

INCREMENTAL COSTS OF PREMATURITY AND LOW BIRTHWEIGHT

PIH14

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INTRODUCTION

Prematurity (birth before 37 completed weeks of gestation) and low birthweight (under 2500 g [1]) are leading morbidity and mortality factors with an overall prevalence of 11.1% [2] and 14.6% [3], respectively. They result in significant risks for short- and long-term organ function insufficiencies and permanent damages. These complications and disorders need additional expensive health care: mainly in the first months of life but in later life also. The seriousness of the complications is usually proportional with prematurity and birthweight. So any preventive intervention that can prolong pregnancy and/or shift the birthweight toward the normal range probably decreases the costs of care of premature infants in the first years of life.

Cost of illness studies aim to quantify the economic burden of a pathologic health state [4, 5]. The recently published literature reviews [6, 7, 8, 9] of the costs and resource use in prematurity or low birthweight, besides demonstrating the extra costs associated with prematurity, highlighted the methodological heterogeneity of the studies. This heterogeneity in costing methods make the interpretation and between-study comparisons of the results difficult.

OBJECTIVE

To quantify the costs of care as ratio of costs of premature and low birthweight versus mature and normal birthweight infants.

METHODS

A literature database search was conducted on 8 March 2018 in Scopus and Cochrane. Those articles were included in the analyses that presented monetary cost data for premature or low birthweight as well as full-term or normal birthweight infants, and the data collection was closed after 31 December 2007.

As the analyses in the included publications showed significant heterogeneity in currency, time horizon, and the analyzed cost categories, the incremental cost ratios instead of absolute costs of prematurity or low birthweight were analyzed within each study – an approach that enabled us to eliminate the problems from between-study heterogeneity. No discounting, cost inflation or currency exchanging were required.

RESULTS

Of the 2514 identified hits 76 were checked for feasibility and 12 were included in this quantitative analyses from the UK [10], France [11], the Netherlands [12], Germany [13], Finland [14], Italy [15], the USA [16, 17], Canada [18], Brazil [19], Australia [20] and China [21]. The studies showed significant heterogeneity both in categorization of the investigated population and in the cost analysis methodology (time horizon and postnatal age ranges investigated, analyzed cost components and health service segments). Due to the multiple dimensions of analyses, trends rather than robust quantitative conclusions could be drawn. No quantitative synthesis was performed.

Costs of initial hospitalization

When analyzed by weeks of gestational age, the ratios of the costs of initial hospitalization ranged from 230 to 0.5 times between weeks 23 and 36 compared to full-term babies [12, 16]. Consistent results were presented when the babies were categorized by gestational age categories [10, 11] (*Figure 1A*). Low birthweight of different severity was associated with 1.1 to 22.6 higher costs compared to normal birthweight (*Figure 1B*). Antenatal corticosteroid was found to moderate this association (from 3.2 to 2.1 times) [19].

Costs in the first year of life – not including initial hospitalization

As the costs of initial hospitalization represent a great proportion of total health expenditure, many analyses for the first year [10, 11, 18, 10, 20] or for the first six months of life [15] presented the inpatient or total costs excluding the initial period. While incremental hospital costs remained high even after the initial inpatient care in the first year (*Figure 2A*), the incremental total medical costs were moderate (*Figure 2B*).

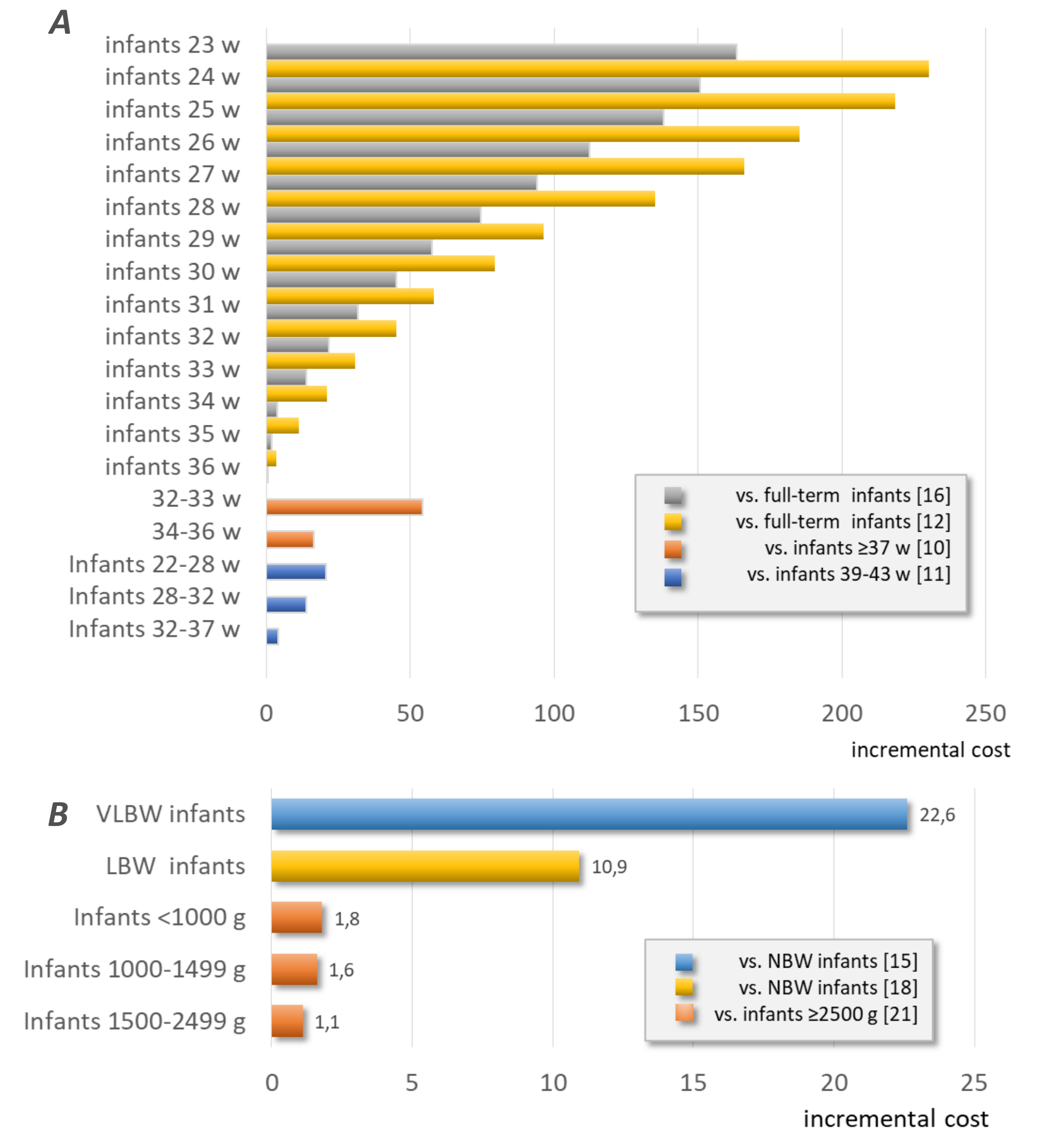


Figure 1. Incremental costs of inpatient care of premature (A) or low birthweight (B) infants in the initial period (NBW, LBW, VLBW: normal, low, very low birthweight, respectively, w: weeks)

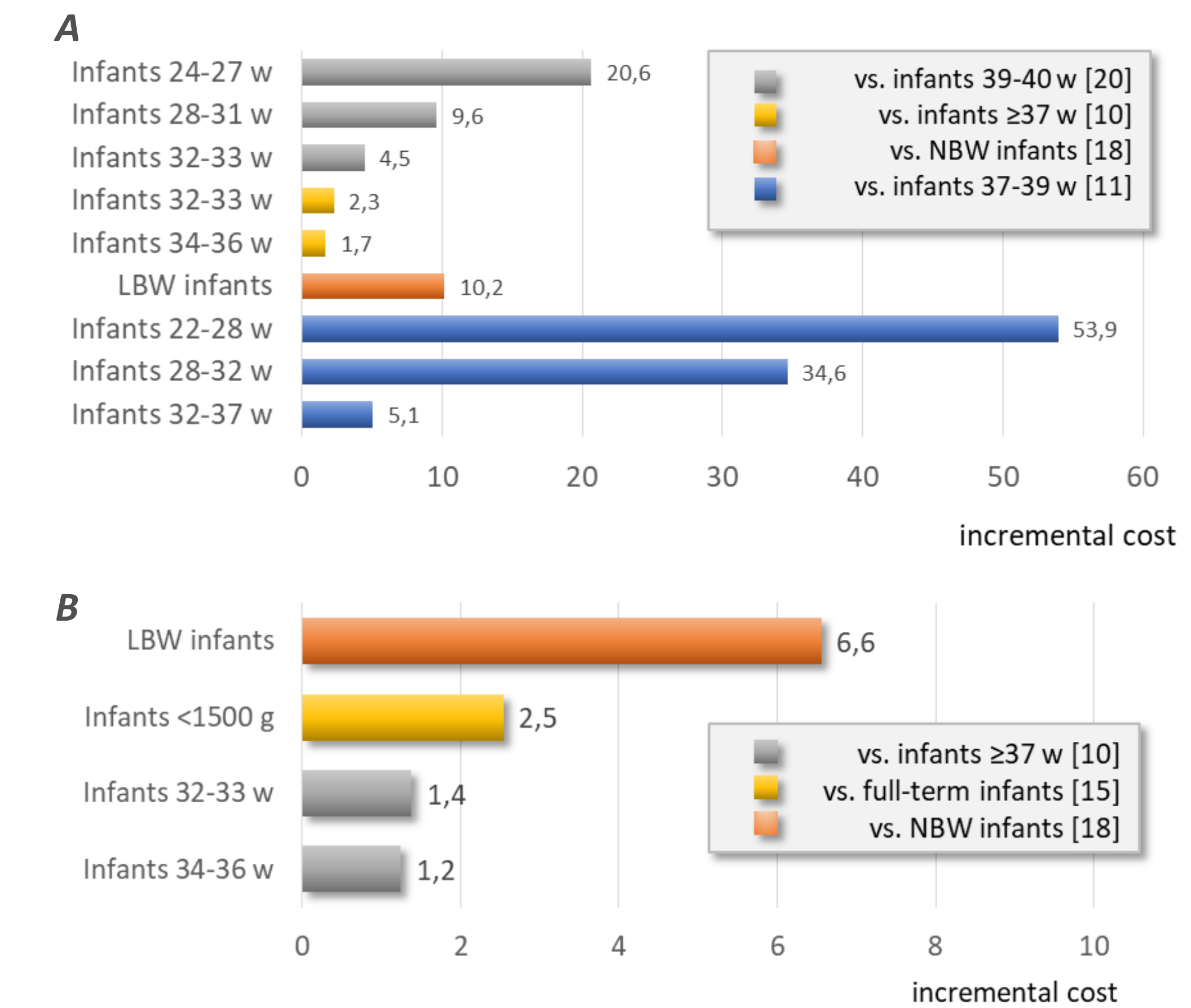


Figure 2. Incremental costs of care of premature or low birthweight infants in the period between the initial hospitalization and the end of the first year. A. inpatient costs, B. total medical costs (NBW, LBW, VLBW: normal, low, very low birthweight, respectively, w: weeks)

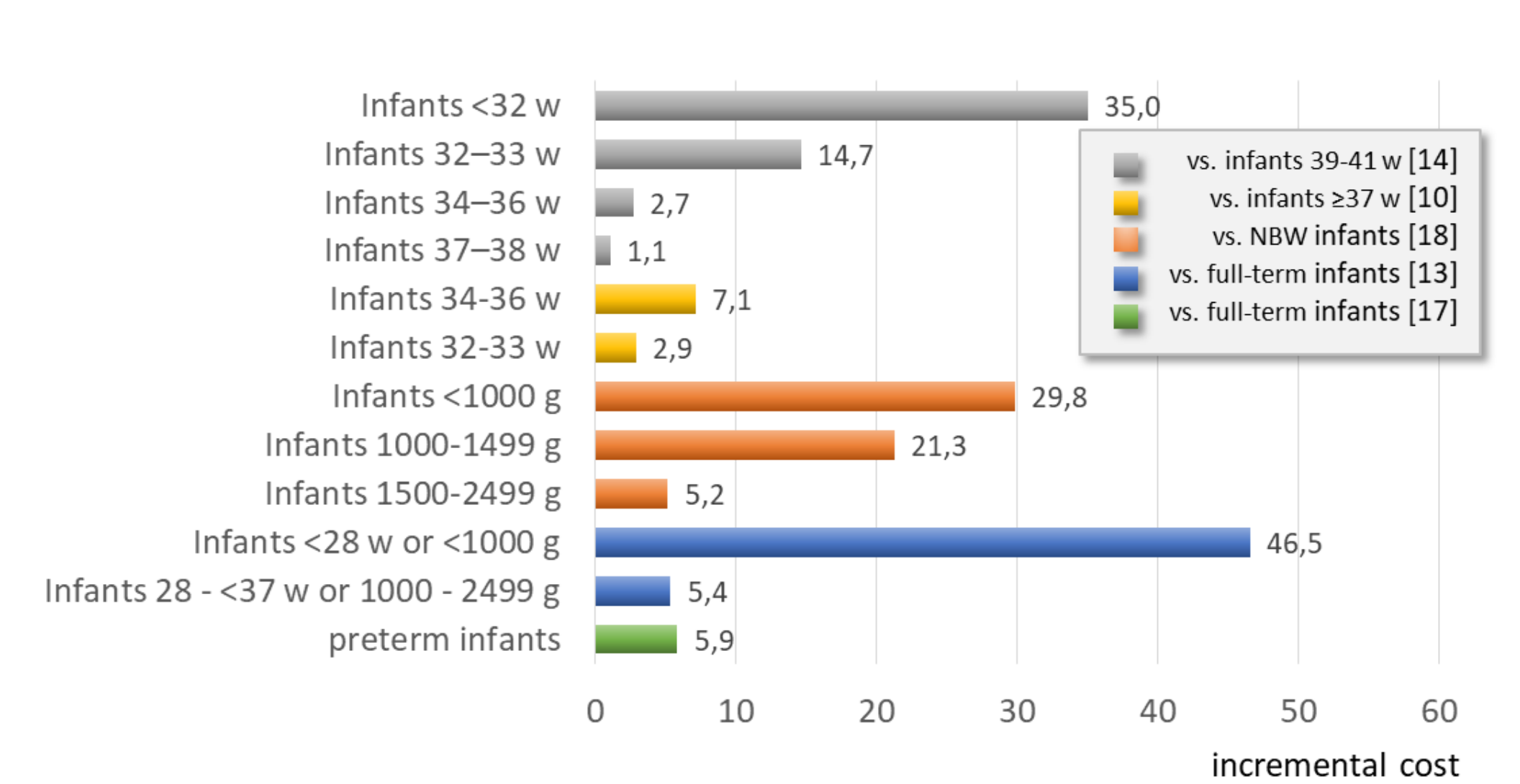


Figure 3. Incremental costs of care of premature or low birthweight infants from birth to the end of the first year of life (NBW: normal birthweight)

Costs in the first year of life – including initial hospitalization

Some cost analyses [13, 18, 10, 14, 17] investigated the costs of care of premature or low birthweight infants in the first year of life including the costs of initial hospitalization (*Figure 3*). The incremental costs were significantly higher compared to the analyses where the costs did not include initial hospitalization. The initial hospitalization represented 55% in low birthweight infants in general [18], or 83% and 61% in infants of 32-33 and 34-36 weeks of gestation, respectively [10] within the total first year costs (the proportions in normal birthweight/mature infants were 42% and 11% in the same studies).

Costs after the first birthday

In the few publications [10, 13, 14] that presented cost data on the period after the first year of life, the decrease in cost ratios of premature/low birthweight versus mature/normal birthweight patients continued as the infants became older. In a study with 2 year follow-up [10], cost ratios in infants of 32-33 and 34-36 weeks of gestational age compared to mature infants were 7.1 and 2.9 in the first year of life, but only 1.6 and 3.4 in the second, respectively. In a three-year study, significant changes in cost ratios was found [14]: in infants <32 weeks of gestation the ratio decreased from 3.5 in the first year to 2.5 in the third year, and similar trends could be detected in infants of 32-33 and 34-36 weeks of gestation (decrease from 14.7 to 1.1 and from 2.7 to 1.2, respectively). In another three-year study [13] that compared early and late preterm to full-term babies, the cost ratios decreased from 46.5 to 4.5 and from 5.4 to 1.4, respectively, suggesting that the significant cost increment associated with prematurity especially in the first year of life moderated but did not disappear as the infant became older. The more premature a baby is, the higher the proportion of cumulative first three-year costs is expected to be paid in the first year of life.

CONCLUSIONS

- This systematic literature review could identify 12 articles that provided cost data for premature or low birthweight versus mature or normal birthweight infants. The included articles showed significant heterogeneity in their methodological approaches.
- Our literature review demonstrated that:
 - there is close correlation between maturity or birthweight and cost of medical care
 - the costs of treatment of extremely premature infants (≤27 weeks of gestation) were more than 100 time higher than that of mature infants
 - the costs of initial hospitalization seemed to be the largest proportion within costs of the first years of life
 - as time passed, the incremental costs moderated but did not disappear completely.
- Medical and health policy interventions that aim to decrease the rate of prematurity and/or shift the gestational age toward maturity significantly decrease the health expenditures.

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