

Original Research :

Utilization and wastage of BCG Vaccine among private practitioners across four districts of Bengal

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Introduction:

India has one of the largest immunization programmes in the world with a budget of more than 500 million US dollars.⁽¹⁾ The country is presently developing new strategies to cover more numbers of children with limited resources. Any reduction in vaccine wastage will save huge resources and have a positive impact on the overall immunization coverage. Majority of private practitioners attends on and average eight deliveries per month in different small nursing homes or hospitals and uses maximum one vial for one baby to vaccinate with BCG. Considering 20 doses per vial wastage is 95%. In this audit we tried to highlight the tip of iceberg by a questionnaire based interview among different private practitioners across city of Kolkata, Howrah, North & South 24 Pgs of West Bengal.

Aim of the study: To provide an estimate of BCG vaccine wastage by practicing Private Pediatrician.

Materials and Method: A questionnaire of ten questions was sent randomly via email, SMS or whatsapp to different practicing pediatricians (n=200). The questionnaire consists of number of deliveries attended by them per month, number of BCG vial used by them to vaccinate number of babies, their place of work, reconstitution of the vaccine, rate of wastage, disposal of used vial and vaccine lost due to other factors like cold chain failure, lot expiry, breakage, spillage etc. If any doctor failed to respond we contact him or her over

phone and register their response.

Result and Analysis: Out of 200 emails only 120 responded after repeated reminders. 90% of private practitioners used one vial for one baby, leading to wastage of 95% of doses. 6% of private practitioners used one vial for two babies amounting to wastage of 90%. Only 5 pediatricians (4%) responded with the opinion that as they practice in an institution, they open one vial for three (85%) to five babies (75% wastage) in majority of their working days.

Conclusion:

BCG wastage is a concern of vaccine provider for many years as it is a freeze dried vaccine and cannot be stored for long after reconstitution. Majority of private practitioners are in the opinion that 95% of the contents of the vial goes to dust bin. 90% of Pediatricians are in the opinion that this wastage can be prevented by availability of single dose BCG vial and increasing its cost. Policy makers as well as immunization experts should give impetus to this problem, that under no circumstances nobody is authorized to spill away even a single dose of BCG vaccine.

Key words: BCG: *Bacille Calmette–Guérin*, SMS: *Short message service*.

Introduction:

The Bacille Calmette–Guérin (BCG) vaccines are the oldest of the vaccines currently used throughout the world⁽²⁾. They have been given

to billions of people and have been used routinely since the 1960s in almost all countries of the world. India has one of the largest immunization programmes in the world with a budget of more than 500 million US dollars.⁽¹⁾ The country is presently developing new strategies to cover more numbers of children with this limited resources. Any reduction in vaccine wastage will save huge resources and have a positive impact on the overall immunization coverage. WHO Effective Vaccine Management (EVM) initiative provides guidelines for storage, reconstitution and use at the level of beneficiary. But practically, in spite of all knowledge and facts, many practicing private pediatricians waste huge number of doses of BCG. Indirectly more the wastage, more number of burden over supply chain, logistics and storage. Wastage is defined as loss by use, decay, erosion, improper storage, theft or leakage. In BCG vaccine main cause of wastage is number of doses remaining in an opened vial at the end of a session, because reconstituted vial should be used within a time span of three hours. The World Health Organization reports over 50% vaccine wastage around the world⁽³⁾. Despite the availability of many tools for reducing such wastage, high wastage rates are still occurring in many places. There is no local or national data on the wastage done by private practitioners. Majority of private practitioners attends on and average eight deliveries per month in different small nursing homes or hospitals and uses maximum one vial for one baby to vaccinate with BCG, thereby wastage of 95% of BCG doses into dustbin. In this audit we tried to highlight the

tip of iceberg by a questionnaire based interview among different private practitioners across city of Kolkata, Howrah, North & South 24Pgs of West Bengal.

Aim and objectives: To provide an estimate of BCG vaccine wastage by practicing private Pediatrician in the city of Kolkata, Howrah, North & South 24 Pgs of West Bengal.

Materials and Method:

Study design: Questionnaire based cross sectional descriptive analytical study.

A questionnaire was made of ten questions about usage of BCG vaccine, reconstitution, interval between reconstitution and inoculation, number of babies vaccinated per vial, number of deliveries attended by individual pediatrician per month, their place of work and number doses wasted by each pediatrician. Questionnaire was sent by email, SMS or whatsapp to 200 practicing pediatrician. The pediatricians were randomly selected from registers maintained by Indian Academy of Pediatrics, West Bengal branch. The main selection criteria was absolute private practice who attends deliveries, not attached to any government hospital and belongs to city of Kolkata, Howrah, and districts of North and South 24 pgs. Repeated emails, SMS, Whatsapp message were sent to answer the questions and finally 120 or 60% responded. If after three reminders or SMS physician failed to respond, they were called by phone and pursued for response.

Result and analysis: Total number of responder was 60% or 120 out of 200 and of these 80% Male and 20% female.

Age of practicing pediatrician:

Age range in yrs	Number	Percentage	Male	Female
30 -40	36	30%	30	6
40-50	60	50%	46	14
Above 50	24	20%	20	4

Maximum numbers of pediatrician who attends deliveries belongs to the age band of 40 to 50 yrs, out of which 46 are male and 14 are female.

Place of work of Pediatricians and BCG inoculation:

Place of vaccination session	Numbers	Percentage	Male	Female
Small nursing Home	70	58	44	14
Home Vaccination	9	8	6	2
Big corporate hospital	29	24	20	9
Chamber or office of Practitioner	12	10	8	4

Majority of private practitioners (58%) attend delivery in small nursing homes and they inoculate babies in the same set up followed by big corporate hospital(24%) and finally few pediatrician prefers BCG vaccination at their office (8%)or home visit(6%).

Inoculation of BCG vaccine with respect to birth place and age of the baby:

Place of birth	On the day of birth	Before discharge	Within one month
Small Nursing Home	66%	30%	4%
Big corporate Hospital	82%	18%	nil

96% of babies delivered at small nursing homes got their BCG dose before discharge or within seven days of life whereas 100% of babies born at corporate hospitals receives BCG before hospital discharge.

Average number of deliveries attending by the individual pediatrician per month is :8

Percentage of pediatrician using BCG vial to vaccinate babies:

One BCG vial for one baby	One BCG vial for two babies	One BCG vial for 3 or more
90%(108)	6%(7)	4%(5)

World Health Organization recommended that, (4) for lyophilized vaccine like BCG maximum allowable wastage is 50%, but practically it is much more high.

Wastage of BCG vaccine considering one vial =20 doses.

Number of babies share one vial	Dose used	Wastage of number of doses
One vial for one baby	One	19 (95%)
One vial for two babies	Two	18(90%)
One vial for three babies	Three	17(85%)
One vial for four babies	Four	16(80%)
One vial for five babies	Five	15(75%)

Actual number of BCG vaccine lost in the immunization sessions per month by 90% or 108 practicing pediatrician= $108 \times 8 \times 19 = 16,416$ doses.

So, per year practicing doctors of four districts of West Bengal just throws away $16,416 \times 12 = 196,992$ doses, a huge loss.

One can imagine number of doses lost in whole state of West Bengal as well as whole country. The loss is directly proportional to the number of babies available, if number of eligible babies is more loss gradually declines. This loss does not include factors like cold chain failure, lot expiry, breakage, spillage or leakage.

Discussion: Among all the vaccines BCG has got highest wastage rate, if we look at our neighboring country, Bangladesh it was in the tune of 85% (5). There are very few studies which validate the WHO recommendations of vaccine wastage. The study by Ajit Mukherjee et al. (6) to assess wastage of oral polio vaccine during pulse polio programme by govt. of India estimated wastage at the point of administration was 15%. Ministry of health and family welfare, government of India has recommended that wastage rate of all

vaccine including lyophilized vaccine like BCG should not be more than 25 %, (7). But no such study was conducted by ministry of health in private sector where wastage is very high. The main cause of wastage of BCG captured by this study was non availability of eligible babies for vaccination. Majority of practitioners are in the opinion that pressure from parents for early inoculation of birth dose of vaccine in a small nursing home set up where number of babies born was much less as compared to public sector. High vaccine wastage increases demand and inflates overall cost to the system. There are small nursing homes which allow used vaccine vial to be thrown into open field and inviting many questions with respect to biohazard and improper waste disposal.

The million dollar question is whether this wastage is preventable? Are we overemphasizing the statement that "higher wastage is acceptable to increase vaccine coverage in a low vaccine coverage setting"? In this study higher wastage rate is attributable to opening a multidose vial in a vaccination session where number of baby is one. Moreover reconstituted BCG vial should be used within three hours to get best efficacy.

This possibly makes it necessary to have single dose BCG vaccine, which is the need of the hour? If manufacturer can produce single dose lyophilized vaccine like MMR or varicella, why not BCG.

Conclusion:

No healthcare system can run properly without an audit, vaccine wastage should also be audited regularly. In this immunization exercise if wastage can be reduced to minimum we can save huge fund for other national programmes. Healthcare policy makers should find out some solution without affecting vaccine coverage.

Role of Contributors-

Joydeep Das: Made the Questionnaire and sent to different private practitioners. Review of literature, introduction, methods etc.,

Devyani De: Written the manuscript, result and analysis.

Conflict of Interest: None.

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Questionnaire to evaluate BCG vaccine utilization and wastage by practicing pediatricians.

(Answer the questions or tick the response as appropriate)

1. Are you an absolute private practice, not attached to any govt. job or hospital? Yes/No.
2. Your age (30-40yrs)/ (40-50 yrs) / above 50 yrs. Sex: Male/Female
3. Number of deliveries attending by you per month?
4. Your place of work (a) Small nursing Home, (b) Big corporate hospital, (c) Home vaccination, (d) Your Chamber.
5. When you inoculate a newborn with BCG vaccine, Day 0 / before discharge / within one month.
6. Number of babies vaccinated by single vial of BCG. One/Two/Three/Four/Five.
7. Number of BCG doses wasted after reconstitution due to non availability of eligible baby 19/18/17/16/15 (considering one vial = 20 doses).
8. Disposal of used vial; municipal vat / authorized biomedical waste disposal.
9. Vaccine lost due to cold chain failure, Yes/No.
10. Any BCG vial lost due to lot expiry / breakage / Spillage, Yes/No.