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Implementing guidelines on the prevention of opportunistic infections in inflammatory bowel disease

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Abstract

Introduction: Opportunistic infections are a key safety concern in the management of patients with inflammatory bowel disease (IBD). Despite the existence of international guidelines, many gastroenterologists have not adopted routine screening and vaccination. The aim of this study was to modify clinical behaviour by use of a simple screening tool.
Methods: A screening and vaccination proforma for hepatitis B, varicella, *Influenza*, *Pneumococcus*, human papillomavirus, tuberculosis, hepatitis C and HIV was provided to each participating

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gastroenterologist. Gastroenterologists were surveyed for awareness of vaccine recommendations and current practice prior to and following the introduction of the proforma. Rates of immunity and the proportion of patients receiving the recommended screening and vaccinations were documented.

Results: 30 gastroenterologists at 8 different IBD centres took part in the assessment. A total of 919 patients were included (55% female, 65% Crohn's, 33% ulcerative colitis, 2% indeterminate IBD). Introduction of the proforma increased self-reported gastroenterologist screening from 47% to 97% pre- and post-intervention respectively, $p < 0.001$. After the proforma was applied, vaccination against hepatitis B, varicella, *Influenza*, and *Pneumococcus* was recommended in 67%, 2.5%, 75% and 69% of the patients respectively. Of these, 42%, 39%, 66% and 49% patients followed the recommendations and were vaccinated. Cervical smears were recommended in 31%, with 62% of these obtaining the recommended cervical smear.

Conclusions: Implementation of a screening and vaccination proforma significantly changed gastroenterologist self-reported behaviour. Patient compliance with these recommendations was not optimal and suggests the need for further patient education, in addition to other forms of support.

1. Introduction

Treatment of Crohn's disease (CD) and ulcerative colitis (UC) has been revolutionised over the past decade with increasing use of immunomodulators and biological (anti-TNFα) therapy at an earlier stage in the disease course. This has been associated with increased rates of steroid-free remission and decreased rates of hospitalisation and surgery.[1,2] Nevertheless, with increasing use of immunosuppression comes the potential for opportunistic infection, much of which is preventable.[3,4]

Vaccination of inflammatory bowel disease (IBD) patients against influenza H1N1 on biological therapy and/or other immunosuppression has been shown to induce adequate seroprotection rates without an exacerbation of intestinal disease.[5,6] In contrast, vaccination of patients with IBD against HBV has been less effective.[7] It has also been suggested that anti-TNFα therapy, either alone, or in combination with azathioprine, impairs response to pneumococcal vaccination.[8] Thus, optimal approaches to prevention of infection in these settings are uncertain.

In 2009, the European Crohn's and Colitis Organisation (ECCO) published consensus guidelines on the prevention, diagnosis and management of opportunistic infections in IBD.[9] The guidelines represent 'work in progress', based on the evidence available, given limited knowledge of the efficacy of vaccination in IBD and no evidence of the likely uptake or implementation of the published guidelines.

Successful implementation of guidelines cannot depend on publication alone and requires the interaction of many factors. These include features of the innovation itself, the target group of professionals, physician beliefs, the patients, the social setting and the economic context. While the effectiveness of an intervention program may be difficult to judge, a systematic approach, using evidenced-based guidelines as the basis for a practical tool, and reminders of best practice, are all thought to be key elements that determine success.[10]

Many gastroenterologists have not adopted screening of patients for preventable opportunistic infections, or the use of vaccination, as part of their routine practice in IBD. An appraisal of current practice among gastroenterologists in the London area demonstrated that very few patients are receiving the vaccinations proposed in the ECCO guidelines.[11] Potential reasons for this include a view that the recommendations appear complex or unfamiliar and evidence of efficacy remains to be established. On the other hand, specialists in infectious diseases in the ECCO consensus were vigorous advocates for vaccination[9] and patients readily recognise the potential value of reducing the risk of preventable infections.

The primary aim of this study was to assess the change in self-reported behaviour of gastroenterologists treating patients with IBD by using a proforma to guide screening and recommendations for vaccination. Secondary aims were 1. to examine the baseline immunity against hepatitis B and varicella; 2. to determine the baseline rates of uptake of influenza and pneumococcal vaccination; 3. to determine the rate of human papilloma virus vaccination and cervical screening in females; 4. to assess the rates of infection or exposure to tuberculosis, hepatitis C and, in Australia, HIV; and 5. to determine whether recommendations to the patient's primary care physician led to subsequent vaccination.

2. Methods

2.1. Gastroenterologists

30 gastroenterologists from eight IBD centres (Fremantle Hospital, Perth, St Vincent's Hospital, Sydney, Liverpool Hospital, Sydney, Royal Prince Alfred Hospital, Sydney, Nepean Hospital, Sydney, St George Hospital, Sydney, Royal Brisbane and Women's Hospital, Brisbane (Australia)) and the John Radcliffe Hospital (Oxford, United Kingdom) took part in the study.

2.2. Patients

This was a non-randomised observational study, approved by the local or lead human research ethics committees for each centre (HREC/09/WGONG/54, HREC/09/QRBW/195, HREC/10/SMAHS/139, LREC/OX/1564). Patients were recruited during follow up visits over a 6-month period in 2010. They were given

WHITE - copy for the Patient

ATTENTION - GENERAL PRACTITIONER

Dear Doctor Date: ..... / ..... / .....

Prevention of Opportunistic Infections in Your Patient with Inflammatory Bowel Disease (IBD)

Most patients with IBD will need immunosuppressant medication during the course of their disease. Therefore, it is important that we are proactive in relation to immunisation & screening in order to avoid unnecessary infections. Below is a summary of the immunisation/ screening measures that your patient needs to bring him/her up to date. Pregnant women should not be given any vaccinations.

Patient's Name: ..... Date of Birth:..... / ..... / .....

Telephone Contact: .....

NOTE: Live-attenuated vaccines can be dangerous if your patient is on immunosuppression (including prednisone). Live vaccines include Measles-Mumps-Rubella, Typhoid Ty21a, varicella, yellow fever, live attenuated influenza vaccine, polio, BCG.

HEPATITIS B *(please tick boxes)*			
Previous immunisation	☐ Yes	☐ No	☐ Unsure
What the gastroenterologist has requested today	☐ HBsAg	☐ HBsAb	☐ HBcAb
ADVICE TO THE GENERAL PRACTITIONER	Booster if HBsAb <10 and previous Hep B immunisation Full Hep B vaccination needed if HBsAb <10 and no previous immunisation Check HBsAb at 3 months if on immunosuppression Liaise with gastroenterologist if HbsAg positive		

VARICELLA (Chicken Pox) *(please tick boxes)*			
Previous infection	☐ Definite	☐ No	☐ Unsure
What the gastroenterologist has requested today	☐ Nil	☐ Varicella serology	
ADVICE TO THE GENERAL PRACTITIONER	☐ Nil further needed ☐ If not immune, vaccinate only if on no immune suppression (including prednisone)		

INFLUENZA (trivalent inactivated influenza vaccine) *(please tick boxes)*		
Previous Fluvax received	☐ Yes	☐ No
ADVICE TO THE GENERAL PRACTITIONER	Annual trivalent influenza vaccine recommended for all patients	

PNEUMOVAX (pneumococcal polysaccharide vaccine) *(please tick boxes)*			
Previous Pneumovax received	☐ Yes	Date: ___/___ /___	☐ No
ADVICE TO THE GENERAL PRACTITIONER	After initial vaccination repeat at 3 years		

TUBERCULOSIS *(please tick boxes)*				
Previous BCG	☐ Yes	☐ No		
Previous screening	☐ Yes	Date	Result +/-	☐ No
	CXR	___/___ /___	_____	
	Mantoux test	___/___ /___	_____	
	Quantiferon gold	___/___ /___	_____	
What the gastroenterologist has requested today	☐ CXR	☐ Mantoux test	☐ Quantiferon gold	

HUMAN PAPILLOMA VIRUS (HPV) *(please tick boxes)*			
Last PAP smear	Date ___/___ /___		
Result	☐ Normal	☐ Abnormal	☐ Unknown
ADVICE TO THE GENERAL PRACTITIONER	Follow normal Australian guidelines for PAP smears and HPV vaccination		

HIV (need to counsel for risk factors) *(please tick boxes)*				
Previously tested	☐ Yes	Year _____	Result _____	☐ No
What the gastroenterologist has requested today	☐ HIV	☐ No HIV requested, after discussion with patient		

HEPATITIS C (need to counsel for risk factors) *(please tick boxes)*				
Previously tested	☐ Yes	Year _____	Result _____	☐ No
What the gastroenterologist has requested today	☐ Hepatitis C Ab	☐ No serology requested, after discussion with patient		

Your cooperation in this matter is appreciated. Kind regards,

Dr..... .....Hospital

Department of Gastroenterology

HREC Approval: HE09/202, HREC/09/QRBW/195
Version 1, July 2009

Figure 1 The proforma was completed during the patient consultation. The original was given to the general practitioner, accompanied by a covering letter explaining the recommendations.

an information sheet (Supplementary File 1) explaining the relevance of infection in patients with IBD and information regarding the study. A consent form agreeing to the serological testing and subsequent contact by telephone to assess uptake of vaccinations was used. Patients also completed a survey including demographic information, current medications and previous vaccinations.

A one page A4 proforma (Fig. 1) was devised with reference to the ECCO Consensus [9] by the authors (AW, MW, MG, ST). Specific infections included hepatitis B, varicella, *Influenza* spp., *Pneumococcus* spp., human papillomavirus, tuberculosis (TB), hepatitis C and human immunodeficiency virus (HIV). The proforma was unvalidated and no test–retest validation was performed. The proforma used in the UK excluded the option to check HIV status. The quadruplicated proforma was completed during the patient consultation. One copy was provided each to the patient, the patient records and the study records. The original was provided for the general practitioner, accompanied by a covering letter explaining the recommendations. The patient was responsible for taking the completed proforma and the covering letter to their general practitioner. In addition, each gastroenterologist was encouraged to include appropriate vaccination recommendations in their correspondence to referring general practitioners.

2.3. Assessments

Prior to the study, each gastroenterologist completed an anonymous survey ranking their current self-reported practice on screening and vaccination of IBD patients (Supplementary File 2). The questionnaire was piloted among 3 gastroenterologists, but was not validated. Each participant rated their current practice for screening and vaccination, against the specific infections listed above, into one of the 5 groups: "almost always", "frequently", "about half the time", "sometimes", "rarely" or "never". Results were reported as a percentage of gastroenterologists rating their behaviour as "almost always" or "frequently" versus the percentage of gastroenterologists rating their behaviour as "about half the time", "sometimes", "rarely" or "never".

The intervention sent to each gastroenterologist included a copy of the ECCO Consensus guidelines[9], the patient information sheet and consent, general practitioner information cover letter, pads of screening and vaccination proformas and a letter of support for the study. Gastroenterologists were encouraged to recruit all patients with IBD seen at their centres, regardless of duration of disease or current therapy, during the study period. Reminder emails were also sent on a regular basis to participating gastroenterologists and there was a principal investigator at each site.

Following the completion of the study the survey was repeated one month after cessation of patient recruitment, to assess whether gastroenterologist self-reported behaviour had been altered by the intervention. Patients were followed up to assess vaccination uptake. This was done at each centre by telephone interview.

2.4. Serological tests

Blood samples were taken for serological testing as part of the routine blood testing. Choice of requested serology was determined by each patients' treating gastroenterologist, however, choices included hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (HBsAb) with levels >10 U indicating immunity, hepatitis B core antibody (HBcAb), *Varicella zoster*, and hepatitis C antibody. Each gastroenterologist was responsible for completing the appropriate pathology request form.

2.5. Microbiological tests

Choices of investigation for TB screening were Chest X-ray (CXR), Tuberculin Skin Test (TST) or a tuberculosis gamma interferon assay (Quantiferon Gold (QG)®). The choice of investigation was at the discretion of the treating gastroenterologist and local practice. HIV was only tested in Australian sites and testing was at the discretion of the treating gastroenterologist and the patient.

2.6. Vaccinations

A full vaccination course (0, 1 and 6 months) for HBV was recommended if no previous vaccination had been performed or the anti-HBs titre was 0. A booster was given if the patient had previous HBV vaccination but the anti-HBs titre was <10 U. Varicella vaccination was considered if serology revealed lack of immunity but was not recommended if the patient was already on immunosuppressants (including prednisone >20 mg), or biological agent, as it is a live vaccine. All sites were encouraged to recommend annual trivalent inactivated influenza vaccination for all patients. The pneumococcal vaccination was recommended for most patients at some sites but only for those on immunosuppression at others. Cervical smears were recommended as per national guidelines. Data were collected regarding human papillomavirus vaccination in females only. However, vaccination was not recommended as part of this project since guidelines were still in evolution. In Australia, HPV vaccination for females has been standard since 2007. There was a national catch up program between 2007 and 2009 which resulted in over 2/3 of females between 14 and 18 having the full course of HPV vaccinations. Currently there is no formal guideline for patients with IBD.

2.7. Statistics

For the gastroenterologist screening survey, results were expressed as the percentage of gastroenterologists rating their behaviour as "almost always" or "frequently" versus the percentage of gastroenterologists rating their behaviour as "about half the time", "sometimes", "rarely" or "never". McNemar's test was used to compare changes from pre to post-intervention between groups.

Rates of immunity as well as proportion of patients receiving recommended screening and vaccination were reported. Significance was determined at the 5% level ($p < 0.05$). No adjustment was made for multiple comparisons. Given the observational nature of this study no sample size calculation was performed.

Table 1 Patient numbers.

Hospital	CD (n = 598)	UC (n = 301)	UIBD (n = 20)	All patients (n = 919)
SVH	43 (56%)	34 (44%)	0 (0%)	77 (8%)
SGH	40 (87%)	5 (11%)	1 (2%)	46 (5%)
NH	32 (64%)	15 (30%)	3 (6%)	50 (5%)
LH	53 (62%)	31 (37%)	1 (1%)	85 (9%)
FH	246 (70%)	104 (30%)	0 (0%)	350 (38%)
RBH	49 (71%)	16 (24%)	4 (5%)	69 (8%)
RPAH	26 (43%)	34 (57%)	0 (0%)	60 (7%)
JRH	109 (60%)	62 (34%)	11 (6%)	182 (20%)

Abbreviations: SVH - St Vincent's Hospital, Sydney; SGH - St George Hospital, Sydney; NH -Nepean Hospital, Sydney; LH - Liverpool Hospital Sydney; FH - Fremantle Hospital; RBH -Royal Brisbane Hospital, Brisbane; RPAH - Royal Prince Alfred Hospital, Sydney; JRH - John Radcliffe Hospital, Oxford; UC - ulcerative colitis; CD - Crohn's disease; UIBD - Unclassified IBD.

3. Results

3.1. Patients

919 patients with IBD (598 CD, 301 UC, 20 IBD unclassified) were recruited from 8 hospitals, shown in Table 1. The median age of patients was 37 years (IQR 27–50) and 55% were female. Medications included 5-ASA (46%), prednisolone (17%), immunomodulator (azathioprine, 6-mercaptopurine, methotrexate) (50%) and anti-TNFα (21%).

3.2. Gastroenterologist behaviour

Before the study intervention, only 14 of the 30 gastroenterologists (47%) reported considering vaccination and screening when seeing patients with IBD. This increased to 29 of the 30 (97%) post-intervention ($p < 0.001$). Behaviour data is expressed as the percentage of gastroenterologists who rated their behaviour "almost always" or "frequently" post-intervention compared with their pre-intervention responses. Positive changes in gastroenterologist self-reported behaviour occurred for all infections studied (Table 2). There was no difference in changes in gastroenterologist behaviour between sites that recruited >100 patients and those that recruited <100 patients.

3.3. Recall and vaccine response to hepatitis B (HBV)

Of 919 patients, 248 (27%) recalled having received vaccinations against HBV, 343 (37%) indicated never having received HBV vaccination and 323 (35%) were unsure. HBsAb was requested in 824 patients. Of the 248 patients who recalled immunisation against HBV, 219 had HBsAb testing and of these 60% had immunity. Of the 343 patients who did not recall vaccination against HBV, 286 had HBsAb testing and of these 12% had immunity. For the 323 patients who were unsure of whether they had previously been vaccinated against HBV, 314 had HBsAb testing and of these only 24% had immunity. HBsAg was requested in 776 (84%) patients. Two patients (0.3%) had a positive result. HBcAb was requested in 662 (72%) patients with positive results in six (0.9%) patients. On the basis of the above findings 617 patients (67%) were

Table 2 Gastroenterologist behaviour pre and post intervention.

	Pre-intervention "almost always" or "frequently"	Post-intervention "almost always" or "frequently"	p value
Do you ask about previous hepatitis B vaccination?	33%	83%	<0.001
If the patient has had hepatitis B vaccination in the past do you check for ongoing immunity?	37%	77%	<0.001
If the patient has not had the hepatitis B vaccination do you check for previous hepatitis B exposure?	50%	87%	0.005
Do you ask about varicella immunity?	20%	90%	<0.001
If the patient can't clearly remember do you check varicella serology?	23%	77%	<0.001
Do you advise the patient to have the annual influenza vaccination?	50%	97%	<0.001
Do you advise the patient to be up to date with the pneumococcal vaccination?	23%	87%	<0.001
Do you ask female patients whether their cervical smear is up to date?	33%	83%	<0.001
Do you screen the patient for tuberculosis?*	77%	90%	0.29
Do you screen for hepatitis C?	40%	77%	0.001
Do you screen for HIV?	7%	47%	0.001
How often do you include vaccination/screening recommendations in your correspondence with the general practitioner?	20%	83%	<0.001

* "Only if the patient needs anti-TNF therapy" was grouped with "almost always" or "frequently".
Legend: 30 Gastroenterologists completed questionnaires before the intervention of education and a proforma for screening and vaccination of specific and vaccine-preventable infections for patients with IBD, and 1 month after recruiting patients for the 6-month study period.

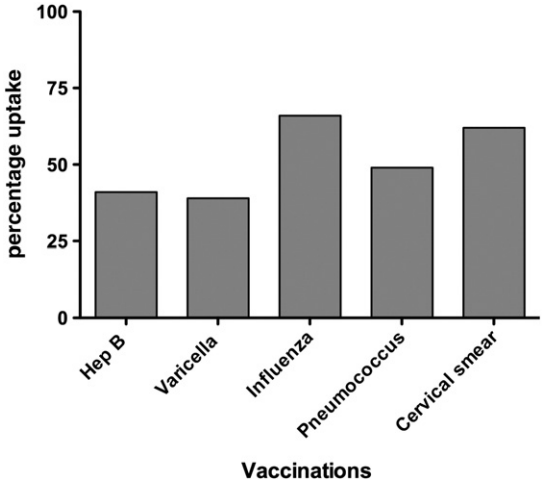

Figure 2 Uptake of vaccination recommendations. For those patients in whom vaccination was recommended, this graph displays the percentage of patients who actually received the vaccination.

deemed to require HBV vaccination. Follow-up data were available in 590 of these (96%) with 245 (42%) having received the recommended vaccination (Fig. 2).

3.4. Recall and vaccine response to varicella

For varicella, 687 (75%) patients recalled, 69 (8%) did not recall, and 162 (18%) were unsure whether they had either suffered from varicella infection or had received varicella vaccination in the past. Varicella serology was requested in 437 patients (48%). Of the 439 of those with results available, 49 (11%) did not have immunity to varicella. Only 12 of the 229 (5%) patients who recalled definite previous infection or varicella vaccination and had serology performed did not show immunity. Varicella vaccination was deemed appropriate in 23 patients (2.5%) however this was only given in 9 (39%) (Fig. 2).

3.5. Recall and vaccine response to *Influenza* spp. vaccination

Four hundred and twenty five patients (46%) reported already having annual influenza vaccination. Continued or initial annual vaccination was advised in 693 (75%) patients, including some of the above. For those with follow up information available, 435/655 (66%) received the recommended vaccine (Fig. 2).

3.6. Recall and vaccine response to *Pneumococcus* spp. vaccination

Sixty-three patients (7%) recalled being given the pneumococcal vaccine at some time in the past. It was recommended in 637 patients (69%) but was given in only 289 of the 594 (49%) in whom follow up information is available (Fig. 2).

3.7. Human papillomavirus

Four hundred and two of the 502 female patients (80%) recalled previous cervical smear results: 372 (93%) were normal, 16 (4%) were abnormal and 14 (3%) were unknown. Follow-up of cervical smear recommendations was available in 452 of the women (90%) with 140 (31%) recorded as being due for a repeat/initial cervical smear. Eighty-three (62%) received the recommended cervical smear (Fig. 2). Sixty (12%) of the females reported having vaccination against HPV. For females $\leq$20 years old, this proportion increased to 42%. The median age of vaccinated patients was 26 years (range 15–49 years) compared to 39 years (range 17–78 years) in those not vaccinated.

3.8. Recall and vaccine response to tuberculosis

Due to a policy difference in TB between Australia and the United Kingdom, we have reported the Oxford results for TB separately to the Australian. In Oxford, 55% of patients reported having previous BCG vaccination. Screening for TB had previously been performed in 21% with 5% of these being positive. CXRs were requested for 5% and no TSTs or QG were requested in the Oxford cohort. In contrast, at the Australian sites, 16% of patients reported previous BCG vaccination, and 39% had received previous screening for TB with 1.4% of these being positive. During the study period, CXRs were requested for 28%, TST for 6.5% and QG in 77%. Positive results were yielded in 22 out of the 625 patients tested, with 19 of these positive results coming from QG.

3.9. Hepatitis C (HCV) status

Five of the 218 patients who had previously been tested said they were HCV positive. HCV testing was requested in 689 patients (75%). Persistent HCV was confirmed in 4 of the 5 patients with a negative test in one patient who had recalled a previous positive result. There was one new positive result in a patient with a history of intravenous drug use.

3.10. Human immunodeficiency virus (HIV) status

One hundred and seventy-nine of the 737 patients in Australia (24%) reported a previously negative HIV test. HIV testing was requested in 208 patients (28%) with no positive results.

4. Discussion

With the increasing use of immunomodulators, prevention of opportunistic infections is a key issue in the treatment of patients with IBD. This study implemented a screening and vaccination program that was used by gastroenterologists in centres with an interest in the management of these patients. Significant changes in behaviour were identified in all categories except for TB screening which was already at high levels prior to the intervention. TB screening has been strongly recommended prior to biologic treatment given the many reports of disease reactivation and, therefore, the dissemination, transfer of knowledge and attitude change

towards TB screening had already occurred among gastroenterologists prior to this study. The screening and vaccination for other infections described in this project have only been encouraged since 2009. The pre-study survey shows that hepatitis B, *Influenza* spp., *Pneumococcus* spp., varicella and cervical smears are not being considered as often as they should be.

This study has shown that the use of a proforma to guide testing and recommendations can increase the screening and vaccination rates significantly, even in centres that have an existing interest in IBD. Attributing a reason or reasons for the positive adoption of this implementation by participating gastroenterologists to a particular aspect of behaviour is difficult because this was a non-randomised observational study whose descriptive evaluation does not determine "cause and effect". Generalising the results should be limited to those centres with motivated IBD specialists and the intervention effect must be interpreted with care. Nevertheless, the simplicity of the proforma and the non-intrusive character of the intervention make it more likely that the vaccination proforma was indeed the main factor in changing behaviour to match the recommendations of guidelines.

Other reasons for the adoption and change in practice include the timing of the implementation, as it was introduced at a time of raised awareness of opportunistic infections and already changing attitudes. The proforma was also based on a highly cited consensus. Each hospital had a principal investigator who was pivotal in motivating other involved gastroenterologists to use the screening and vaccination proforma. Simple proformas have been shown to facilitate uptake.[12] Sustainability of this adoption and change in practice will need to be followed in the future.

Changing the practice of motivated gastroenterologists with a simple proforma was one outcome, but the uptake of advice regarding vaccination was only followed in 40–65% of cases. Uptake of advice varied with the different recommendations. Influenza vaccination and cervical smears had the highest rates of patient uptake (66% and 62% respectively), no doubt because there are well-established procedures in primary care. Hepatitis B and varicella vaccination for appropriate individuals only had approximately 40% uptake, which may reflect the cost, or the need for several visits to the general practitioner to complete the vaccination series, or (in the UK) the fact that hepatitis B vaccination for patients on immunomodulators is not covered by national recommendations. It was not the aim of this project to investigate the barriers to the uptake of recommendations, but we acknowledge that this is an important factor. We believe that IBD nurse specialists will play a pivotal role in implementing screening and vaccination as standard practice in the future. Patient education through national patient support groups is also a motivator for change. On average, each general practitioner manages only 3–4 IBD patients and many general practitioners feel uncomfortable with the medications used in IBD.[13] Specialists, supported by nurses and patient support groups will, therefore, have to lead the change.

This study has provided valuable insight into the current rates of immunity within the IBD population. Both doctors and patients can be informed by these results. A patient's recollection of hepatitis B vaccination is not a reliable way to screen for immunity and repeat HepBsAb titres are recommended. For patients who recalled having varicella or previous varicella immunisation, immunity was found to be present in 94% of cases. This compares to 89% of the total IBD population. No cases of HIV were found in the 530 patients screened for HIV. Only one new case of hepatitis C was discovered in 689 patients screened for hepatitis C and this patient had the previous risk factor of intravenous drug use. This IBD population was a low risk population and perhaps patients should only be screened for HIV and hepatitis C if risk factors are present. We feel that it is important to know if either HIV or hepatitis C is present as additional communication between the patient's infectious disease specialist/hepatologist and gastroenterologist is required. Cervical smear questioning improved significantly and one can postulate that this will improve cervical smear follow up which is important in this often immunosuppressed population as abnormal changes are likely to be accelerated.[14] Human papillomavirus vaccination was not part of this study, however, despite national guidelines and a recent community catch up program for females between 14 and 18, it was noted that only 46% of females under the age of 20 years had undergone previous vaccination. The 19 patients with positive Quantiferon Gold results are being further followed up. The significance of their positive results is still to be determined. Many of these patients are undergoing prophylactic treatment with isoniazid and pyrazinamide. The exact time for screening for TB remains controversial.

Screening and vaccination in IBD patients have now become part of the new standard of care. This observational study supports the implementation of a proforma to assist gastroenterologists with this process. We recommend that all gastroenterologists treating patients with IBD use a screening and vaccination proforma to facilitate this important change in clinical practice. Further implementations will be needed to promote this change. We also encourage the specialist societies to establish evidenced-based recommendations that are easily accessible to both patients and doctors.

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