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Serologic Protection to Routine Vaccinations in Children with Inflammatory Bowel Disease

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Abstract

The health care maintenance of immunocompromised individuals is unique due to the balance of protection against vaccine-preventable diseases and the risk of vaccine adverse events. The aim was to evaluate serologic protection to and completeness of routine vaccinations in children with inflammatory bowel disease [IBD]. Of 155 participants, 69.7% had the standard immunizations up to date. Of 152 participants, 81.9% demonstrated serologic protection to rubella; 20.6% to hepatitis A [HAV], and 65.8% to hepatitis B [HBV]. This study determined that children with IBD are at risk for vaccine-preventable illnesses due to lack of receiving vaccine series and inadequate serologic protection.

Background

IBD is a chronic immune-mediated disease of the gastrointestinal system resulting from an inappropriate inflammatory response to an environmental stimulus in a genetically susceptible host. IBD affects 70 per 100 000 children with 4.7 per 100 000 new cases in children per year in North America and Western Europe, the regions of highest prevalence. [1,2] Treatment for IBD frequently involves the aggressive use of potent immunosuppressants that increases susceptibility to and severity of other infections. Consequently, many individuals postpone or refuse immunizations due to unstable disease activity or because of fear of disease exacerbation

This study aims to determine the proportion of children with IBD with serologic protection to routine childhood and additional vaccinations (varicella zoster virus [VZV], measles, mumps, rubella [MMR], hepatitis B virus, and hepatitis A virus) and to evaluate adherence to completion of routine childhood vaccinations.

Methods

In this single-center cross-sectional study, children with IBD followed at the Alberta Children's Hospital were recruited from September 15, 2011 to August 15, 2012. Serum was collected in conjunction with information about demographic data, IBD medication use, infection risk factors, and vaccination records. From review of vaccination records, the proportion with complete series for each vaccine according to the Alberta schedule (at age of vaccination) was evaluated. Diphtheria-pertussis-tetanus-polio-*haemophilus influenza* b (DTap-IPV-Hib), MMR, and HBV will constitute the standard childhood vaccinations when assessing for completeness of vaccinations as the Alberta schedule has changed in the last decade.[3] The Provincial Laboratory of Public Health analyzed the assays.

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Results

155 children with IBD (93 Crohn's disease, 46 ulcerative colitis, 16 IBD-unclassified) underwent serum collection; complete and valid vaccine records were available for 152 of these children. At enrolment, 93 participants (60.0%) were currently on and 123 participants (79.4%) reported having ever used immunosuppressive therapy. Of 155 participants, 69.7% had the standard immunizations (MMR, DTap-IPV-Hib, and HBV) up to date.

Table 1. Baseline Characteristics and Risk Factors

	Total Cohort	Immunizations UTD	Immunizations Not UTD
Characteristics	n =155	n =106	n =46
Inflammatory bowel disease type, n (%)			
Crohn's disease	93 (60.0%)	65 (61.3%)	26 (56.5%)
Ulcerative colitis	46 (29.7%)	31 (29.2%)	14 (30.4%)
Indeterminate colitis	16 (10.3%)	10 (9.4%)	6 (13.0%)
Sex, n (%)			
Male	83 (53.5%)	56 (52.8%)	26 (56.5%)
Female	72 (46.5%)	50 (47.2%)	20 (43.5%)
Median diagnosis age in years (Q1, Q3)	12.1 (9.0, 14.5)	12.6 (9.5, 14.6)	10.5 (7.2, 13.8)
Median current age in years (Q1, Q3)	15.9 (12.8, 17.6)	16.3 (13.7, 17.7)	14.0 (11.5, 16.9)
Medically immunocompromised, n (%)			
Any immunosuppressant use	123 (79.4%)	81 (76.4%)	39 (84.8%)
Current immunosuppressant use	93 (60.0%)	61 (57.5%)	30 (65.2%)
Any corticosteroid use	105 (67.7%)	70 (66.0%)	32 (69.6%)
Current corticosteroid use	20 (12.9%)	13 (12.3%)	5 (10.9%)
Any immunomodulator use	98 (63.2%)	67 (63.2%)	31 (67.4%)
Current immunomodulator use	70 (45.2%)	47 (44.3%)	23 (50.0%)
Any biologics use	59 (38.1%)	37 (34.9%)	20 (43.5%)
Current biologics use	48 (31.0%)	30 (28.3%)	16 (34.8%)
Chicken pox risk factors, n (%)			
Previously infected	87 (56.1%)	62 (58.5%)	23 (50.0%)
Vaccinated	62 (40.0%)	42 (39.6%)	18 (39.1%)
No vaccinations/infection	10 (6.5%)	5 (4.7%)	5 (10.9%)
Hepatitis B risk factors, n (%)			
Caucasian	107 (69.0%)	74 (69.8%)	31 (67.4%)
Born in Canada	140 (90.3%)	100 (94.3%)	39 (84.8%)
Jaundice	30 (19.4%)	20 (18.9%)	10 (21.7%)
Liver disease	7 (4.5%)	6 (5.7%)	1 (2.2%)
Travel outside Canada	131 (84.5%)	90 (84.9%)	39 (84.8%)
Household exposure to Hepatitis B	3 (1.9%)	3 (2.8%)	0
Blood transfusion	22 (14.2%)	11 (10.4%)	9 (19.6%)
Needle stick injury	1 (0.6%)	0	1 (2.2%)
Body piercings	49 (31.6%)	39 (36.8%)	10 (21.7%)
Tattoos	3 (1.9%)	3 (2.8%)	0

UTD, up to date; standard immunizations: 1) measles, mumps, and rubella, 2) hepatitis B, and 3) diphtheria, tetanus, acellular pertussis, inactivated polio virus, *Haemophilus influenzae* type b conjugate vaccine; Q1, first quartile; Q3, third quartile; 3 participants did not have valid documentation of immunization records

Results continued

Of 155 participants, serologic immunity was demonstrated by 127 participants (81.9%) to rubella, 102 participants (65.8%) to HBV, and 32 participants (20.6%) to HAV. Of those who had completed the specific vaccinations, serologic immunity was mounted by 113 of the 142 participants (79.6%) to rubella, 79 of the 114 participants (69.3%) to HBV, and 100% of the participants to HAV.

Table 2. Vaccination Protective Status

	Up to date			Not up to date		
Vaccinations, n (%)	n =152	Complete (series)	Complete for age	n =152	No Doses	Partial (Series)
MMR	142 (93.4%)	139 (97.9%)	3 (2.1%)	10 (6.6%)	5 (50.0%)	5 (50.0%)
DTaP-IPV-Hib	130 (85.5%)	73 (56.2%)	57 (43.8%)	22 (14.5%)	1 (4.5%)	21 (95.5%)
HBV	127 (83.6%)	114 (89.8%)	13 (10.2%)	25 (16.4%)	14 (56.0%)	11 (44.0%)
HAV	13 (8.6%)	9 (69.2%)	4 (30.8%)	139 (91.4%)	137 (98.6%)	2 (1.4%)
VZV	142 (93.4%)	60 (42.3%)	*85 (60.0%)	10 (6.6%)	10 (100.0%)	0
PCV13	17 (11.2%)	16 (94.1%)	1 (5.9%)	135 (88.8%)	135 (100.0%)	0
Men C	111 (73.0%)	111 (100.0%)	0	41 (27.0%)	36 (87.8%)	5 (12.2%)
HPV§	41 (58.6%)	21 (51.2%)	20 (48.8%)	29 (41.4%)	25 (86.2%)	4 (13.8%)

Complete (series)- received all scheduled doses; Complete for age- received all doses appropriate for age; No doses- zero doses; Partial (series)- received ≥1 dose, still missing ≥1 dose; * 85 participants had infection history with 3 also receiving vaccinations; § 70 female participants had valid immunization documentation

For VZV, 10 of 152 participants had neither been infected nor vaccinated, including 7 participants who were currently using immunosuppressive medications.

For MMR, 26 participants who had completed the MMR series lacked serologic protection to rubella, including 15 participants who were currently using immunosuppressive medications.

For HBV, in the naive group, potential risk factors for infection included past history of travel outside of Canada (n=49), blood transfusion (n=8), and body piercing (n=15).

Interestingly, 22 of 137 participants with no prior history of HAV vaccination mounted serologic protection to HAV; though 18 of these participants were born in Canada, all 22 participants had travelled outside of Canada.

Conclusion

Children with IBD are at risk for vaccine-preventable illnesses due to lack of receiving or completing vaccine series and inadequately mounting appropriate serologic protective response in spite of vaccination. Therefore, clinicians caring for patients with IBD should be conscientious about adherence to recommended vaccination schedules, measurement of immune response and serologic protection to vaccines, and booster vaccinations where appropriate.

References

1. Kappelman MD, Rifas-Shiman SL, Kleinman K, Ollendorf D, Bousvaros A, Grand RJ, Finkelstein JA. The prevalence and geographic distribution of Crohn's disease and ulcerative colitis in the United States. Gastroenterol Hepatol 2007;5(12):1424-9.
2. Størdal K, Jahnsen J, Bentsen BS, Moum B. Pediatric inflammatory bowel disease in southeastern Norway: a five-year follow-up study. Digestion 2004;70(4):226-30.
3. Routine immunization schedule, Government of Alberta Health and Wellness. Available at:http://www.health.alberta.ca/health-info/imm-routine-schedule.html. Accessed Aug 1, 2012.