시경 소독지침 준수이다.

소화기내시경 분야의 전문 분야에 해당하여 전문 지식을 갖춘 동료들에 의해 평가되는 것이 바람직하다. 따라서, 우수내시경실 인증 사업의 도입 단계를 고려하여 의료기관의 부담을 최소화하기 위한 많은 의료기관의 부담을 최소화하는 방향으로 의료기관 내시경에서 준비가 가능한 방법을 모색하고, 1차 및 2차 의료기관에서 실현 가능한 현실적인 기준을 제시하였다. 우수내시경실 인증 사업은 자율 인증제도에 따른 하부의 의료기관에 있어서는 더 많이 적용될 가능성이 높아간다. 표준형 평가항목에 대한 심사 결과는 인증과 불인증의 조건에 따라 15개 기관이 포함되었다.

3. 국내 내시경 질 향상 사업의 성과

그 동안 내시경 질 향상 사업을 통해 많은 검진기관에서 내시경 소득에 관한 인식을 달리하게 되어 다양한 내시경 소득이 이루어졌으며, 정확한 시술 환경 및 기록 작성, 검진 대상자의 안전 대비로 인해 전반적인 내시경 행위의 질 향상이 이루어졌다. 실제로, '암점검 10개년 계획' 시행 이전인 1993-1995년과 비교할 경우 위암 및 대장암의 5년 생존율 증가가 현저하였고, 이러한 생존율 증가는 남녀 전반에 걸쳐 계약되었다.

현재 재검진 사업을 통해 내시경 소득 관련 교육 프로그램을 제공하고 있다.12 온라인 교육 프로그램은 시간과 장소로 구애받지 않고 수준별 학습이 가능한 장점이 있다. 특히, 이 교육 프로그램에서는 내시경 소득에 대해 동영상으로 전달하는 것을 시행하고 있으며, 표준 시식지와 표준 보고서 등을 제공하고 있다. 내시경 질 향상에서 가장 중요한 영역 중 하나가 내시경 소득이기에, 실제로 내시경 소득을 직접 해보는 교육인 1:1 도전식 내시경 소득교육을 정기적으로 시행하고 있다. 또한, 전년도의 국가 암점검 내시경 질 향상의 평가 결과에 근거하여 부적합 판정을 받은 의료기관을 중심으로 내시경 전반에 걸친 집중 교육인 벤더 스쿨을 운영하고 있다. 내시경 평가가 단순히 평가가 아니라 교육을 통한 질 향상을 유도하는 것이 목표는 되는 것이 잘못된 경우에도 벤더 스쿨이다.

우수내시경실 인증제도는 사업이 시작된 지 2년이 경과되었기 때문에 시작 단계라고 할 수 있다. 2013년에는 200병상 이상의 병원급 기관의 내시경실을 대상으로 20여 개 기관이 인증을 받았으며, 올해는 100병상 이상의 병원급 기관의 내시경실을 대상으로 15개 기관이 인증을 받을 예정이다.

4. 국가 내시경 질 향상 사업의 미래

1) 평가항목의 한계

내시경을 시행하는 의사 또는 의료기관 간의 다양한 차이가 있는 인식을 통해 이를 개선하고 차이를 극복할 수 있다. 내시경 수술 차이를 확인할 수 있으며, 인증제, 교육, 인센티브 제도, 피드백, 전산 프로그램 등 다양한 방법으로 질 향상을 유도할 수 있게 된 것이다. 더욱이, 평가항목에 대한 심사를 하지 않더라도 해당 평가항목의 질 수준이 향상될 수 있는데, 이는 피검자를 보호하고 측정하기도 해도 피검자의 관심과 참여가 향상되는 Hawthorne 효과 때문이다.14 하지만, 차이를 확인하기 위해서는 차이를 측정할 수 있는 평가항목이 필요하다.
Table 1. Quality Evaluation Criteria of Esophagogastrroduodenoscopy (EGD) in the National Cancer Screening Program

Criteria for ‘Manpower’
1. Qualification of endoscopists performing EGD
   1) Is the endoscopist a specialist who is able to perform EGD?
   2) Did the endoscopist receive endoscopy training for more than 1 year after becoming a medical specialist?
2. Continuous medical education for EGD (one point per one hour education)

Criteria for ‘Process’
1. Are fasting state, general health status, and past medical and medication history of the patients checked before the EGD?
2. Has the patient received explanations for the necessity, notabilia, and any complications of EGD?
   Or have they been asked to sign informed consent?
3. Is the patient's status monitored and recorded during the EGD?
4. Is endoscopic biopsy performed in order to verify any suspicious lesions?
5. Are retroflexed or close observations of the EGD made in order to have more precise observation for the suspicious lesion?
6. Is the EGD inserted thoroughly into the duodenum and photo documentation of the second part of the duodenum obtained at all times?
7. Are the instruments for emergency resuscitation or therapeutic endoscopy available in case of any complications?
8. Does the EGD report include information about the location, shape, and size of sighted polyps/cancerous lesions?
9. Are the results of the EGD preserved as digital files or photo documents?
10. Is informed consent for conscious sedative endoscopy obtained?
11. Are SaO2 and heart rate monitored during conscious sedative endoscopy?
12. Is the patient managed based on discharge criteria when leaving the endoscopy unit after conscious sedative endoscopy?

Criteria for ‘Facility and Equipment’
13. Are the cardia and fundus observed clearly with the retroflexed vision of the EGD from the gastric angle?
14. Are there endoscopy examination rooms for EGDs separate from those at the outpatient clinic?
15. Do you maintain a specimen reception registry for EGD?
16. Do you maintain a medication administration registry for EGD?

Criteria for ‘Outcome’
17. Is the date of examination precisely recorded in the EGD report?
18. Is the registration number precisely recorded in the EGD report?
19. Is the name of the endoscopist precisely recorded in the EGD report?
20. Is the presence of medication usage (e.g., anesthetics, analgesics, and sedatives) precisely recorded in the EGD report?
21. Are the EGD findings precisely recorded in the EGD report?
22. Are the EGDS findings precisely recorded in the EGD report?
23. Is the endoscopic diagnosis precisely recorded in the EGD report?
24. Is the Helicobacter pylori infection test performed in cases of gastric or duodenal ulcer?
25. Do endoscopists attend endoscopy quality education or does your hospital have such a program?

Criteria for ‘Reprocessing’
Is the reprocessing process followed by the ‘Endoscopy cleansing and disinfection guidelines of Korean Society of Gastrointestinal Endoscopy’?
26. Is the precleaning and cleaning process completely performed?
27. Is the endoscopy channel brushed repeatedly during the reprocessing process?
28. Are all detachable parts including valves and rubber cap separated from the endoscope and exchanged for every examination?
29. Are the disinfectant solutions changed optimally according to recommended cycles of the disinfectant solution manufacturer?
30. Is the soaking time obeyed according to the guidelines of the disinfectant solution manufacturer?
31. Are the reusable components and accessories disinfected?
32. Do the clinicians, nurses, and cleansing staff attend the endoscopy cleansing and disinfection education of the ‘Korean Society of Gastrointestinal Endoscopy’?
33. Is the reprocessing room and equipment available?
34. Optimal keeping of the endoscope after the reprocessing process
   1) Is the endoscope hung vertically after the reprocessing process?
   2) Is the endoscope reprocessed just before the first examination of the next day?

요하기 때문에, 적절한 내시경 질 평가항목의 개발은 내시경 질 향상의 가장 중요한 첫 단추이다. 국내 내시경 질 향상을 위해서는 현재 내시경 질 평가항목을 재검토하고 개선할 필요가 있다.

위내시경 평가항목의 경우 2006년 미국소화기내시경학회는 18개 항목을 추천하면서, 추천 등급을 같이 제시하였다(Table 5).15 이 항목에는 진단내시경 검사에 대한 적절한 적응증, 동의서, 내시경 반전을 포함한 완전한 검사, 위궤양의 조직 검사, 바렛 식도의 평가와 조직 검사, 문서화된 설명문 제공, 소화성 궤양에 대한 약물 처방 및 헬리코박터 감염의 내용이 포함되어 있다. 하지만 이 지침은 이후 개정이 되지 않았으며, 서구에서는 바렛 식도와 바렛 식도 유래 선암에 더 관심이 많지만, 국내에서는 내시경 검진을 통한 조기 위암이 나 이형성의 조기 발견 및 위암 사망율 감소에 더 관심이 있
Table 2. Quality Evaluation Criteria of Colonoscopy in the National Cancer Screening Program

Criteria for ‘Manpower’
1. Qualification of endoscopist performing colonoscopy
   1) Is the endoscopist a specialist who is able to perform colonoscopy?
   2) Did the endoscopist receive endoscopy training for more than one year after becoming a medical specialist?
2. Continuous medical education for colonoscopy (one point per one hour education)

Criteria for ‘Process’
1. Are fasting state, general health status, past medical/medication history, and the bowel preparation of the patient checked before the colonoscopy?
2. Are written instructions about bowel preparation and colonoscopy including bowel preparation provided to the patient before colonoscopy?
3. Is the patient asked to sign informed consent stating the necessity, notabilia, and any complications of the colonoscopy?
4. Is the patient’s status monitored and recorded during the colonoscopy?
5. Is endoscopic biopsy performed in order to verify any polyps or suspicious lesions?
6. Is withdrawal time at least 6 minutes on average in order to have a thorough look at the lesion during colonoscopy?
7. Does the colonoscopy report include information about the location, shape, and size of sighted polyps/cancerous lesions?
8. Are the results of the colonoscopy preserved as digital files or photo-documents?
9. Are the instruments for emergency resuscitation or therapeutic endoscopy available in case of any complications?
10. Is the intubation into the cecum photo-documented and recorded?
11. Is informed consent for conscious sedative endoscopy obtained?
12. Are SaO2 and heart rate monitored during conscious sedative endoscopy?
13. Is the patient managed based on discharge criteria when leaving the endoscopy unit after conscious sedative endoscopy?

Criteria for ‘Facility and Equipment’
14. Are the appendiceal orifice, ileocecal valve, or more than three series of haustrations observed clearly with a single viewing?
15. Are there endoscopy examination rooms for colonoscopy separate from those at the outpatient clinic?
16. Do you maintain a specimen reception registry for colonoscopy?
17. Do you maintain a medication administration registry for colonoscopy?

Criteria for ‘Outcome’
18. Is the date of examination precisely recorded in the colonoscopy report?
19. Is the registration number precisely recorded in the colonoscopy report?
20. Is the name of the endoscopist precisely recorded in the colonoscopy report?
21. Is the state of bowel preparation precisely recorded in the colonoscopy report?
22. Is the presence of medication usage (e.g., anesthetics, analgesics, and sedatives) precisely recorded in the colonoscopy report?
23. Is the presence of cecal intubation precisely recorded in the report?
24. Is the presence of biopsy tests precisely recorded in the colonoscopy report?
25. Are the findings and diagnosis of colonoscopy precisely recorded in the colonoscopy report?
26. Is the average cecal intubation rate more than 90%?
27. Do the endoscopists attend endoscopy quality improvement education or does your hospital have such a program?

Criteria for ‘Reprocessing’
Is the reprocessing process followed by the ‘Endoscopy cleansing and disinfection guidelines of the Korean Society of Gastrointestinal Endoscopy’?
28. Are the precleaning and cleaning processes completely performed?
29. Is the endoscopy channel brushed repeatedly during the reprocessing process?
30. Are all detachable parts including valves and rubber cap separated from the endoscope and exchanged for every examination?
31. Are the disinfectant solutions changed optimally according to recommended cycles of the disinfectant solution manufacturer?
32. Is the soaking time obeyed according to the guidelines of the disinfectant solution manufacturer?
33. Are the reusable components and accessories disinfected?
34. Do the clinicians, nurses, and cleansing staff attend the endoscopy cleansing and disinfection education of the ‘Korean Society of Gastrointestinal Endoscopy’?
35. Is the reprocessing room and equipment available?
36. Optimal keeping of the endoscope after the reprocessing process
   1) Is the endoscope hung vertically after the reprocessing process?
   2) Is the endoscope reprocessed just before the first examination of the next day?
### Table 3. Accreditation Quality Rating Scale of Endoscopy Unit Accreditation (EUA) in Korea

| Classification | EUA evaluation criteria | Grade |
|----------------|-------------------------|-------|
| **Criteria for ‘Manpower’ (2 items of Regular A, 4 items of Demonstration)** |  |  |
| **Qualification** (first accreditation) | At least half of endoscopists performing endoscopy should have a subspeciality qualification of the ‘Korean Society of Gastrointestinal Endoscopy’ or qualification equal to its subspecialty. In addition, remaining endoscopists should have a specialty board related to endoscopy. When only one endoscopist is working in the endoscopy unit, the endoscopist should have a specialty board related to endoscopy and complete at least six grade of continuous endoscopy education per year. | Regular A |
| **Continuous education** | All endoscopists of the endoscopy unit should complete at least six grade of continuous endoscopy education per year. When manpower is to be changed at re-accreditation, criteria of manpower should satisfy the initial criteria of first accreditation. | Regular A |
| **Endoscopy education** | Endoscopy education program for new staff should be available. | Demo. |
| | Endoscopy education program should include the period of orientation course and be followed for this period. | Demo. |
| | Endoscopy unit should have its own continuous education course for endoscopy. | Demo. |
| | Endoscopy staff should attend a formal regular educational program at least once per three years. | Demo. |
| **Criteria for ‘Facility and equipment’ (9 items of Regular A, 2 items of Regular B, 4 items of Demonstration)** |  |  |
| **Endoscope** | The cardia and fundus are observed clearly with the retroflexed vision of the EGD from the gastric angle. | Regular A |
| | The appendiceal orifice, ileocecal valve, or more than three series of haustrations are observed clearly with a single viewing of the colonoscope. | Regular A |
| | Endoscopy schedule should be maintained for a sufficient time interval (for example, at least 10 min for EGD and 15 min colonoscopy) for each examination in order to provide optimal time for reprocessing, preparation for examination, and procedure. | Regular A |
| **Space** | There are endoscopy examination rooms aside from those at the outpatient clinic. | Regular A |
| | There are recovery rooms for conscious sedative endoscopy. | Regular A |
| **Registry** | A specimen reception registry is maintained for endoscopy. | Regular A |
| | Registries for medication and accessories are used for endoscopy. | Regular A |
| **Emergency resuscitation and monitoring** | Pulse oximeter and O₂ supplementation are maintained for conscious sedative endoscopy. | Regular A |
| | Emergency cart including medications and devices for emergency resuscitation should be equipped and checked regularly for conscious sedative endoscopy. | Regular A |
| **Environment** | Endoscopy examination room and reprocessing room should be ventilated properly. | Regular B |
| | Equipment | Endoscopy examination room is equipped with intensive monitoring devices for blood pressure and electrocardiography. | Regular B |
| | Endoscope | Endoscope should be checked regularly and managed for damage or injury (such as, injury of lens, working channel and suction valve or flexion function). | Demo. |
| | Environment | For colonoscopy, a dressing room and closet are maintained for both genders. | Demo. |
| | Equipment | The recovery room of the endoscopy unit is equipped with patient monitoring devices for recovery of patients from sedation. | Demo. |
| | Portable O₂ tank is equipped for emergency situations (for transferring of emergency patients). | Demo. |

(Table 6)
### Table 3. Continued

| Classification | EUA evaluation criteria | Grade |
|----------------|-------------------------|-------|
| **Criteria for ‘Process’ (20 items of Regular A, 4 items of Regular B, 1 item of Demonstration)** | | |
| **Explanation** | The patient is identified using name, birthdate, and hospital registration number before starting endoscopy. Each endoscopic examinations is explained before starting endoscopy. For colonoscopy, the patient is asked to sign informed consent stating the necessity, notabilia, and any complications. | Regular A |
| **Sedation** | Informed consent should include signatures of physician and patient. | Regular A |
| | Fasting state, general health status, past medical and medication history, and teeth state (for EGD) and bowel preparation state (for colonoscopy) of the patients are checked before the endoscopy. | Regular A |
| | Sedative medications for sedative endoscopy are administered according to guidelines of ‘sedation and anesthesia in gastrointestinal endoscopy’ | Regular A |
| | Sedative medications should be kept in an inaccessible area with a locking device | Regular A |
| | Patients’ level of consciousness is evaluated before starting conscious sedative endoscopy. Respiration, SaO₂, and pulse rate are monitored during the procedure of conscious sedative endoscopy. | Regular A |
| | The patients are managed based on discharge criteria when leaving the endoscopy unit after conscious sedative endoscopy. | Regular A |
| **Process of examination** | The patient’s status is monitored and recorded during endoscopy. | Regular A |
| | The results of the endoscopy procedure are preserved as digital files or photo documents. | Regular A |
| | Endoscope is retroflexed or closely observed in order to have more precise observation for the suspicious lesion. | Regular A |
| | Endoscopic biopsy is performed in order to verify any suspicious lesions. | Regular A |
| | Endoscopists should know the management plan for possible complications developed during endoscopy. | Regular A |
| | EGD is inserted thoroughly into the duodenum and photo documentation of the second part of the duodenum is obtained at all times. | Regular A |
| | Testing for Helicobacter pylori infection is performed in cases of gastric or duodenal ulcer. | Regular A |
| | Colonoscope should be inserted into cecum and photo-documentation of the cecum should be obtained. | Regular A |
| **Explanation** | Instructions regarding endoscopic biopsy should be explained to patients undergoing biopsy and how to obtain histopathological information should also be explained. | Regular A |
| | Instructions about precautions after endoscopy should be explained to all patients. | Regular B |
| **Safety** | Guidelines for handling toxic agents such as formalin should be available and obeyed. | Regular A |
| | Guidelines for a fall down injury should be available and obeyed. | Regular B |
| **Process** | The patient is asked to sign informed consent stating the necessity, notabilia, and any complications of the EGD. | Regular B |
| **Safety** | Guidelines for renewal of endoscopy report should be available. | Demo. |
| Classification | EUA evaluation criteria | Grade |
|---------------|------------------------|-------|
| **Criteria for ‘Outcome’ (3 items of Regular A, 4 items of Regular B)** | | |
| EGD | EGD report should include the following items: 1) the date of EGD; 2) name, sex and age of patients; 3) the registration number; 4) the name of endoscopist; 5) medication usage (e.g., anesthetics, analgesics, and sedatives); 6) biopsy; 7) findings; and 8) endoscopic diagnosis. | Regular A |
| Colonoscopy | Colonoscopy report should include the following items: 1) the date of EGD; 2) name, sex and age of patients; 3) the registration number; 4) the name of endoscopist; 5) bowel preparation state; 6) medication usage (e.g., anesthetics, analgesics, and sedatives); 7) cecal intubation; 8) biopsy; 9) findings; and 10) endoscopic diagnosis. | Regular A |
| Longitudinal data | Monthly registry for a number of endoscopic examinations should be maintained. | Regular A |
| Common item | Endoscopy report should include the descriptions for the 1) number, 2) location, 3) shape, and 4) size of polyps/cancerous lesions. | Regular B |
| Therapeutic endoscopy report should include 1) method of endoscopic therapy and 2) retrieval of resected specimen. | Regular B |
| Horizontal data | Monthly registry for complications (such as transfusion, hospitalization or surgery cases) of endoscopic examinations should be maintained. | Regular B |
| **Criteria for ‘Reprocessing and Infection’ (13 items of Regular A, 4 items of Regular B and 2 items of Demonstration)** | | |
| Guideline | Documented guidelines for endoscopy reprocessing should be available and followed in the endoscopy unit. | Regular A |
| Education | Endoscopists, nurses, and cleaning staff must attend education on endoscopy reprocessing. | Regular A |
| Cleaning | Immediately after the endoscopic examination, the contaminants of the surface of the endoscope should be removed and the contaminants that remained in the biopsy channel are sucked out. | Regular A |
| The endoscopy channel should be brushed repeatedly during the reprocessing process. | Regular A |
| All detachable parts including valves and rubber cap should be separated from the endoscope and exchanged for every examination. | Regular A |
| Disinfection | High level disinfectants should be used in the reprocessing of the endoscope. | Regular A |
| Each biopsy and working channel is filled with the disinfectant solution. | Regular A |
| Are the disinfectant solutions changed optimally according to recommended cycles of the disinfectant solution manufacturer? | Regular A |
| The soaking time should be followed according to the guidelines of the disinfectant solution manufacturer. | Regular A |
| Rinsing | Using drinkable clean water, the endoscope and channels are sufficiently washed. | Regular A |
| Dry | Remaining water in each channel and surface of the endoscope should be removed and the endoscope should be hung vertically. | Regular A |
| Reprocessing | Precleaning, cleaning, disinfection, and rinsing are performed after every examination. | Regular A |
| Accessory | According to the manufacturer’s guidelines, the endoscopic accessories that pass the mucous membrane should be sterilized. | Regular A |
| Drying | The endoscope is hung vertically in a cabinet after the reprocessing process. | Regular B |
| Space | The reprocessing room should be available and kept clean. | Regular B |
| Etc. | For reprocessing, clinicians, nurses, and cleaning staff must use individual protection equipment (such as gloves, masks, and waterproof gowns) to protect themselves. | Regular B |
| Etc. | Enzymatic detergents or neutral detergents for medical use are recommended as cleansing solutions. | Demo. |
| Quality control of the reprocessing process should be performed at least once a year. | Demo. |

Demo., demonstration; EGD, esophagogastroduodenoscopy.
Table 4. Comparative Analysis between Endoscopy Quality Evaluation Criteria in the ‘National Cancer Screening Program (NCSP)’ and Accreditation Quality Rating Scale of ‘Endoscopy Unit Accreditation (EUA)’

| Characteristics          | NCSP                                                                 | EUA                                                                 |
|--------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------|
| Voluntariness            | Involuntary program by government                                    | Voluntary program by endoscopy society                              |
| Target unit              | Endoscopy unit for NCSP                                              | All endoscopy unit                                                   |
| Grade                    | 2 Grade (pass/fail)                                                  | 5 Grade (A, B, C, D, E)                                             |
| Interval                 | 2 Years                                                              | 3 Years                                                             |
| Payment                  | None                                                                 | Voluntary payment                                                   |
| Goal                     | Minimal requirement for endoscopy quality                            | Optimal requirement for endoscopy quality                           |

| Evaluation criteria      | EGD (point) | Colonoscopy (point) | Regular A (item) | Regular B (item) | Demonstration (item) |
|--------------------------|-------------|---------------------|------------------|------------------|---------------------|
| Manpower                 | 30          | 30                  | 2                | -                | 4                   |
| Facility/equipment       | 10          | 10                  | 9                | 2                | 4                   |
| Process                  | 30          | 30                  | 22               | 2                | 1                   |
| Outcome                  | 10          | 10                  | 4                | 3                | -                   |
| Reprocessing             | 20          | 20                  | 17               | -                | 2                   |
| Total                    | 100         | 100                 | 54               | 7                | 11                  |
| Requirement              | 100%        | 50%                 | 7                | 3                | 1                   |

EGD, esophagogastroduodenoscopy.

Table 5. Summary of Proposed Quality Indicators for Esophagogastroduodenoscopy (EGD)15

| Quality indicator                                                                 | Recommendation grade |
|----------------------------------------------------------------------------------|----------------------|
| 1. Accepted indication(s) is provided before performance of EGD                  | 1C+                  |
| 2. Informed consent is obtained, including specific discussion of risks associated with EGD | 3                   |
| 3. Prophylactic antibiotics are given in patients with cirrhosis with acute upper GI bleeding who undergo EGD | 1A                  |
| 4. Prophylactic antibiotics are given before placement of a PEG                   | 1A                  |
| 5. Complete examination of the esophagus, stomach, and duodenum, including retroflexion in the stomach | 2C                  |
| 6. Biopsy specimens are taken of gastric ulcers                                  | 1C                  |
| 7. Barrett’s esophagus is measured when present, with the location of the gastroesophageal junction and squamocolumnar junction in centimeters from the incisors being documented | 3                   |
| 8. Biopsy specimens are obtained in all cases of suspected Barrett’s esophagus   | 3                   |
| 9. Type of upper GI bleeding lesion is described and location is documented. For peptic ulcers, at least one of the following stigmata is noted: active bleeding, nonbleeding, nonbleeding visible vessels (pigmented protuberance), adherent clot, flat spot, cleaned based | 3                   |
| 10. Unless contraindicated, endoscopic treatment is given to ulcers with active bleeding or with visible nonbleeding vessels | 1A                  |
| 11. In cases of attempted hemostasis of upper GI bleeding lesions, whether hemostasis has been achieved is clearly documented | 3                   |
| 12. When epinephrine injection is used to treat nonvariceal upper GI bleeding or nonbleeding visible vessels, a second treatment modality is used (e.g., coagulation or clipping) | 1A                  |
| 13. Variceal ligation is used for endoscopic treatment of esophageal varices      | 1A                  |
| 14. Written instructions, which include particular signs and symptoms to watch for after EGD, are provided to the patient on discharge | 3                   |
| 15. In patients undergoing dilation for peptic esophageal strictures, PPI therapy is recommended | 1A                  |
| 16. Patients diagnosed with gastric or duodenal ulcers are instructed to take PPI medication or an H2 antagonist | 1A                  |
| 17. Patients diagnosed with gastric or duodenal ulcers have documented plans to test for the presence of Helicobacter pylori infection | 1A                  |
| 18. Rebleeding rates after endoscopic hemostasis are measured                     | 1C+                  |

GI, gastrointestinal; PEG, percutaneous endoscopic gastrostomy; PPI, proton pump inhibitor.
Adapted from Cohen J, Safdi MA, Deal SE, et al; ASGE/ACG Taskforce on Quality in Endoscopy. Quality indicators for esophagogastroduodenoscopy (Am J Gastroenterol 2006;101:886-891).
Table 6. Summary of Proposed Quality Indicators for Colonoscopy

| Quality indicator | Recommendation grade |
|------------------|----------------------|
| 1. Appropriate indication | 1C+ |
| 2. Informed consent is obtained, including specific discussion of risks associated with colonoscopy | 3 |
| 3. Use of recommended postpolypectomy and postcancer resection surveillance intervals | 1A |
| 4. Use of recommended ulcerative colitis/Crohn’s disease surveillance intervals | 2C |
| 5. Documentation in the procedure note of the quality of the preparation | 2C |
| 6. Cecal intubation rates (visualization of the cecum by notation of landmarks and photo documentation of landmarks should be present in every procedure) | 1C |
| 7. Detection of adenomas in asymptomatic individuals (screening) | 1C |
| 8. Withdrawal time: mean withdrawal time should be 6 minutes in colonoscopies with normal results performed in patients with intact anatomy | 2C |
| 9. Biopsy specimens obtained in patients with chronic diarrhea | 2C |
| 10. Number and distribution of biopsy samples in ulcerative colitis and Crohn’s colitis surveillance. Goal: 4 per 10-cm section of involved colon or approximately 32 specimens per case of pancolitis | 1C |
| 11. Mucosally based pedunculated polyps and sessile polyps 2 cm in size should be endoscopically resected or documentation of unresectability obtained | 3 |
| 12. Incidence of perforation by procedure type (all indications vs. screening) is measured | 2C |
| 13. Incidence of postpolypectomy bleeding is measured | 2C |
| 14. Postpolypectomy bleeding managed nonoperatively | 1C |

Adapted from Rex DK, Petrinli JL, Baron TH, et al. Quality indicators for colonoscopy (Gastrointest Endosc 2006;63[4 Suppl]:S16-S28).
Table 7. Quality Assurance in Screening Colonoscopy in the Position Statement of the European Society of Gastrointestinal Endoscopy27

| Quality assurance item                        | Proposed standard by the European Society of Gastrointestinal Endoscopy |
|----------------------------------------------|------------------------------------------------------------------------|
| Consent and withdrawal of consent           | Audit the number of patients who decline colonoscopy on the day of the procedure and the number of intraprocedural withdrawals of consent. Proposed standard: fewer than 5% of cases to withdraw consent on the day of the procedure and fewer than 1% during the procedure |
| Experience of the screening colonoscopist    | We recommend that a minimum lifetime colonoscopy experience together with a minimum number of annual screening colonoscopies should be agreed. Proposed standard: to be agreed by screening boards |
| Bowel cleansing                              | The state of bowel cleansing should be audited. Proposed standard: at least 90% of examinations should be rated as “adequate” bowel cleansing or better |
| Sedation, analgesia, and comfort             | Audit of sedation practices, including average doses used of medication together with comfort scores. Proposed standard: no more than 1% of patients should become hypoxic (saturation below 85% for more than 30 seconds) or for other reasons requiring administration of a reversal agent |
| Unadjusted cecal intubation rate             | Audit the completion rate for all colonoscopies. Proposed standard: unadjusted cecal intubation rate of at least 90% |
| Adenoma and cancer detection rates          | The number of detected adenomas and cancers should be audited. Proposed standard: to be agreed by screening boards |
| Colonoscope withdrawal time                 | Average withdrawal times should be audited. Proposed standard: a minimum of 6 minutes in at least 90% of purely diagnostic examinations |
| Polyp retrieval rate                         | Screening programs anticipate that all resected polyps are retrieved for histological analysis. Proposed standard: ≥90% of resected polyps should be retrieved for histological analysis |
| Significant interval lesions                | We recommend that screening programs monitor size, appearance, location, and histology of all polyps larger than 1 cm and cancers found between screening examinations as well as after the patient has been discharged from a screening program. Proposed standard: to be agreed by screening boards |
| Specialist referral for removal of larger polyps | We anticipate that the removal of larger polyps will be deferred to a dedicated clinical session, perhaps at a separate tertiary referral center. Screening programs should record how larger polyps detected at screening are managed, together with details of outcomes. Proposed standard: to be agreed by screening boards |
| Cleaning and disinfection                    | Adoption of manufacturers’, national, and European standards for disinfection. Proposed standard: routine microbiological testing at intervals not exceeding 3 months |
| Tattooing sites of larger polyps and cancers | We recommend that screening programs set standards regarding which polyp sites should be tattooed. Proposed standard: the placement of tattoos following the removal of all polyps 2 cm or larger outside of fixed colonic landmarks such as the cecum and rectum |
| Unscheduled readmissions                    | We recommend that screening programs record details of all emergency admissions within 30 days of the screening colonoscopy. Proposed standard: to be agreed by screening boards |
| Perforation rate                             | We recommend that details should be recorded of all perforations complicating diagnostic and therapeutic procedures that require surgical repair and that occur up to 2 weeks after endoscopy. Proposed standard: fewer than 1:1,000 diagnostic or therapeutic examinations should result in a perforation requiring surgical repair. |
| Bleeding rate                                | All cases of immediate and late bleeding following polypectomy should be recorded. Proposed standard: fewer than 1:20 cases of bleeding should ultimately require surgical intervention |

Adapted from Rembacken B, Hassan C, Riemann JF, et al. Quality in screening colonoscopy: position statement of the European Society of Gastrointestinal Endoscopy (ESGE) (Endoscopy 2012;44:957-968).
## Table 8. Quality Indicators (QI) and Auditable Outcomes (AO) by Spanish Society of Gastroenterology and Spanish Society of Gastrointestinal Endoscopy Working Group

| Quality indicators and auditable outcomes | QI/AO | Mandatory | Desirable |
|------------------------------------------|-------|-----------|-----------|
| 1. Age and sex of patient                |       |           | +         |
| 2. Cancer detection rate (all cancers)   |       |           | +         |
| 3. Cancer detection rate (endoscopically removed cancers) |       |           | +         |
| 4. Referral rate into surveillance programs (total and by risk category) | QI   | +         |           |
| 5. Adenoma excision and retrieval rates; withdrawal times | QI   | +         |           |
| 6. Numbers and detection rates of colorectal lesions, in total and broken down by: | QI/AO | +         | +         |
| 6.1 non-neoplastic, 2) neoplastic, and 3) uncommon lesions |         |           |           |
| 7. Numbers and detection rates in 6.1 broken down by sector of the colon | AO   | +         |           |
| 7.1 non-neoplastic, 2) neoplastic, and 3) uncommon lesions |         |           |           |
| 8. Numbers and detection rates of colorectal lesions, in total, and by predicted histology: | AO   | +         |           |
| 8.1 non-neoplastic, 2) neoplastic, and 3) uncommon lesions |         |           |           |
| 9. Numbers and detection rates of colorectal lesions, in total, and by confirmed histology: | QI/AO | +         | +         |
| 9.1 non-neoplastic, 2) neoplastic, and 3) uncommon lesions |         |           |           |
| 10. Withdrawal times from caecum to anus (in patients who have not had biopsy or therapy) | QI/AO | +         | +         |
| 11. Colonoscopy completion rate          | QI    | +         |           |
| 12. Wait time: Fecal occult blood test to colonoscopy  | QI    | +         |           |
| 13. Wait time: Flexible sigmoidoscopy    | QI    | +         |           |
| 14. Wait time: Colonoscopy to pathology results | QI    | +         |           |
| 15. Wait time: Flexible sigmoidoscopy to pathology results | QI    | +         |           |
| 16. Wait time: pathology results to definitive treatment | QI    | +         |           |
| 17. Unplanned admission on day of procedure: four options | AO   | +         |           |
| 18. Type of insufflation gas (air or CO2) | AO   | +         |           |
| 19. Type of sedation used: three options | AO   | +         |           |
| 20. Comfort: only if conscious or no sedation used | AO   | +         | +         |
| 21. Adequacy of preparation              | AO    | +         |           |
| 22. Delayed adverse outcomes: two options | AO   | +         |           |
| 23. Key endoscopic characteristics of polyps written on pathology request form: five key characteristics: number, site, size, completeness of excision, separate pots used for different sites (see also 6-9) | QI   | +         |           |
| 24. Lesions referred elsewhere for excision | AO   | +         |           |
| 25. Patient feedback on information and consent, booking, environment, comfort and aftercare | AO   | +         | +         |
| 26. Adverse incidents related to incomplete pre-assessment | AO   | +         |           |
| 27. Decontamination indicators          | AO    | +         |           |

Adapted from Jover R, Herráiz M, Alarcón O, et al; Spanish Society of Gastroenterology; Spanish Society of Gastrointestinal Endoscopy Working Group. Clinical practice guidelines: quality of colonoscopy in colorectal cancer screening (Endoscopy 2012;44:444-451).
결론
소화기내시경 검사의 진료 수준 차가 다양하고 시행 전수가 많기 때문에, 소화기내시경 분야의 질 향상이 필수적인 분야라는 인식 전환이 필요하다. 현재 시행되고 있는 국가 압박을 커다란 평가 사업과 우수내시경실 인증제 사업의 단점을 잘 보완한다면, 국내 소화기내시경 질 수준이 높은 더 향상될 수 있을 것이라고 생각한다. 하지만, 이를 위해서는 소화기내시경 질 향상에 대한 관심과 연구가 필수적일 뿐만 아니라, 관련 단체들과 협의체를 구성하여 질 향상 사업을 조직적으로 관리할 필요가 있다. 국내 소화기내시경 수준이 양적인 측면 뿐만 아니라 질적인 측면에서도 세계에서 우수한 미래가 도래하기를 기대하며 본다.

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