Understanding the magnitude and kinetics of the serological responses to killed Oral Cholera Vaccine (OCV) when given 4 years after an initial receipt of OCV in Cameroon

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Background: Oral cholera vaccine (OCV) protects for 3 to 5 years. The Cholera Roadmap suggests repeating vaccination after this interval; however, there is no evidence supporting any recommendation on the number of vaccine doses to be used.

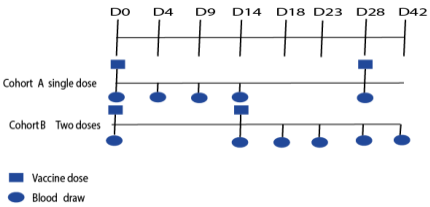
Aim: Determine whether, among people vaccinated with OCV four years earlier, the early immune response following one OCV booster dose, differ according to previous OCV exposure status, and if; among people exposed to two doses of OCV four years earlier, the booster immune response following one dose is equivalent to that following two doses?

Study design: This is an open label, age-stratified, phase 2, controlled clinical trial conducted in 2021 targeting people ≥ 1 year old exposed to OCV campaign in 2017 in Mogode Health District in Far North Cameroon. Consenting eligible participants were randomly assigned to receive a single-dose (cohort A) or two-dose two weeks apart (cohort B) of OCV. Vibriocidal titre was assessed from serum samples collected as indicated in table 1 to estimate vibriocidal Geometric mean titre (VGMT) and seroconversion rate (VSCR) at given time following single dose and compared between previous OCV exposure status and age group. In addition, we compared per study arm, VGMT and VSCR at given period following dose 1 in cohort A to VGMT and VSCR following dose 2 in cohort B.

Results:

Baseline characteristics of participants are presented in tables 2 and 3. The participants flow is presented in figure 1. Overall and for each age group, and for both the Ogawa and Inaba serotypes, the early immune response following one dose of vaccination did not differ between people exposed four years earlier to zero dose and those exposed to two doses, and between previous exposure to zero dose and exposure to one or two doses. On the other hand, the GMT nine days following OCV administration of the single booster dose was significantly higher in all age groups for serotype Ogawa in people exposed four years earlier to two doses than in those exposed to zero doses. Among those exposed to two OCV doses four years earlier, the VGMT and VSCR at 4 days following the second OCV booster dose was significantly higher compared to VGMT and VSCR at day four following single dose in people aged 5 to 14 years but did not differ in other age groups. The VGMT at days 9 and 14 following the second OCV booster dose among those exposed to two OCV doses four years earlier, was significantly higher compared to VGMT at days 9 and 14 following single dose in people aged 1 to 4 years but did not differ in other age groups.

Table 1: Study Design



Event schedule for OCV doses and obtaining serum

The present findings indicate that early immune response is not enhanced by prior exposure to OCV vaccine. It further supports that the second booster OCV dose administration induces a higher immune response following the second dose of OCV than following the first in young populations (1 to 4 years and 5 to 14 years).

Table 2: Comparison between characteristics of participants exposed to zero OCV dose four years earlier and those exposed to two or at least one dose four years earlier

	Number of OCV doses four year earlier			Number of OCV doses four year earlier		
Characteristics	**0 dose (N=136)**	**2 doses (N=113)**	**p.value**	**0 dose (N=136)**	**1 or 2 doses (N=214)**	**P.value**
Sex, n(%)*						
Male	53 (38.97)	48 (42.48)	0.57	53 (38.97)	88 (41.12)	0.68
Age group,n(%)*						
1-4	44(32.35)	21 (18.58)	0.048	44(32.35)	30 (14.02)	0.0002
5-14	46 (33.82)	46 (40.71)		46 (33.82)	92 (42.99)	
>14	46 (33.82)	46 (40.71)		46 (33.82)	92 (42.99)	
Floor material, n (%)*						
Cement / Brick/Tiles	47 (34.56)	17 (15.04)	0.0004	47 (34.56)	43 (20.09)	0.0025
Listen information,n(%)*						
Yes	63 (46.32)	40 (35.40)	0.081	63 (46.32)	98 (45.79)	0.922
Using improved toilet facility,n(%)*						
	18 (13.24)	9 (7.96)	0.1829	18 (13.24)	16 (7.48)	0.076
Weight in kg, mean (SD)+						
	31.94 (19.73)	35.98 (19.09)	0.1104	31.94 (19.73)	37.29 (19.62)	0.0136
Height / Length in m, mean (SD)+						
	1.30 (0.28)	1.36 (0.27)	0.082	1.30 (0.28)	1.39 (0.25)	0.0028
Baseline vibriocidal GMT inaba, geomean(geosd)++						
	9.36 (3.30)	9.82 (3.21)	0.527	9.36 (3.30)	11.16 (3.85)	0.211
Baseline vibriocidal GMT Ogawa, geomean(geosd) ++						
	21.15 (5.58)	34.52 (6.21)	0.0276	21.15 (5.58)	34.46 (6.10)	0.007

Source: MOBS. + P.value are from ttest; ++ P.value are from Wilcoxon test , * P.value are from chi-square

Table 3: comparison of participants characteristics per study cohort

Characteristics	Cohort A (N=174)	Cohort B N(176)	p.value
Sex, n(%)*			
Male	72 (41.38)	69 (39.20)	0.68
Age group,n(%)*			
1-4	37 (21.26)	37 (21.02)	0.99
5-14	69 (39.66)	69 (39.20)	
>14	68 (39.08)	70 (39.77)	
Floor material, n (%)*			
Cement / Brick/Tiles	50 (28.74)	40 (22.73)	0.198
Listen information,n(%)*			
Yes	79 (45.40)	82 (46.59)	0.823
Using improved toilet facility,n(%)*			
	19 (10.92)	15 (8.52)	0.45
Weight in kg, mean (SD)++			
	34.42 (19.74)	35.99 (19.92)	0.45
Height / Length in m, mean (SD)++			
	1.34 (0.28)	1.37 (0.27)	0.36
Baseline vibriocidal GMT inaba , geomean(geosd)+			
	9.72 (3.56)	11.17 (3.71)	0.18
Baseline vibriocidal GMT Ogawa, geomean(geosd)+			
	30.63 (6.42)	26.56	0.6
Vaccination status, n(%)*			
0 dose	68 (39.08)	68 (38.64)	0.96
1 dose	49 (28.16)	52 (29.55)	
2 doses	57 (32.76)	56 (31.82)	

Source: MOBS data, + P.value are from ttest; ++ P.value are from Wilcoxon test, * P.value are from chi-square

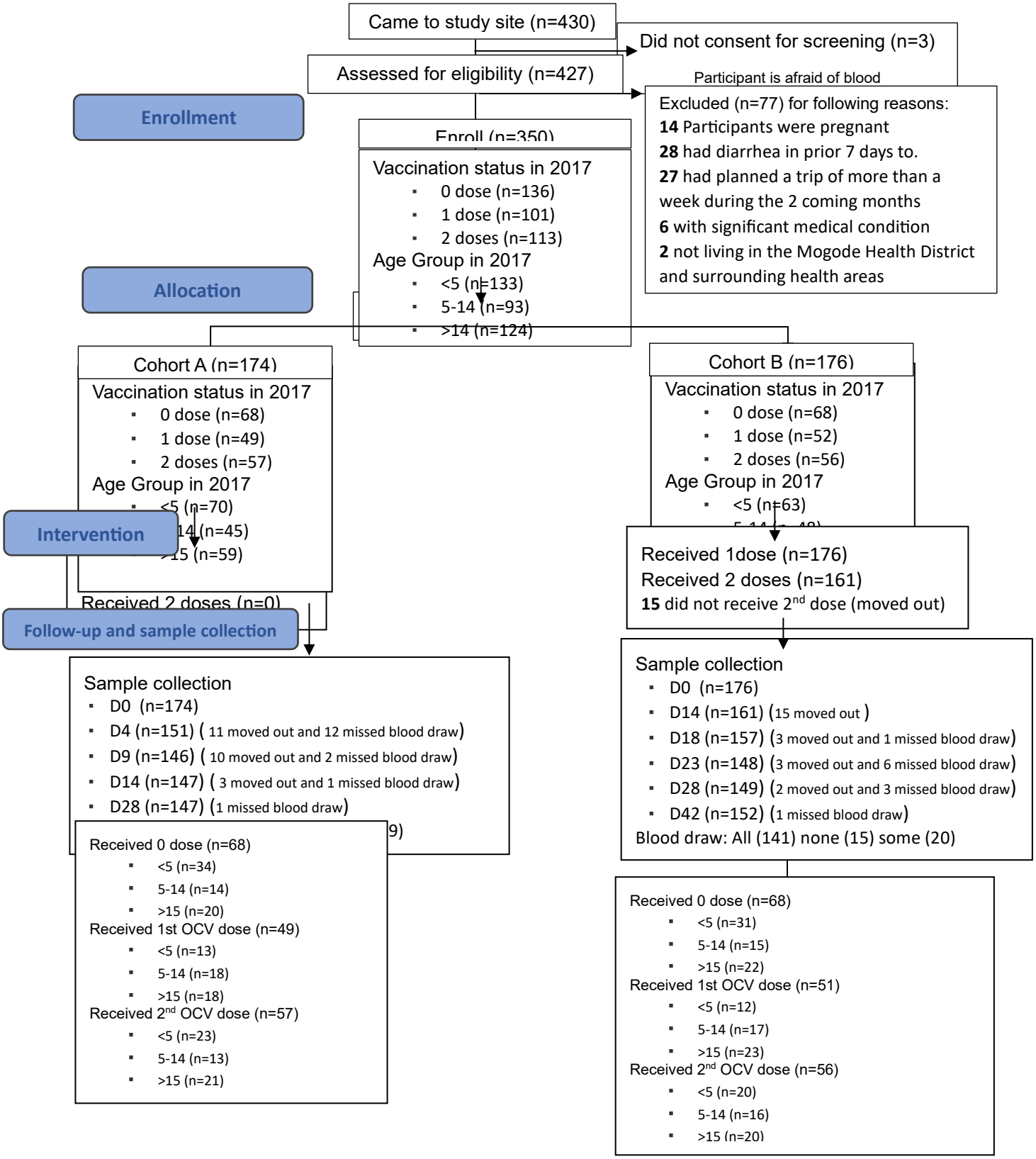


Figure 1: Participants flow