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Original Contribution

Incidence and Duration of Group B *Streptococcus* by Serotype among Male and Female College Students Living in a Single Dormitory

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Group B *Streptococcus* causes a variety of morbid and sometimes fatal conditions affecting individuals of all age groups. There are nine known serotypes of this Gram-positive coccus but few estimates of the incidence and duration of its colonization and none by serotype in the literature. In 2001, the authors conducted a prospective cohort study among 257 men and women living in a single dormitory in Ann Arbor, Michigan. The 3-week incidence with any serotype was 11.3% (±3.9%) among women and 8.8% (±3.0%) among men; 3-week incidence rates were highest for serotype V (4.7% for women and 3.5% for men) and type Ia (2.3% for women and 2.4% for men), with no significant differences by gender. The estimated average duration of any group B *Streptococcus* colonization was longer for women (13.7 weeks) than men (8.5 weeks); serotype Ia was carried an average of 6.5 weeks longer in women, and serotype III was carried 4.9 weeks longer. Colonization with more than one serotype occurred significantly less than would be expected by chance ($p <<< 0.001$). Based on the overall incidence, transmission occurred between roommate pairs at the rate expected. Group B *Streptococcus* colonization is frequent and dynamic, but it is not transmitted by casual contact.

disease transmission; incidence; *Streptococcus agalactiae*

Abbreviations: PFGE, pulsed-field gel electrophoresis; RR, relative risk.

Group B *Streptococcus* is a common inhabitant of the bowel flora and vaginal cavity, and it is found somewhat less frequently in the urethra and throat. A variety of morbid and sometimes fatal conditions affecting individuals of all age groups are caused by group B *Streptococcus*. However, the greatest burden is on newborns, where it is a major cause of neonatal sepsis and meningitis (1), and the elderly or those with underlying chronic disease, where it causes skin, soft-tissue, or bone infection, bacteremia with no identified source, urosepsis, pneumonia, and peritonitis (2). During pregnancy, group B *Streptococcus* may cause amnionitis, endometritis, urinary tract infection, bacteremia or sepsis, and septic abortion (1). Among nonpregnant adults without underlying disease, group B *Streptococcus* causes vaginitis, cervicitis, urethritis, cystitis, pyelonephritis, balanitis (1), and pharyngitis (3).

Group B *Streptococcus* has a polysaccharide capsule. The different capsular polysaccharide antigens are used to classify group B *Streptococcus* into nine different serotypes. Serotype is associated with virulence: Among 178 isolates

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from 279 patients with invasive disease collected by a prospective population-based surveillance in metropolitan Atlanta, Georgia, serotypes V and Ia accounted for 62 percent of disease among the 65 isolates typed from nonpregnant adults and for 55 percent of invasive disease overall ($n = 178$ isolates) (4). Serotype III accounts for 70 percent of late-onset neonatal disease and meningitis cases among neonates (5), although types Ia and III predominate among early onset infections at 40 and 27 percent, respectively (6, 7).

Group B *Streptococcus* colonization occurs frequently, and the incidence is dynamic among both pregnant (8) and nonpregnant (9) female populations, although no studies have been conducted with follow-ups more frequent than 3-month intervals. While serotype is an important disease determinant, we found no estimates of the serotype-specific incidence or duration of colonization in the literature, nor any estimates of incidence rates among males. Further, the extent to which colonization with one serotype prevents colonization with another is uncertain, as is whether superinfection occurs. Understanding the dynamics of colonization by serotype is crucial for effective application of group B *Streptococcus* conjugate vaccines currently under development (10).

Group B *Streptococcus* acquisition is associated with sexual activity (9, 11), but little is known about transmission by nonintimate contact. Previously, using prevalence data, we found no evidence for transmission by casual contact among college roommates (12). However, because group B *Streptococcus* turns over rapidly, it is possible that a transmission event might have been missed when assessed at a single point in time. Only an incidence study can provide the information necessary to confirm or refute this finding.

To describe the incidence and duration of group B *Streptococcus* by serotype, we conducted a prospective cohort study among men and women living in a single university dormitory. Participants were followed at 3-week intervals to characterize the dynamics of colonization. In addition, we analyzed the risk of superinfection, transmission among roommate pairs, and movement between colonization sites.

MATERIALS AND METHODS

Study protocol

As described previously (12), 738 students who lived in a first year dormitory at the University of Michigan between January and February of 2001 were invited to participate via an advertisement in their dormitory mailbox. The dormitory is divided into nine ''houses'' spread over six floors. Houses have male, female, and/or coed floors. We enumerated all floors associated with each house and, using a random numbers table, randomly sampled from male, female, and coed floors. A total of 462 students (63 percent), 216 males and 246 females, consented and completed the enrollment protocol. Participants provided informed consent, a throat and mouth (cheek) culture, self-collected initial-void urine, and anal orifice and vaginal specimens, and they completed a self-administered questionnaire. For anal orifice specimens, participants were instructed to ''wipe'' with a swab as they do with toilet paper. Although many would consider this a rectal swab, it is technically a swab of the anal orifice, as participants were not instructed to pass the anal sphincter. Nonresponders were sent up to three e-mail reminders and contacted by telephone. All participants positive for group B *Streptococcus* and a random sample of those negative for it at enrollment were invited to return for four additional visits at 3, 6, 9, and 12 weeks after enrollment. At each follow-up visit, additional specimens were collected, and participants completed a self-administered questionnaire. The study protocol was approved by the University of Michigan Institutional Review Board.

Of the 462 participants in the initial survey, 299 were invited to participate in the follow-up study (149 men and 150 women); 257 of the 299 (86 percent) completed the first follow-up, and 82 percent, 80 percent, and 79 percent completed the second, third, and fourth follow-ups, respectively. Follow-up rates were virtually identical by gender. Participants were compensated for participation, with a bonus for completing all four follow-ups.

Group B *Streptococcus* isolation

As described previously (12, 13), participants self-collected urine, vaginal, and anal orifice specimens using the CultureSwab Plus Collection System (Baltimore Biological Labs, Sparks, Maryland) with Amies transport medium. This system was also used for the throat and mouth specimens collected by the research assistant. Following collection, each swab or tampon was inoculated in selective broth medium containing gentamicin and nalidixic acid, incubated overnight at 37°C with carbon dioxide, subcultured onto trypticase soy agar with 5 percent sheep's blood, and incubated overnight. Urine specimens were cultured directly onto trypticase soy agar. Suspect isolates were confirmed serologically as described in previous studies (12, 13).

Pulsed-field gel electrophoresis

We used pulsed-field gel electrophoresis (PFGE) to determine whether participants with colonies at multiple sites carried identical group B *Streptococcus* strains and whether transmission occurred between roommate pairs. PFGE methods were described previously (11). The similarity of group B *Streptococcus* isolates from participants was determined first by visually observing band differences between strains on the same gel. As described by Tenover et al. (14), strains were considered closely related if they differed by no more than two bands. Group B *Streptococcus* strains from participants were also compared using BioNumerics software (Applied Maths, Kotrijk, Belgium), with a separate dendrogram created for each participant. The Dice coefficient was used to assess strain similarity, and strain A909, a Lancefield protype type Ia/c strain, was used as the control. For analyses of roommate pairs, we created a separate dendrogram for all strains from each roommate pair for analysis and visual comparison. PFGE data were not available for six strains, because either they were missing or nonviable, or the DNA could not be digested.

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Serotyping

We classified isolates into serotypes Ia, Ib, and II–VIII by use of DNA dot blot hybridization, as previously described (15). For a subset of isolates, however, DNA hybridization was performed using an alternative antifluorescein-alkaline phosphatase antibody, according to the manufacturer's protocol (Roche Diagnostics, Penzberg, Germany), as the reagents used previously had been discontinued. Isolates that could not be typed were probed for the presence of the group B *Streptococcus* 16S RNA gene to verify that chromosomal DNA was present on the membrane when it was initially probed with the capsular-specific gene probes. DNA extraction for two isolates was found to be inadequate for capsular typing, and they were excluded from the analysis. When more than one isolate from a single individual had the same PFGE pattern, we assumed that the isolates had the same serotype (14). Thus, for each person, we performed capsular typing on only one randomly selected isolate from each PFGE band pattern observed.

TABLE 1. Sociodemographic characteristics and sexual history of 129 female and 128 male freshman students living in a single college dormitory, Ann Arbor, Michigan, 2001

Characteristic	Women		Men	
	No.	%	No.	%
White race	111	86	109	85
Ever engaged in vaginal, oral, or anal intercourse	109	84	90	70
Lifetime no. of sex partners				
None	20	16	39	30
1	45	35	31	24
2–3	34	26	30	23
4 or more	30	23	28	22
	Median	Range	Median	Range
Age (years)	19	17–28	19	18–22
Age (years) at first sex	16	14–21	17	13–19

Data analysis

An incidence of group B *Streptococcus* colonization or group B *Streptococcus* acquisition was defined as a culture-positive specimen at any site following a negative specimen at all sites at the previous 3-week sampling interval. The incidence rate was defined as the number of positive specimens divided by the number of person-intervals at which a person was at risk for acquiring group B *Streptococcus*. For example, women with culture-positive group B *Streptococcus* in the previous interval were not at risk for group B *Streptococcus* incidence in that interval. Comparisons of incidence rates by gender and serotype were performed by the chi-square test.

The duration of group B *Streptococcus* carriage was estimated by use of incident cases with two different calculations. First, a Kaplan-Meier estimate of time to loss of group B *Streptococcus* was calculated, and the median duration was estimated. Because of the discrete sampling intervals, the median could not be precisely estimated. Second, the mean duration was estimated by use of the formula: (incidence per week) $\times$ (mean duration (weeks)) = prevalence/(1 $-$ prevalence) (16). Although the mean was expected to be somewhat larger then the median because of a skewed distribution of the duration of carriage, the estimates provided some confirmation of each other.

We tested for independence of colonization by serotypes versus a synergistic or an antagonistic relation among the various serotypes. First, we estimated the prevalence of each serotype as p_i = (number with ith serotype/number at enrollment). Next, we calculated, under the assumption of independence, the probability of acquiring new colonization with two or more serotypes in the same interval in the same person. The calculation was performed as 1 $-$ the probabilities of zero ($= \Pi\,(1 - p_i)$) or one ($\Sigma\, p_i \times (\Pi\,(1 - p_j)$ for all $j \neq i$)) serotype at the same person-interval. We then tested the hypothesis of independence, on the basis of the observed and expected proportions of subjects with two or more serotypes at the same time, using a normal approximation to the binomial distribution. We performed this analysis both for enrollment and for the first interval.

We tested the equality of the proportion of observed transmissions between roommate pairs to that expected between random pairs based on the background incidence by serotype using a normal approximation to the binomial distribution. Details are given in the footnote to table 3.

All analyses and data management were conducted using SAS, version 9.1, software (17).

RESULTS

The 257 study participants who completed at least one follow-up were residents of a single freshman dormitory. The majority of participants were White and aged 19 years. Most had engaged in sexual activity, defined as vaginal, oral, or anal intercourse, with a median age at first sex of 16 years for women and 17 years for men (table 1).

The incidence of group B *Streptococcus* colonization was quite high for both men and women (figure 1); the 3-week incidence with any serotype was 11.3 percent (95 percent confidence interval: 7.4, 15.2) among women and 8.8 percent (95 percent confidence interval: 5.8, 11.8) among men. Incidence rates were highest for serotype V (4.7 percent for women and 3.5 percent for men) and type Ia (2.3 percent for women and 2.4 percent for men), with no significant differences in incidence by gender, either overall or by serotype. Because risk of colonization with more than one serotype is small (see below), we calculated serotype-specific incidence using the risk periods for colonization with any group B *Streptococcus* rather than risk periods by serotype. Since there is some simultaneous colonization with more than one serotype, this method slightly underestimates the true value. However, use of capsular-specific risk periods would result in substantial overestimates. We believe that using the risk period for any group B *Streptococcus* results in estimates closer to the true values.

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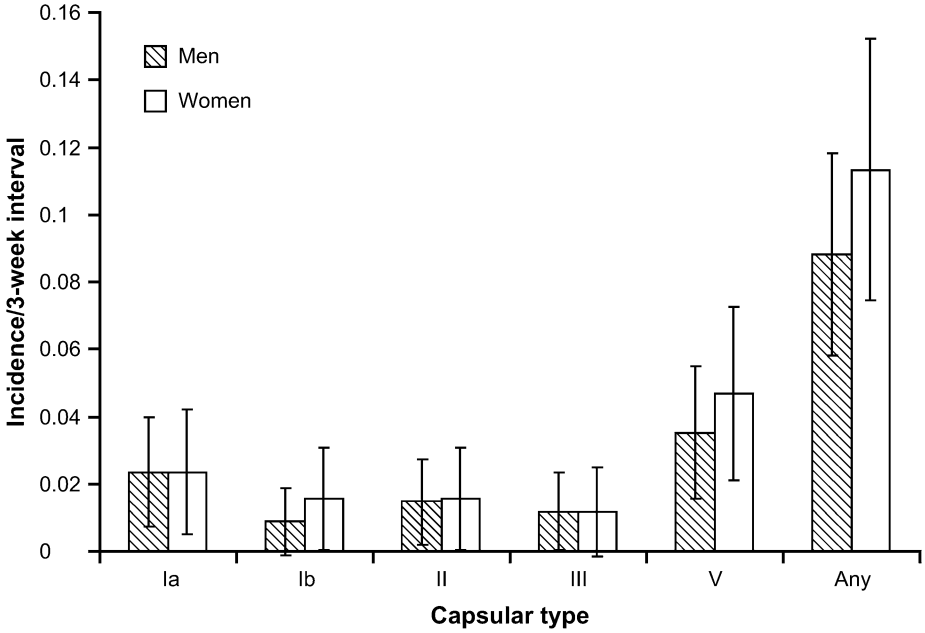


FIGURE 1. Three-week incidence rate of group B *Streptococcus* by serotype and gender among 129 female and 128 male freshman students living in a single college dormitory, Ann Arbor, Michigan, 2001. Ticked lines represent 95% confidence intervals.

The site of initial group B *Streptococcus* colonization for both men and women most often included the rectum (figure 2), although it was not uncommon to find group B *Streptococcus* in multiple sites. At enrollment, 60 percent of women and 23 percent of men were colonized at two or more sites. We determined the potential for movement

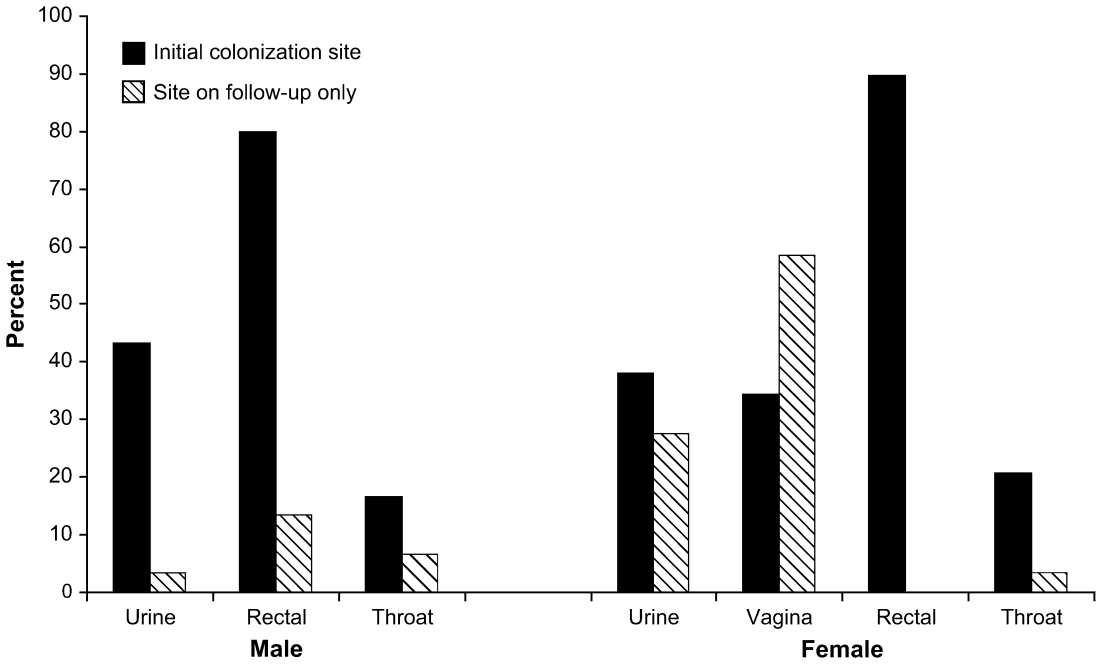


FIGURE 2. Initial colonization site of group B *Streptococcus* and movement to a new site on follow-up, by gender, among 129 female and 128 male freshman students living in a single college dormitory, Ann Arbor, Michigan, 2001.

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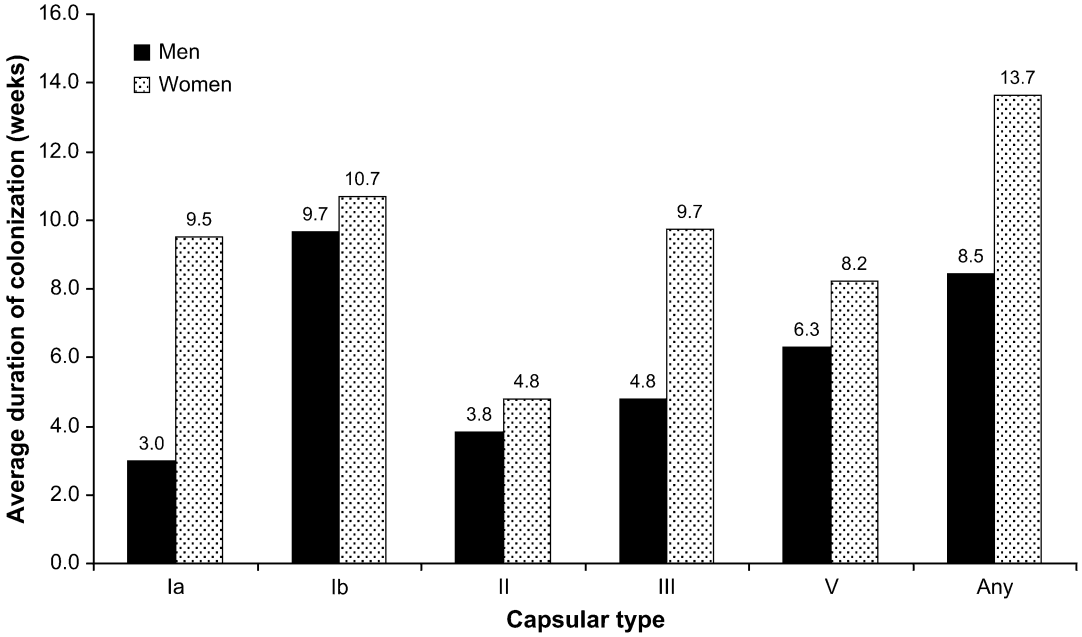


FIGURE 3. Average duration of group B *Streptococcus* colonization by serotype and gender among 129 female and 128 male freshman students living in a single college dormitory, Ann Arbor, Michigan, 2001. Duration was estimated using the approximation that duration = $(P/(1 - P))/I$, where P is the prevalence at enrollment and I is the 3-week incidence rate.

between sites in subsequent visits following initial colonization. Among men, there was relatively little movement between colonization sites. By contrast, movement to either the urine or vaginal cavity following colonization in another site occurred frequently among women, but there was no movement into the rectum.

The estimated duration of any group B *Streptococcus* colonization was longer for women (13.7 weeks) than men (8.5 weeks), but gender differences were not observed for all serotypes (figure 3). The greatest differences were for serotypes Ia (6.5 weeks longer in women) and III (4.9 weeks longer in women), with modest to no gender differences for the other serotypes (figure 3).

To estimate the potential for simultaneous/dual colonization with more than one serotype, we used the serotype-gender–specific incidence rates to calculate the expected rate of colonization with more than one serotype assuming independence of all types. We compared the expected and observed rates by use of a chi-square test. We calculated this test for the rates of dual colonization at enrollment, separately for men and women. In each case, the observed number of persons colonized with more than one serotype was significantly less ($p <<< 0.001$) for each gender than one would expect on the basis of the serotype-specific incidence rates by gender (we observed no women and one man with dual colonization and expected to find dual colonization in 80 women and 23 men).

To assess whether acquiring group B *Streptococcus* might be associated with symptoms, we queried respondents at each follow-up regarding the presence of genitourinary symptoms in the previous 3 weeks (table 2). Women reporting pain during intercourse over the previous 3 weeks were 3.7 times more likely than those with no pain to have acquired group B *Streptococcus* ($p = 0.04$), but there was no association with any urinary tract symptom measured. By contrast, men reporting frequent (relative risk (RR) = 3.4; $p = 0.06$) or painful (RR = 4.8; $p = 0.01$) urination, an urgent need to urinate (RR = 2.6; $p = 0.09$), pain or pressure in the abdomen (RR = 4.8; $p = 0.01$), back pain (RR = 4.1; $p = 0.009$), or flank pain (RR = 6.2; $p = 0.003$) during the previous 3 weeks were more likely than those not reporting the symptom to have acquired group B *Streptococcus*.

A total of 27 female roommate pairs and 28 male roommate pairs enrolled in the study, allowing us to estimate the frequency of transmission of group B *Streptococcus* between roommates over time. Among the 55 roommate pairs, we observed 120 risk periods (i.e., when one roommate was colonized and the other was not in the previous interval). On the basis of the gender-specific incidence, we would expect 12.5 transmission events; we observed nine potential transmission events ($p = 0.30$) (table 3). These events were potential transmission events in that they did not take into account whether the group B *Streptococcus* detected was the same serotype or PFGE type in both roommates. After recalculation of transmission of identical group B *Streptococcus* (by PFGE) between roommates as the outcome, the observed ($n = 2$) and expected ($n = 1.5$) transmission events were also no different than might be expected by chance ($p = 0.67$).

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TABLE 2. Associations of genitourinary symptoms during the previous 3 weeks with incidence of any GBS* and incidence of GBS serotype V for women, by gender, among 129 female and 128 male freshman students living in a single college dormitory, Ann Arbor, Michigan, 2001

Characteristic	Women			Men	
	3-week intervals† (no.)	Any GBS (%)	Serotype V (%)	3-week intervals (no.)	Any GBS (%)
Frequent urination					
No	247	11.7	4.1	333	8.4
Yes	9	0	0	7	28.6
p value‡		0.3	0.5		0.06
Painful urination					
No	253	11.1	4.0	335	8.4
Yes	3	33.3	0	5	40.0
p value		0.2	0.7		0.01
Urination at night					
No	249	11.2	4.0	334	8.7
Yes	7	14.3	0	6	16.7
p value		0.8	0.6		0.5
Urgent need to urinate					
No	243	11.1	4.1	326	8.3
Yes	13	15.4	0	14	21.4
p value		0.6	0.5		0.09
Pain/pressure in abdomen					
No	239	10.9	3.8	335	8.4
Yes	17	17.7	5.9	5	40.0
p value		0.4	0.7		0.01
Back pain					
No	248	10.5	3.6	331	8.2
Yes	8	37.5	12.5	9	33.3
p value		0.02	0.2		0.009
Flank pain					
No	248	10.9	4.0	334	8.1
Yes	8	25.0	0	6	50.0
p value		0.2	0.6		0.003
Pain during intercourse					
No	249	10.8	3.6		
Yes	5	40.0	20.0		
p value		0.04	0.06		
Pain after intercourse					
No	247	10.5	3.6		
Yes	7	42.9	14.3		
p value		0.008	0.15		
Antibiotics in previous 3 weeks					
No	213	12.7	4.2	296	8.1
Yes	42	4.8	2.4	44	13.6
p value		0.1	0.6		0.2

* GBS, group B *Streptococcus*.

† Number of 3-week intervals at risk for incident GBS (refer to Materials and Methods).

‡ All *p* values were for the chi-square test of the equality of proportions of subjects with GBS for those with and without the given symptom.

DISCUSSION

Group B *Streptococcus* colonization is frequent and dynamic among otherwise healthy college students living in a freshman dormitory, with a 3-week incidence of 11.3 percent for women and 8.8 percent for men. This translates to a 1-year cumulative incidence of 1.96 and 1.53 episodes of colonization per person per year for women and men, respectively, assuming that an individual is continuously at risk. Colonization was also of relatively short duration (13.7 weeks for women and 8.5 weeks for men), with the duration of colonization longer in women than in men for the two serotypes most associated with neonatal disease: types Ia and III. We found no evidence that transmission might occur with the type of casual contact that occurs between college roommates: Group B *Streptococcus* acquisition in roommate pairs occurred no more frequently than might be expected based on chance alone. However, we found some evidence that colonization is not wholly asymptomatic. Men reporting one or more urinary symptoms during the previous 3-week interval were significantly more likely to have acquired group B *Streptococcus* during that interval, and women reporting pain during intercourse during the previous 3-week interval were significantly more likely to have acquired group B *Streptococcus* in that interval.

This is the first study that we are aware of that estimates group B *Streptococcus* incidence by serotype, for men and women and for intervals shorter than 3 months. Meyn et al. (9) followed 1,089 nonpregnant women aged 18–30 years at 4-month intervals for 12 months, collecting rectal and vaginal specimens at each interval; 44.9 percent of those negative at enrollment acquired group B *Streptococcus* during follow-up. This is a somewhat lower cumulative incidence than estimated from our incidence rate/3 weeks (0.113/person/3 weeks $\times$ 52 weeks or 196 percent). This may reflect missed colonization (as colonization may be acquired and lost during 4 months), differences in population incidence, differences from sampling two sites rather than three (we sampled vaginal, rectal, and urine at each interval), or other study design differences. Nonetheless, the conclusion of both studies is that group B *Streptococcus* acquisition occurs frequently.

We found no other reports of group B *Streptococcus* incidence among males in the literature. The higher incidence rates and longer duration of carriage among females can probably be attributed to the fact that women have an additional colonization site, the vaginal cavity.

We can use the estimated durations from our study to estimate the incidence rate for the observed prevalence of colonization in other populations. Among pregnant women, the prevalence of group B *Streptococcus* in vaginal flora varies by geographic region, by racial group, and by culture technique, ranging from 9.2 to 27.2 percent (18, 19). By use of the average duration of carriage that we observed of 13.7 weeks among women, the estimated annual incidence in these populations would be 36 percent and 140 percent, respectively. The high incidence highlights why effective screening during pregnancy should take place during labor (20) and underscores why testing and ultimately implementing an effective vaccine would be desirable (21).

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TABLE 3. Observed and expected transmission frequencies among 27 female and 28 male roommate pairs, in which at least one roommate was colonized with group B *Streptococcus*, Ann Arbor, Michigan, 2001

	Women		Men		Total	
	No. of roommate pairs	*p* value	No. of roommate pairs	*p* value	No. of roommate pairs	*p* value
Any group B *Streptococcus*						
Periods at risk*	76		44		120	
Observed transmission†	6		3		9	
Expected no.‡	8.6		3.9		12.5	
		0.35		0.64		0.30
Identical group B *Streptococcus* (by pulsed-field gel electrophoresis)						
Observed transmission	2		0		2	
Expected no.§	1.1		0.4		1.5	
		0.81		0.53		0.67

* A person is considered at risk in a given follow-up interval if he/she was negative and his/her roommate was positive for group B *Streptococcus* in the previous interval.

† Transmission is potential, as isolates were not necessarily identical by pulsed-field gel electrophoresis.

‡ "Expected no." assumes independence of colonization between roommates and overall incidence probabilities (per 3 weeks) of 0.113 for women, 0.088 for men, and 0.201 combined. We also assume independence of follow-up periods. For example, the expected no. of incident cases for women is calculated as 76×0.113. We tested the equality of observed ($\hat{p}$) and expected (p^*) proportions positive for group B *Streptococcus* (e.g., 6/76 compared with 8.6/76 for women) using a z test for comparing a binomial proportion with a hypothesized value, i.e., $z = (\hat{p} - p^*)/(\sqrt{(p^* \times (1 - p^*)/n)})$.

§ Calculation of "expected no." assumes independence of colonization among roommates. Expected no. is the sum over all risk periods of the probability of incident group B *Streptococcus* (0.113 for women, 0.088 for men, as given above) multiplied by the overall incidence probabilities calculated for each pulsed-field gel electrophoresis pattern based on the pattern of the roommate for each period at risk.

We observed women to have a longer duration of carriage of group B *Streptococcus* serotypes Ia and III than men, suggesting that these types may have an affinity for the vaginal cavity or possibly an affinity for gender-related tissue receptors. If true, this would help to explain why these serotypes are more likely to cause neonatal disease (22). Unfortunately, our sample size was too small to detect significant differences in initial colonization site by serotype. Confirmatory epidemiologic studies and appropriate laboratory studies are needed.

We observed only one case of colonization with two different group B *Streptococcus* strains (by PFGE). Further, although we observed four cases of apparent reinfection during our 15 weeks of follow-up, all were reinfected with the same serotype, suggesting that continuous colonization might have been missed. Thus, colonization with one group B *Streptococcus* type seems to prevent colonization with another, at least during the limited duration of carriage.

The observation that transmission occurred between roommate pairs at a rate expected based on overall incidence is reassuring. Although we have no measures of the extent of intimate contact between roommate pairs, it seems clear that group B *Streptococcus* will not be spread through doorknobs or casual contact as might be found among individuals sharing a dormitory room.

Acquiring group B *Streptococcus* colonization does not appear to be entirely asymptomatic in all individuals. Men reporting urinary symptoms and women reporting pain during intercourse during the previous interval were more likely to have acquired group B *Streptococcus* during the interval than were individuals without those symptoms. Unfortunately, our numbers were too small to determine whether symptoms were associated with acquiring a particular serotype. However, there was no association with seeing a physician in the previous interval and acquiring group B *Streptococcus* in either the previous interval or the one prior, suggesting—although not confirming—that any symptoms were not severe enough to seek medical attention. We found no published literature supporting or refuting this observation.

In generalizing our findings to other populations, readers should consider the special characteristics of this study population. All lived in a single college dormitory, and most were White and aged 19 years. Only 63 percent of those offered participation chose to enroll in the study, although follow-up participation rates were high (86 percent). Thus,

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if the reason for participation was associated with risk of group B *Streptococcus* colonization, then our incidence rates will be under- or overestimated accordingly. This seems unlikely, as other than engaging in sexual activity, there are few known group B *Streptococcus* risk factors (9, 12), and the frequency of sexual activity among participants is consistent with that found in other studies of the student population (13).

We used selective medium to culture group B *Streptococcus* and previously validated methods for specimen collection (12, 13); prevalence estimates from this study (12) are consistent with those from other reports using these methods in the literature (9, 13). Nonetheless, there is a potential for sampling error both when the sample is collected and during the culturing process. Therefore, it is possible that we missed continued colonization, potentially overestimating incidence, or missed colonization altogether, potentially underestimating incidence. The use of selective medium minimizes, but does not eliminate, missed colonization. To minimize the errors of missed continued colonization, we considered colonization at any of the sites cultured to be continued colonization. Of the 59 incident cases that were group B *Streptococcus* positive at one or more sites in one interval, three were negative at all sites in the following interval and subsequently positive at one or more sites with the same isolate by PFGE, giving an estimate of missed colonization of 5 percent. Two of these were colonized with serotype V and one with serotype Ia, the two serotypes of highest incidence.

In summary, we report the incidence and duration of group B streptococcal colonization, by serotype, among male and female college students living in a single dormitory. Incidence and duration vary by serotype and gender, but regardless of serotype the incidence rates are quite high.

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