IIAC Information note

Hepatitis E infection and occupation

Background

1. Professor Sarah O'Brien (Institute of Infection and Global Health at Liverpool University) attended a meeting of the Industrial Injuries Advisory Council's (IIAC) Research Working Group (RWG) in May 2013 to provide expert advice on the epidemiology of the prescribed infectious diseases. She suggested that there was some evidence of an increased risk of hepatitis E in certain occupations. This topic was last considered by IIAC during the review of the 'B' diseases ('Conditions due to Biological Agents' Cm. 5997; 2003); at the time there was insufficient evidence of a greater than doubled risk to recommend prescription of hepatitis E for any groups of workers.

2. IIAC's scientific adviser undertook a literature search on the topic which suggested that there might be an elevation in risk of swine farmers being infected with hepatitis E. This Information Note summarises the outcome of further inquiries by the Council, including evidence taken from Dr Bengu Said (epidemiologist, Public Health England).

Pathology

3. Hepatitis E virus (HEV), a positive stranded RNA virus, is transmitted by the faeco-oral route and is a common cause of viral hepatitis in Asia, Africa and Central America, particularly where sanitation and food hygiene is poor. HEV infections have also been increasingly recognised in North America and Europe, and in the UK hepatitis E infections are now more commonly reported than hepatitis A, with many cases acquired from exposure within the UK. HEV usually produces mild disease but in rare cases it can prove fatal, particularly in pregnant women.

4. In contrast to hepatitis B, the disease does not usually lead to chronic hepatitis or to a carrier state. Four HEV genotypes that infect humans have been identified: genotype 1 is regularly found in HEV-endemic areas such as Africa and Asia; genotype 2 in Mexico and West Africa; genotype 3 in the United States, Europe, and Japan; and genotype 4 in Asia.

Proof of concept of transmission of HEV from swine to humans

5. Serologically confirmed cases of hepatitis E indigenously acquired in the UK tend to be sporadic, rather than part of an outbreak or epidemic. These non-travel associated cases usually occur in older men and infection is with the genotype 3 strain (related to the pig strain). Some 85% of British pigs are known to be anti-HEV antibody positive.

6. There is evidence that HEV may be acquired by eating HEV infected pork products (Said *et al*, 2013), but no other direct evidence of transmission from pig to human has been demonstrated.

Review of literature

7. Further review was restricted to reports where HEV genotype was known to be type 3, or paper relating to workers in Europe, USA or Japan. The table below lists the findings from six relevant studies identified by the Council.

8. Although a trend may be seen towards higher serum anti-HEV levels in people working in close contact with pigs, evidence that HEV genotype 3 is an occupationally acquired infection is currently insufficient.

Conclusions

9. IIAC does not recommend that hepatitis E infections be added to the list of prescribed diseases but the Council will keep the topic under review.

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Study	Country	Exposed	Unexposed	Results	Notes
Villalba *et al,* 2013	Cuba	69 swine-related work	37 no pig contact	28/69 40% (95% Confidence Interval (CI) 28.2-52.8%) in exposed vs 10/37 27% (95%CI 11.3-42.6) in unexposed	Prevalence of HEV higher in older workers and those who have worked with swine >10 years Faecal samples taken from swine and humans. Human and swine HEV sequences very similar and all genoype 3 but HEV RNA only detected in 14% human samples and 18.8% of swine samples
Galiana *et al,*2010	Spain	113 pig workers	99 blood donors	21 of 113 (18.6%) pig workers were positive for IgG HEVvs.4 of 99 (4%) blood donors (p=0.004)	12 of those who were found to be infected reported that they usually drank untreated water, but it is not possible to interpret this further without data on the proportion in those unaffected.
Masia *et al,* 2009	Sardinia	130 swine farm workers	402 blood donors	Anti-HEV prevalence =2.3% in swine workers vs 5.0% in blood donors (p>0.05)	6 of 95 pig bile samples tested positive for HEV genotype 3. Confirms pigs could be reservoir for infection
Vulcano *et al,*2007	Italy	92 pig breeders	3511 city dwellers	Anti-HEV prevalence = 3.3% in pig breeders vs 2.9% in city dwellers (p>0.05)	
Olsen *et al,* 2006	Sweden	115 male pig farmers	108 age matched male controls	Anti-HEV prevalence = 13.0% in pig farmers vs 9.3% in controls (p>0.05)	
Meng *et al,* 2002	USA	468 vets working with swine	400 blood donors	Relative risk in vets for swine HEV strain, 1.55	No differences in those who spent >80% of their time working with pigs or in academic/practicing/student/

				(95%CI 1.03-2.20). Relative risk in vets for human HEV strain, 1.46 (95%CI 0.99-2.17)	industry-based veterinary practice

References

Galiana C, Fernández-Barredo S, Pérez-Gracia M. Prevalence of hepatitis E virus (HEV) and risk factors in pig workers and blood donors. Enferm Infecc Microbiol Clin. 2010; 28:602-7

Industrial Injuries Advisory Council. Conditions due to biological agents. 2003. Cm. 5997. HMSO: London.

Olsen B, Axelsson-Olsson D, Thelin A, Weiland O. Unexpected high prevalence of IgG-antibodies to hepatitis E virus in Swedish pig farmers and controls. Scand J Infect Dis. 2006;38:55-8.

Masia G, Orrù G, Liciardi M, Desogus G, Coppola R, Murru V, Argiolas M, Orrù G. Evidence of hepatitis E virus (HEV) infection in human and pigs in Sardinia, Italy. J Prev Med Hyg. 2009;50:227-31.

Meng X, Wiseman B, Elvinger F, Guenette D, Toth T, Engle R, Emerson S, Purcell R. Prevalence of antibodies to hepatitis E virus in veterinarians working with swine and in normal blood donors in the United States and other countries. J Clin Microbiol. 2002; 40:117-22.

Said B, Ijaz S, Chand M, Kafatos G, Tedder R, Morgan D. Heptatitis E virus in England and Wales: indigenous infection is associated with consumption of processed pork products. Epidemiol Infect. 2013; 20:1-9.

Villalba M, Owot J, Corrreia B, Corredor M, Flaquet P, Frometa S, Wong M, Rodríguez Lay L de L. Hepatitis E virus genotype 3 in humans and swine, Cuba. Infect Genet Evol. 2013. 14:335-9

Vulcano A, Angelucci M, Candelori E, Martini V, Patti A, Mancini C, Santi A, Calvani A, Casagni L, Lamberti A. HEV prevalence in the general population and among workers at zoonotic risk in Latium Region. Ann Ig. 2007; 19:181-6.