The Infant Behavioral Assessment and Intervention Program for Very Low Birth Weight Infants at 6 Months Corrected Age

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Objective To determine whether the Infant Behavioral Assessment and Intervention Program (IBAIP), designed to support and enhance infants' self-regulatory competence, improved developmental and neurobehavioral outcomes in very low birth weight (VLBW) infants.

Study design We randomized 86 infants to 1 intervention before discharge and to 6 to 8 home interventions until 6 months corrected age, and 90 control infants received standard care. Developmental and behavioral outcomes were evaluated at 6 months corrected age with the Bayley Scales of Infant Development-II (BSID-II). Neurobehavioral functioning was evaluated with the Infant Behavioral Assessment (IBA) at baseline and at 6 months corrected age.

Results Despite randomization, some differences in neonatal characteristics were found between the intervention and control infants. After adjustment, intervention effects of 7.2 points (± standard error 3.1) on the Mental Developmental Index and 6.4 ± 2.4 points on the Psychomotor Developmental Index favored the intervention infants. The Behavioral Rating Scale of the BSID-II ($P = .000$) and the IBA (more approach [$P = .003$] and less stress [$P = .001$] over time) also favored the intervention infants.

Conclusions The IBAIP improved the mental, motor, and behavioral outcomes of VLBW infants at 6 months corrected age. *(J Pediatr 2009;154:33-8)*

Although the number of survivors of neonatal intensive care is increasing, very low birth weight (VLBW) infants continue to have more behavioral, cognitive, motor coordination, and visuomotor difficulties at school age and in adolescence compared with term-born peers.[1,2] These late neurodevelopmental impairments of preterm infants may be apparent as self-regulatory problems in early infancy, including an unstable physiological base, poor quality of movements and a lack of postural control, less robust state, and underreactivity or overreactivity to sensory information.[3-5] Problems with self-regulation decrease an infant's social interactive and exploratory opportunities, which are necessary for learning,[6-8] and increase stress and coping behaviors,[9] which may alter the architecture of the rapidly developing brain.[6-8] Because early caregiving conditions and socioeconomic factors mediate infants' self-regulatory competence,[8,10,11] parents of preterm infants may need preventive support.[12,13]

Despite the heterogeneity in outcomes and content of early intervention programs for preterm infants,[14-16] a recent meta-analysis demonstrated that these programs improve cognitive development in the short to medium term and suggested that programs that focus on parent–infant relationships along with infant development may have the greatest impact.[17] Few intervention studies have addressed infants' self-regulatory competence during early interactions or have reported changes in the quality of neurobehavioral performance over time, however. Consequently, we investigated, in 2 pilot studies,[9,18] the Infant Behavioral Assessment (IBA)[19] and the corresponding Infant Behavioral Assessment and Intervention Program (IBAIP),[20] which are designed to support and enhance

BRS	Behavioral Rating Scale	MDI	Mental Developmental Index
BSID-II	Bayley Scales of Infant Development	NIDCAP	Newborn Individualized Developmental Care and Assessment Program
GA	Gestational age		
IBA	Infant Behavioral Assessment	PDI	Psychomotor Developmental Index
IBAIP	Infant Behavioral Assessment and Intervention Program	VLBW	Very low birth weight

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The trial is registered with controlled-trials.com (ISRCTN65503576).

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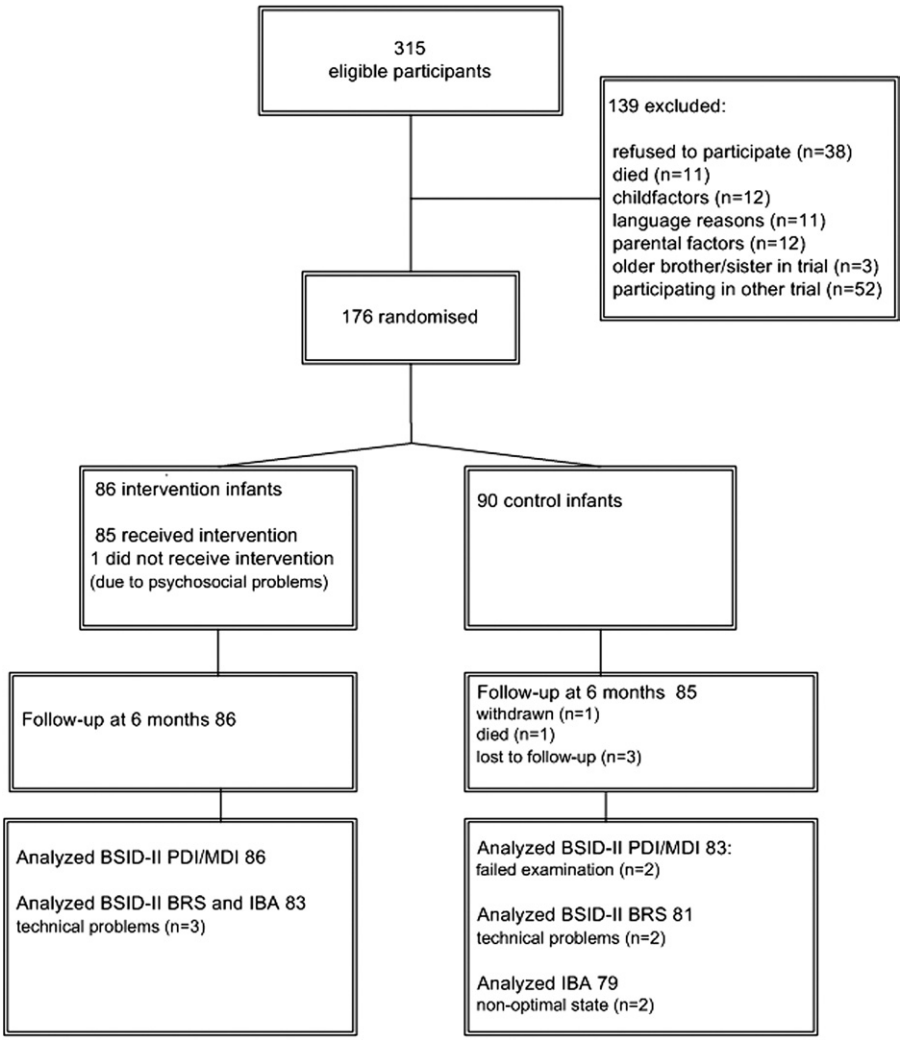

Figure. Patient flow and follow-up.

infants' self-regulatory competence. We found that the IBA was a valuable instrument in discriminating differences in self-regulation, and that the IBAIP improved scores on the Bayley Scales of Infant Development (BSID-II).[18] The current randomized controlled trial was performed to evaluate whether the IBAIP improves motor, mental, and behavioral outcomes and regulatory competence of VLBW infants at 6 months corrected age.

METHODS

A randomized controlled trial was carried out in Amsterdam, the Netherlands. Two level-III hospitals with neonatal intensive care unit facilities and all 5 city hospitals participated. The Medical Ethics Committees of all hospitals involved approved the study design. All infants of gestational age (GA) $<$ 32 weeks and/or birth weight $<$1500 g whose parents lived in Amsterdam were eligible for the study. Infants with severe congenital abnormalities, those born of mothers with a documented history of illicit drug use or severe physical or mental illness, those from non-Dutch speaking families for whom an interpreter could not be arranged, and those participating in another trial on postdischarge management were excluded.

The parents were given verbal and written information when their infant was 32 to 34 weeks GA (Figure). In a second meeting, parents who decided to participate in the study signed informed consent. Baseline assessments and interventions were carried out by 6 experienced pediatric physical therapists specially trained in the IBAIP. Because the interventions were administered by the same person who performed the baseline assessment, randomization was done after a baseline video recording of the infant's neurobehavioral performance at 35 to 38 weeks postmenstrual age. Randomization into the control or intervention group was computer-generated, stratified for GA ($<$ 30 weeks and $\geq$ 30 weeks) and recruitment site, with twins assigned to the same group. The infants and parents in the intervention group received 1 IBAIP session shortly before discharge and 6 to 8 home interventions up to when the infant reached 6 months corrected age. The control infants received standard care. Reg-