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The impact of a booster dose at the age of 18 on immunization against Hepatitis B four years later

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Background:

Hepatitis B virus (HBV) infection is a world-wide public health problem. There are more than 2 billion people in the world that carry serological evidence of HBV infection. Out of which 257 million are chronic carriers, in 2015 approximately 887,000 died from HBV related hepatic diseases

Prevention of HBV by vaccination is the recommended technique to prevent infection. The introduction of effective vaccination programs in many countries evoked a significant decrease in the incidence of new HBV infections, as well as reduction in morbidity and mortality especially from hepatocellular carcinoma.

Observational studies imply that a vaccination at birth provides protection for 90% of the population for at least 20 years, however data on response to a booster and long-term effects are lacking.

All Israeli children born >1992 were immunized in their first year of life against HBV with a 99% compliance nationwide.

Teenagers who volunteer as first aid providers or train as paramedics are boosted against HBV regardless of their status.

Methods:

we evaluated the immunization status of health-care students born in Israel >1992 and immunized in their first year of life.

Students were considered protected with antibody titers ≥10 mIU/mL.

We compared the results of students who were also boosted at the age of 17 - 18 (boosted) to students who were not boosted since birth (primary). Those that were unprotected were boosted and reassessed (figure 1).

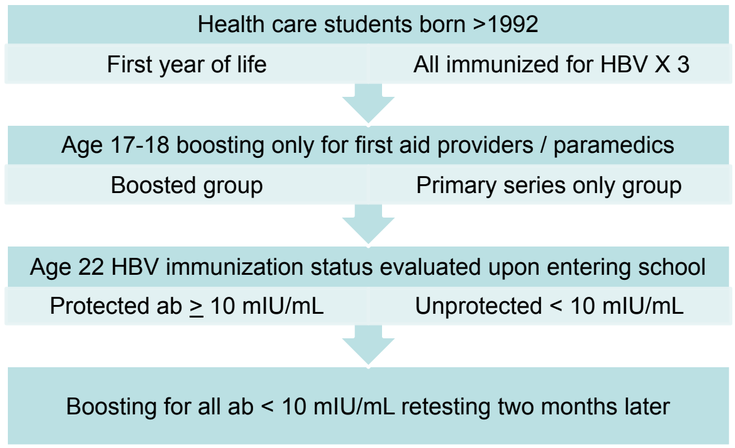

Figure 1 – flow chart of study

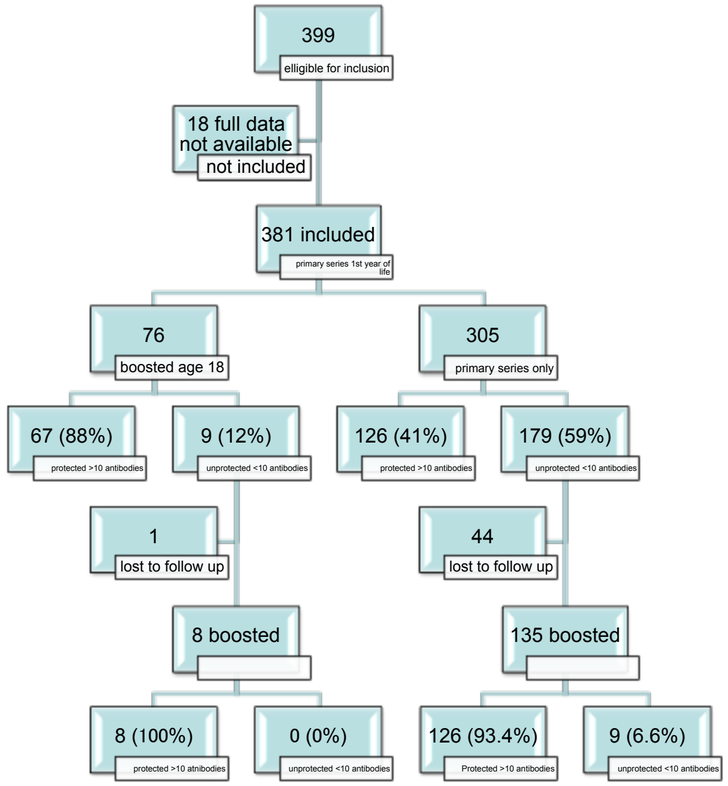

Figure 2 – flow chart of health care students monitored for HBV immunization status and their status before and after boosting

Results: We followed 381 students (figure 2 & table), 305 who only received the primary series and 76 who were boosted on average 4 years earlier. The average age of both groups was 22, only 126 (44%) of primary group had protective levels compared to 67 (88.2%) of boosted group p<0.001. 8 students from the boosted group who had unprotective levels received an additional booster and all developed protective levels. Of the 135 from the primary series with unprotective levels 126 (93%) developed protective levels.

Conclusion: An immunization series administered during the first year of life does not provide lifetime protection levels against HBV. A booster provided at the age of 18 boosts the primary series and provides high levels of antibodies for at least 4 years later if not longer. This data suggests the need for a routine booster dose against HBV at the age of 18 especially for healthcare professionals.

Parameter	Boosted at age 17-18 (n=76)	Not boosted since primary series at birth (n=305)	p value	Odds Ratio
female	57 (75%)	248 (81.3%)	0.26	1.45 (0.8 - 2.6)
Jewish	61 (80.3%)	192 (63%)	0.004	0.41 (0.22 – 0.76)
Arab	15 (19.7)	113 (37%)	0.004	2.39 (1.29 - 4.4)
Medical Students	37 (48.7%)	136 (44.6%)	0.52	1.17 (0.71 - 1.95)
Nursing Students	18 (23.7%)	92 (30.2%)	0.33	0.71 (0.4 - 1.28)
Other students [a]	21 (27.6%)	77 (25.2%)	0.78	1.13 (0.64 - 1.98)
Chronic illness [b]	2 (2.6%)	10 (3.3%)	0.55	0.79 (0.17 – 3.71)
Mean age (range)	22.5 (19-25)	21.7 (19-25)	0.17	
Unprotected at baseline <10 mIU/mL	67 (88.1%%)	126 (44.5%)	<0.001	10.5 (5-22)

Table 1 baseline characteristics of students that were included in the study.

a – included students of pharmacy, physical therapy, paramedic academic training program
b – included the following diseases: crohn's, rheumatoid arthritis, diabetes mellitus, post splenectomy and familial Mediterranean fever

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