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## Breastfeeding promotion for infants in neonatal units: a systematic review and economic analysis.

Renfrew MJ, Craig D, Dyson L, McCormick F, Rice S, King SE, Misso K, Stenhouse E, Williams AF.

Mother and Infant Research Unit, Department of Health Sciences, University of York, UK.

**OBJECTIVES:** To evaluate the effectiveness and cost-effectiveness of interventions that promote or inhibit breastfeeding or feeding with breastmilk for infants admitted to neonatal units, and to identify an agenda for future research. **DATA SOURCES:** Electronic databases were searched (including MEDLINE and MEDLINE In-Process Citations, EMBASE, CINAHL, Maternity and Infant Care, PsycINFO, British Nursing Index and Archive, Health Management Information Consortium, Cochrane Central Register of Controlled Trials, Science Citation Index, Pascal, Latin American and Caribbean Health Sciences, MetaRegister of Controlled Trials, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, Health Technology Assessment Database, National Research Register) from inception to February 2008. Advisors identified further published or unpublished material. **REVIEW METHODS:** All papers fulfilled eligibility criteria covering participants, interventions, study design and outcomes. Results from primary studies were assessed and summarised in a qualitative synthesis for each type of intervention and across types of intervention. To estimate long-term cost utility, a decision tree was developed to synthesise data on enhanced staff contact, breastmilk effectiveness, incidence of necrotising enterocolitis (NEC) and sepsis, resource use, survival and utilities. **RESULTS:** Forty-eight studies met the selection criteria for the effectiveness review, of which 65% (31/48) were RCTs, and 17% (8/48) were conducted in the UK. Seven were rated as good quality and 28 as moderate quality. No studies met the selection criteria for the health economics review. There is strong evidence that short periods of kangaroo skin-to-skin contact increased the duration of any breastfeeding for 1 month after discharge [risk ratio (RR) 4.76, 95% confidence interval (CI) 1.19 to 19.10] and for more than 6 weeks (RR 1.95, 95% CI 1.03 to 3.70) among clinically stable infants in industrialised settings. There is strong evidence for the effectiveness of peer support at home (in Manila) for mothers of term, low birthweight infants on any breastfeeding up to 24 weeks (RR 2.18, 95% CI 1.45 to 3.29) and exclusive breastfeeding from birth to 6 months (RR 65.94, 95% CI 4.12 to 1055.70), and for the effectiveness of peer support in hospital and at home for mothers of infants in Special Care Baby Units on providing any breastmilk at 12 weeks [odds ratio (OR) 2.81, 95% CI 1.11 to 7.14;  $p = 0.01$ ]. There is more limited evidence for the effectiveness of skilled professional support in a US Neonatal Intensive Care Unit on infants receiving any breastmilk at discharge (OR 2.0, 95% CI 1.2 to 3.2,  $p = 0.004$ ). Multidisciplinary staff training may increase knowledge and can increase initiation rates and duration of breastfeeding, although evidence is limited. Lack of staff training is an important barrier to implementation of effective interventions. Baby Friendly accreditation of the associated maternity hospital results in

improvements in several breastfeeding-related outcomes for infants in neonatal units. Limited evidence suggests that cup feeding (versus bottle feeding) may increase breastfeeding at discharge and reduce the frequency of oxygen desaturation. Breastmilk expression using simultaneous pumping with an electric pump has advantages in the first 2 weeks. Pharmaceutical galactagogues have little benefit among mothers who have recently given birth. Our economic analysis found that additional skilled professional support in hospital was more effective and less costly (due to reduced neonatal illness) than normal staff contact. Additional support ranged from 0.009 quality-adjusted life-years (QALYs) to 0.251 QALYs more beneficial per infant and ranged from 66 pounds to 586 pounds cheaper per infant across the birthweight subpopulations. Donor milk would become cost-effective given improved mechanisms for its provision.

**CONCLUSIONS:** Despite the limitations of the evidence base, kangaroo skin-to-skin contact, peer support, simultaneous breastmilk pumping, multidisciplinary staff training and the Baby Friendly accreditation of the associated maternity hospital have been shown to be effective, and skilled support from trained staff in hospital has been shown to be potentially cost-effective. All these point to future research priorities. Many of these interventions inter-relate: it is unlikely that specific clinical interventions will be effective if used alone. There is a need for national surveillance of feeding, health and cost outcomes for infants and mothers in neonatal units; to assist this goal, we propose consensus definitions of the initiation and duration of breastfeeding/breastmilk feeding with specific reference to infants admitted to neonatal units and their mothers.

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