Table III a. Safety of MenC conjugate vaccines. Are conjugated MC group C-vaccines causally associated with serious adverse reactions when used in individuals ≥2 months to <5 years?				
			Rating	Adjustment to level
Quality Assessment	No of Studies/Starting quality score		1 RCT	4
	Factors decreasing confidence	Limitation in study design	None serious	0
		Inconsistency	None serious	0
		Indirectness	Not applicable	0
		Imprecision	Serious[1]	-1
		Publication bias	None serious	0
	Factors increasing confidence	Large effect	Not applicable	0
		Dose-response	Not applicable	0
		Mitigated bias and confounding	Not applicable	0
	Final rating of quality of evidence			3
Summary of Findings	Statement on quality of evidence			We are moderately confident in the estimate of effect on health outcome
	Conclusion			Conjugated MC group C-vaccines are not causally associated with serious adverse reactions when used in individuals aged ≥2 months to <5 years

[1] The number of participants in the reported studies is rather small..

Table III b. Safety of MenC conjugate vaccines. Are conjugated MC group C-vaccines causally associated with serious adverse reactions when used in individuals ≥5 years of age?				
			Rating	Adjustment to level
Quality Assessment	No of Studies/Starting quality level		1 RCT and 2 observational studies	4
	Factors decreasing confidence	Limitation in study design	None serious	0
		Inconsistency	None serious	0
		Indirectness	None serious	0
		Imprecision	Serious[1]	-1
		Publication bias	None serious	0
	Factors increasing confidence	Large effect	Not applicable	0
		Dose-response	Not applicable	0
		Mitigated bias and confounding	Not applicable	0
	Final numerical score and quality of evidence			3
Summary of Findings	Statement on quality of evidence			We are moderately confident in the estimate of effect on health outcome
	Conclusion			Conjugated MC group C-vaccines are not causally associated with serious adverse reactions when used in individuals ≥5 years of age.

[1] The number of participants in the reported studies is rather small..

Randomised controlled trials on immunogenicity

A single-center, double-blind, randomized controlled trial conducted in UK by *MacLennan et al* in 1995-96 included 182 healthy infants. Participants were randomly assigned to receive vaccination with doses of 1 of 2 lots of meningococcal C conjugate vaccine (groups 1 and 2; n=60 in each group) or a hepatitis B control vaccine (group 3; n=62), administered with routine immunizations at 2, 3, and 4 months of age. Approximately half of each group received meningococcal C conjugate vaccine and half received plain meningococcal polysaccharide vaccine (MPS) at 12 months of age. Local and systemic reactions recorded for 6 days after each vaccination were compared by intervention group. Safety data were analyzed for all doses administered. The vaccines were generally well tolerated. The respective rates of local

reactions to the meningococcal C conjugate and HBV vaccines were very similar. There was no significant difference in systemic reactions between any of the vaccine groups.

In a randomized study *Choo S et al (2000)* evaluated the reactogenicity of a group C meningococcal conjugate vaccine (MenC) (n=92) compared with a group A+C meningococcal polysaccharide vaccine (MenPS) (n=90) in healthy adolescents. No differences in post immunization reaction rates were noted between the two vaccinated groups.

Observational studies

A study by *Richmond et al* included 30 healthy adult volunteers to evaluate the safety and immunogenicity of a serogroup C conjugate vaccine. Subjects were given a single dose of a new serogroup C meningococcal polysaccharide-tetanus toxoid conjugate vaccine. The vaccine was well tolerated with no serious adverse events and minimal local reactions and systemic symptoms.

A study by *Southern et al* looked at the safety and immunogenicity of a meningococcal C-tetanus conjugate vaccine (MCC-TT) vaccine. 113 laboratory staff including vaccine naive adults (n = 73) and prior meningococcal AC polysaccharide vaccinees (n = 40) were included. MCC-TT was well tolerated, with similar safety profiles in the two groups. Pain in the arm and headache were the most frequently reported events following vaccination.

References:

1. MacLennan JM, Shackley F, Heath PT, Deeks JJ, Flamank C, Herbert M, et al. Safety, immunogenicity, and induction of immunologic memory by a serogroup C meningococcal conjugate vaccine in infants: A randomized controlled trial. JAMA. 2000 Jun 7;283(21):2795-801.

2. Choo S, Zuckerman J, Goilav C, Hatzmann E, Everard J, Finn A. Immunogenicity and reactogenicity of a group C meningococcal conjugate vaccine compared with a group A+C meningococcal polysaccharide vaccine in adolescents in a randomised observer-blind controlled trial. Vaccine. 2000 Jun 1;18(24):2686-92.

3. Richmond P, Goldblatt D, Fusco PC, Fusco JD, Heron I, Clark S, et al. Safety and immunogenicity of a new Neisseria meningitidis serogroup C-tetanus toxoid conjugate vaccine in healthy adults. Vaccine. 1999 Nov 12;18(7-8):641-6.

4. Southern J, Deane S, Ashton L, Borrow R, Goldblatt D, Andrews N, et al. Effects of prior polysaccharide vaccination on magnitude, duration, and quality of immune responses to and safety profile of a meningococcal serogroup C tetanus toxoid conjugate vaccination in adults. Clin Diagn Lab Immunol. 2004 Nov;11(6):1100-4.

5. Choo S, Zuckerman J, Goilav C, Hatzmann E, Everard J, Finn A. Immunogenicity and reactogenicity of a group C meningococcal conjugate vaccine compared with a group A+C meningococcal polysaccharide vaccine in adolescents in a randomised observer-blind controlled trial. Vaccine. 2000 Jun 1;18(24):2686-92.