Commentary: What remains to be done regarding transmission of *Helicobacter pylori*

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*Helicobacter pylori* causes a chronic and serious infection. *Helicobacter pylori* shares with syphilis and tuberculosis the features of a long latent period, a small proportion of infected individuals experiencing clinical illness, and a male predominance of clinical disease despite equal infection among sexes. Humans are the only known reservoir. Transmission is 'opportunistic' in that any method that allows the organism access to the stomach is likely to be a mode of transmission. The most common modes of transmission involve lapses in household hygiene, or ingestion of contaminated food or water. The infection is typically acquired in childhood or when children are in the family. In developed countries the prevalence of the infection is falling in all adult birth cohorts (loss exceeds the rate of acquisition of the infection). This is possibly related to the widespread use of antibiotics for other infections with the general high levels of hygiene practised limiting reacquisition. Prior to the culture of *H. pylori*, gastritis was an important topic for epidemiological studies and many features and associations were subsequently confirmed. What new epidemiological information is needed and do the three papers in this issue address these questions?

Moayyedi et al. examined several risk factors for *H. pylori* acquisition among adults between the ages of 40–49 years from an urban community in the north of England. The original design was an intervention trial to evaluate the outcome of medical benefits on *H. pylori* eradication and it also provided data for epidemiological analysis. Although the participants were randomly selected, the sample was not representative of the general population in terms of social class and frequency of dyspepsia. *Helicobacter pylori* is typically acquired in childhood making it unlikely that typical adult lifestyles would influence the risk of *H. pylori* infection. The authors confirmed prior observations that smoking, alcohol and coffee consumption, and usual adult lifestyles are not risk factors for *H. pylori* acquisition, whereas childhood socioeconomic status and overcrowding are.

Brown et al. report a cross-sectional study from a rural population between the ages of 35 and 69 from Shandong Province, China. This study was a portion of a larger trial of cancer prevention and was not designed to specifically address *H. pylori* transmission. Prior studies from China had not found a role for water in *H. pylori* transmission, possibly because of the widespread practice of boiling water before consumption. This study suggested that drinking water from shallow wells in the villages might lead to *H. pylori* acquisition. Unfortunately, because the water source was highly correlated with the educational level of the village, it was not possible to separate an excess risk for *H. pylori* acquisition related to differences in water source. Overall, there are sufficient studies that strongly support a role for water in *H. pylori* transmission, but only in some localities. A recent study from Kazakhstan found a significant association between the prevalence of *H. pylori* infection and household hygienic variables related to water use. Further studies in areas with a high prevalence of *H. pylori* infection, where water is likely a source of infection, are needed to investigate the variables to show how the water source plays a role in transmission. Such studies must include important household sanitary variables related to water source, water storage and use.

A large population-based study of the relationship between breastfeeding and *H. pylori* infection was conducted in Germany. The study was one of a series of 'minimal publishable units' from this group drawn from larger studies. This study targeted first grade children. The authors reported no protective effect of breastfeeding and found a trend for a higher rate of infection among those who were breastfed. *Helicobacter pylori* infection was concentrated among families in which the mother was also infected (exposure). These results contrasted sharply with another large population study of non-affluent Black and Hispanic children in the US that reported a consistently lower rate of *H. pylori* infection among breastfed children compared to those not breastfed, independent of the mothers' educational level. There were several potential technical flaws in the German study that might influence the accuracy of detection of *H. pylori* infection including failure to normalize the results of the breath test for CO and use of an infrared spectrometer which is inherently less accurate than mass spectroscopy near...
the cut-off value. Additionally, the relatively long delay between the breastfeeding period and assessment of H. pylori status allowed any behavioural differences linked with the tendency to breastfeed to become confounding variables. Subsequent studies are needed that focus on behavioural differences in relation to breastfeeding practices (moistening the nipple with saliva) and social/ethnic differences such as premastication to understand why the results among children living in Germany were different than among children in the US.

Helicobacter pylori infection clusters within families and improvement in socioeconomic status of parents reduces the risk and rate of transmission. Transmission requires exposure to an infected person or contaminated source as well as access of the organism to the stomach. The evidence overwhelmingly supports person-to-person transmission as the predominant mechanism. In areas with lax sanitation, contaminated water or food may also play a role in transmission. To date, most studies have examined surrogates such as socioeconomic status instead of attempting to break down and identify the elements of household hygiene that are critical elements within a particular society or ethnic group. Enteric infection related to water can be either water-borne (such as cholera), or related to poor sanitary practices (water-washed), or both. The data suggest that H. pylori can be transmitted either way, and that to reduce the rate of transmission, an improvement in overall sanitation will be required, including clean water, waste disposal, and household hygienic practices. Unfortunately, the extraction of an epidemiological ‘study’ from a study with a different primary focus rarely provides little in the way of new information or insights. None of these three studies discussed above address the critical issues. The remaining critical issue is to identify the weak links in the chain of transmission amenable to behavioural modification.

References