REPORT N°2

ADVERSE EVENTS FOLLOWING IMMUNIZATION WITH ORAL CHOLERA VACCINES IN LEBANON

Phases I – II:

November 12, 2022 – January 22, 2023

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Table of Contents

List of Tables

List of Figures

Abbreviations

AAH: Action Against Hunger

AEFI: Adverse Evet Following Immunization

DPNA: Development for People and Nature Association

ER: Emergency Room

ICRC: International Committee of the Red Cross

IMC: International Medical Corps

IOCC: International Orthodox Christian Charities

IOM: International Organization for Migration

LMIC: Low- and Middle-Income Countries

LNPVP: Lebanese National Pharmacovigilance Program

LRC: Lebanese Red Cross

MoPH: Ministry of Public Health

MSF: Médecins Sans Frontières

NGO: Non-Governmental Organizations

NRC: Norwegian Refugee Council

OCV: Oral Cholera Vaccine

ORS: Oral Rehydration Salts

ORT: Oral Rehydration Therapy

PT: Preferred Term

SC: Save the Children

SI: Solidarités International

SOC: System Organ Class

SOP: Standard Operating Procedure

UN: United Nations

UNHCR: United Nations High Commissioner for Refugees

WHO: World Health Organization

WVI: World Vision International

Executive Summary

Cholera is an acute diarrheal infection caused by the ingestion of food or drinks contaminated by the bacterium *Vibrio cholerae*. It is associated with acute watery diarrhea which can lead to dehydration and death if left untreated[1].

On October 6th 2022, Lebanon recorded its first confirmed case of cholera since 1993. The number of the suspected cases gradually increased across all affected areas, to reach 6,408 cases and 23 deaths by the end of the period covered by this report (January 22nd, 2023). In response, a multi-sectorial work plan was developed in collaboration with all relevant partners to contain the outbreak[2]. A collaboration between the World Health Organization, the United Nations High Commissioner for Refugees, the Ministry of Public Health, and their partners was initiated to manage and coordinate the cholera response[3].

The Oral Cholera Vaccine (OCV) immunization campaign played an integral part in this response. In an effort to enhance the coverage of the campaign across Lebanon and thus optimize the positive impact on disease burden, logistic efforts divided the campaign into three phases: I, II and III.

The Lebanese National Pharmacovigilance Program (LNPVP) was the main entity concerned with monitoring and evaluating Adverse Events Following Immunization (AEFIs) with OCVs during the campaign in the aim of ensuring patient and medication safety.

To this end, the present report provides a cumulative overview of the AEFIs that were temporally associated (i.e., occurred after administration of the vaccine) with the OCV Euvichol-Plus® available in Lebanon since the beginning of the OCV national immunization campaign. This report covers Phases I and II that were deployed between November 12th, 2022, and January 22nd, 2023.

The objective of this report is to document serious and non-serious AEFIs caused by the OCV Euvichol-Plus®. It aims to:

- Estimate the rate of AEFIs among people receiving OCV
- Rapidly respond to vaccine safety concerns
- Identify risk factors for specific AEFIs in people having received the OCV
- Monitor trends in known AEFIs

Highlights

A total of 38 case reports and 97 AEFIs were received by the LNPVP following the administration of 1,025,000 of OCV Euvichol-Plus® in Lebanon during Phases I and II of the OCV vaccination campaign between the 12th of November 2022 and the 22nd of January 2023:

- This is equivalent to a reporting rate of 0.037 case reports and 0.094 AEFIs per 1,000 doses administered.
- Most of the reports (60.5 %) were received through the OCV hotline 1787 (Table 3).
- The age groups of vaccine recipients who mostly reported AEFIs were between 2 and 11 years old and between 18 and 44 years old (34.2% each), with females reporting more than males (60.5% vs.39.5%) (Tables 4 and 5).
- The majority of the received cases were reported from Baalbeck-El Hermel governorate (36.9%) (Table 6).
- Only 8 case reports (21.1%) were classified as serious as per the WHO seriousness classification criteria (Table 9).
- Most of the reported case reports (73.7%), belonged to the “Gastrointestinal Disorders” System Organ Class (Table 7), with vomiting (34.2%) being the most reported AEFI (Table 8).

1. Background

1.1. Cholera Overview

Cholera is an acute intestinal infection caused by the ingestion of food or water contaminated with toxigenic serogroups of the bacterium *Vibrio cholerae*. The hallmark of the disease is profuse secretory diarrhea, which can lead to dehydration and even death if untreated [4].

Historically, devastating outbreaks of cholera resulted in millions of cases and hundreds of thousands of deaths. Currently, despite all the major advances in research, the condition is still a global threat to public health occurring as an endemic disease in some regions and is causing major epidemics in some Low- and Middle-Income Countries (LMICs)[5] lead by Nigeria, Niger, India and Bangladesh[6].

1.1.1. Transmission

Cholera is transmitted by the fecal-oral route. It has two main reservoirs, humans and water.

V cholerae is a saltwater organism, and its primary habitat is the marine ecosystem. Primary infection in humans is incidentally acquired. Risk of primary infection is facilitated by seasonal increases in the number of organisms. Secondary transmission occurs through fecal-oral spread of the organism through person-to-person contact or through contaminated water and food. Infection rates predictably are highest in communities in which water is not potable and personal and community hygiene standards are low[7].

1.1.2. Pathophysiology

Although more than 200 serogroups of *V cholerae* have been identified, *V cholerae* O1 and *V cholerae* O139 are the principal ones associated with epidemic cholera. Both serogroups cause clinical disease by producing an enterotoxin that promotes the secretion of fluid and electrolytes into the lumen of the small intestine, through the feces and vomitus[8].

1.1.3. Symptoms

Most *Vibrio cholerae* infections are asymptomatic; mild to moderate diarrhea due to *V cholerae* infection may not be clinically distinguishable from other causes of gastroenteritis.

Symptoms of cholera can begin as soon as a few hours or as long as five days after infection. Most infected people do not develop any symptoms, although the bacteria are present in their feces for 1-10 days after infection, which could increase risk of infectiosity[1].

Among people who develop symptoms, the majority have mild or moderate symptoms. Approximately 1 in 20 people infected have severe watery diarrhea accompanied by vomiting, which can quickly lead to dehydration. Patients with severe disease may present with a stool of an opaque white color that is not malodorous and often is described as having a "rice water" appearance.

If not promptly treated, the severe dehydration and associated complications such as renal failure, shock, hypokalemia, and pulmonary oedema can lead to death within hours. Signs and symptoms of dehydration include: rapid heart rate, loss of skin elasticity (the ability to return to original position quickly if pinched), dry mucous membranes(including the inside lining of the mouth, throat, nose, and eyelids), low blood pressure, and muscle cramps[8].

1.1.4. Diagnosis

According to World Health Organization (WHO) standard case definition, a case of cholera is suspected when the following conditions are met[9]:

- Suspected case: in areas where a cholera outbreak has not been declared: any person aged two years and older presenting with acute watery diarrhea (AWD) and severe dehydration or dying from AWD; once a cholera outbreak has been declared: any person presenting with or dying from AWD.
- Confirmed case: A suspected case with *Vibrio cholerae* O1 or O139 confirmed by culture or PCR and, in countries where cholera is not present or has been eliminated, the *Vibrio cholerae* O1 or O139 strain is demonstrated to be toxigenic

Isolation of *V. cholerae* from fecal samples remains the gold standard for confirmation of cholera diagnosis. A positive culture test from several patients is required for outbreak confirmation. More

accurate techniques such as Polymerase Chain Reaction (PCR) methods are becoming available for cholera confirmation, but require enhanced laboratory capacity. Additionally, detection can be facilitated using stool Rapid Diagnostic Tests (RDTs), where one or more positive samples triggers a cholera alert. This means of diagnosis offers point-of-care diagnostic options, especially in the absence of skilled personnel[5]. In Lebanon, Ministerial Decision Number 41 describing the cholera management process decrees that diagnosis is done through RDTs, or referral to the nearest reference hospital in case of absence of the tests[10].

1.1.5. Treatment

Cholera is an easily treatable disease. If patients have access to appropriate care, the case fatality rate is greatly reduced. Rapid rehydration constitutes the primary treatment for cholera, either through Oral Rehydration Therapy (ORT), or the administration of Intravenous (IV) fluids preferably Ringer's Lactate Solution to replace fluids and electrolytes in severe cases. Patients with mild or moderate dehydration are usually treated with Oral Rehydration Salts (ORS). Rehydration can be lifesaving but it has no effect on the duration of the disease or excretion of bacteria in feces.

For children under the age of 5, Zinc is an important adjunctive therapy to reduce the duration of diarrhea, and potentially prevent future episodes of other causes of acute watery diarrhea.

Mass administration of antibiotics is not recommended, as it has no proven effect on the spread of cholera and may contribute to antimicrobial resistance[1,5].

In Lebanon, treatment guidelines abide by the international standards where the specified appropriate course of action is based on the symptoms: the volume of administered ORS is increased with signs of dehydration. More severe cases are given Ringer Lactate IV drips and antibiotics regimens[11].

1.1.6. Prevention and Control

A multifaceted approach is key to control cholera. A combination of hygienic and treatment measures remains the mainstay of prevention of both endemic cholera and cholera outbreaks.

Improving access to clean potable water, adequate sanitation, and promotion of good WAter, Sanitation and Hygiene (WaSH) practices are indicated. Also important for cholera prevention is

the enforcement of standard sanitation laws for food industries. Proper case management is additionally vital in reducing mortality from the disease and limiting its spread.

Details about the prevention and control plans in Lebanon can be found in Ministerial Decision number 41[10].

On the other hand, cholera vaccination is a complementary cholera prevention measure, which can be implemented in the short-to-medium term.

1.1.7. Epidemiology

Cholera first emerged from its original reservoir in India during the 19th century. Six subsequent pandemics spread across the world to kill millions of people across all continents[1].

Cholera is now endemic in many countries. After a long hiatus, a seventh cholera pandemic spread in 1961, then subsided in the 1970s but continues today on a smaller scale. Outbreaks occur across the developing world to the current day[8].

Cholera continues to be a significant problem globally, with large epidemics, such as those experienced in Haiti and Yemen, and surges in endemic disease in areas of sub-Saharan Africa and Asia. While epidemic cholera attracts attention and accounts for most of the cases reported to WHO each year, endemic cholera continues to be present in large parts of sub-Saharan Africa, south and south-east Asia, as well as Haiti[1].

An estimated 2.86 million cholera cases (uncertainty range 1.3 m – 4.0 m) occur annually in endemic countries. The spatial distribution of cholera cases is highly heterogeneous. Systematic reviews have shown the wide variation of cholera epidemiology across the world[12].

Almost every developing country in the world faces cholera outbreaks or the threat of a cholera epidemic. Specifically, the Eastern Mediterranean Region (EMR) continued to experience recurring cholera outbreaks in the last two decades and it's becoming a major public health threat to the region with increased social and economic consequences[8].

After decades without a single case of cholera, outbreaks declared in Syria and Lebanon marked an unwelcome comeback. On 10 September 2022, the Syrian Ministry of Health (MoH) declared an outbreak of cholera in Aleppo Governorate following 15 confirmed laboratory cases, including one death[13]. This is part of a worsening pattern across the region, and the globe, as 8 of the 22

countries in the EMR are facing outbreaks of cholera and acute watery diarrhea; these include Lebanon, Syria, Pakistan, Somalia, Iraq, Yemen, Afghanistan, and the Islamic Republic of Iran[14].

Nationally, cholera has returned to Lebanon after almost a 3-decade hiatus. An outbreak was declared on the 6th of October 2022, the first since 1993, after a person residing in an informal settlement in Akkar was admitted to Halba Governmental Hospital and presented with dehydration and clinically reported rice-water diarrhea. Further investigations revealed more positive cases in the same settlement, and water samples returned positive for *V cholerae*[15].

Amid a worldwide spike in cholera infections, the outbreak in Lebanon was evolving at an alarming rate. From the date of declaration of the epidemic in October, the suspected and confirmed cases count increased exponentially to 6,408 reported cases along with a total of 23 associated deaths, resulting in a case fatality ratio of 0.36%[16]. So far, 54% of the suspected and confirmed cases were reported among females, and 46% among males. Around 50% of the confirmed patients are less than 15 years of age, 14% are between 15 and 24 years of age, 20% are between 25 to 44 years of age, 10% are between 45-64 and 6% are aged 65 years and older (Figure 1).

1.1.8. Multi-Sectorial Response to the Cholera Outbreak

A timely and well-coordinated response among all stakeholders[3] was promptly implemented to control the outbreak and curb the further spread of cases and deaths within the affected area[14].

- Surveillance of suspected cholera cases at the community level and the primary health care centers was carried out by the United Nations High Commissioner for Refugees (UNHCR), International Organization for Migration (IOM), AMEL, International Medical Corps (IMC), and the International Orthodox Christian Charities (IOCC).
- The OCV campaign was supported by UNHCR for operational cost and coordination and carried out by MEDAIR, AMEL, Lebanese Red Cross (LRC), and Médecins Sans Frontières (MSF) Swiss and Belgium. In addition, UNICEF provided technical support to MoPH on planning and implementation of the OCV campaign.
- Community support through a full-scale cholera WaSH response was conducted by UNICEF with its partners Action Against Hunger (AAH), Development for People and Nature Association (DPNA), LebRelief, LOST, SAWA, Save the Children (SC), Solidarités

International (SI), and World Vision International (WVI), as well as Oxfam and Norwegian Refugee Council (NRC).

The WHO worked closely with the MoPH, providing technical guidance to ensure proper clinical management practices, infection prevention, control, and cholera testing protocols are in place. WHO's response has been also extended to include supplying life-saving treatment kits and medicines and raising awareness among healthcare workers and populations on prevention protocols. Clinical care guidelines and SOPs have been disseminated to referral hospitals, Primary HealthCare Centers (PHCs) and other frontline health workers. Training sessions on surveillance and reporting were also undertaken for staff in hospitals, health facilities, medical centers, and NGOs at all levels[15].

Additionally, Sanofi donated to the Ministry of Public Health 13,440 doses of Shanchol® targeting prisoners and healthcare workers, and the WHO provided 600,000 doses of Euvichol-Plus®, for the most vulnerable populations, including frontline workers, prisoners, refugees and their host communities[17]. This was followed with 901,800 doses of Euvichol-Plus® provided from the WHO to cover Phases II and III.

Also, two reference laboratories, three prisons and 12 hospitals designated for cholera treatment with laboratory reagents, treatment kits and rapid diagnostic tests, and deployed nurses and doctors to surge capacity in hospitals in the most affected areas[3].

The MoPH has developed the Lebanon Cholera Preparedness and Response Strategic Plan and Operational Plan under the overall coordinating and advising role of the WHO as lead in the Health Emergency response. On behalf of the Government of Lebanon, the MoPH is leading the overall response to the outbreak. The Minister of Public Health composed and chaired a national Task Force that convenes twice a week and gathers representatives from the different stakeholders involved. These include departments within the MoPH, other involved Ministries, the Lebanese Red Cross (LRC), the International Committee of the Red Cross (ICRC), and representatives from the United Nations (UN) agencies and Non-Governmental Organizations (NGO) partners[15].

The MoPH continues to lead the overall guidance of the response with cross-sectional coordination with the involved stakeholders[3].

1.1.9. Lebanese National Pharmacovigilance Program Response to the Cholera Outbreak

To ensure safety, any vaccine-related adverse event should be detected, assessed, and actions should be taken to prevent their occurrence and reduce their harm on the vaccine recipients. This is the role of pharmacovigilance. As part of the MoPH response to the outbreak, the LNPVP undertook the responsibility of AEFIs surveillance following the deployment of the OCV.

The LNPVP was appointed to detect and document AEFIs caused by the OCV. The responsibilities charged to the LNPVP are as follows:

- Ensure that monitoring of AEFI with OCV is part of the immunization campaign
- Define the methods of reporting of AEFIs associated with the OCV vaccination campaign
- Prepare a case management plan
- Conduct an AEFI causality review when required
- Investigate reports of serious AEFIs to decide on the causality of the reaction to the OCV
- Prepare a final report on the reported AEFIs.

A reporting form adapted to the OCV in Arabic and English (ANNEX I) was disseminated to all relevant channels. New and existing reporting tools specific to the OCV were promoted by the LNPVP since the initiation of the vaccination campaign. These tools includes 1787 Hotline call center and the LNPVP landline (01-830254), and the KoboToolbox AEFIs reporting Software for healthcare professionals and hospitals[18].

Received reports are managed by the LNPVP through the regular AEFI handling protocol that was put in place. Patient follow-up, data cleaning and validation, and data entry to VigiFlow (a web-based PV management system), are performed for each reported case. When the received case report falls under the WHO seriousness classification criteria, an additional investigation step and causality assessment are performed to confirm or reject the causal relationship of the reported event with the OCV. As a final communication effort, the received cases are aggregated in a report set to be a regular release, the second issue of which is the present document.

1.2. Vaccine Overview

Three OCVs are currently pre-qualified by WHO[19]:

- Dukoral® is a vaccine used mainly by travelers. It includes inactivated whole cells and a component of the cholera toxin
- Shanchol® and Euvichol-Plus®, which contain only inactivated whole cells.

All three vaccines have usually a two-dose regimen with a two weeks' interval between the two doses (three doses for Dukoral® in children aged 2–5 years). However, the WHO set out to temporarily suspend of the standard two-dose vaccination regimen and replace it with a single dose due to vaccine shortages and rising outbreaks worldwide[20].

All three listed OCVs have a good safety profile. Shanchol® and Euvichol-Plus® have the same formulation with comparable safety and immunogenicity profiles and are considered as reformulated versions of Dukoral®. Unlike Dukoral®, Shanchol® and Euvichol-Plus® does not require a buffer to be administered[21].

Shanchol® and Euvichol-Plus® are the vaccines currently available for the mass vaccination campaigns through the Global OCV Stockpile. More than 20 million doses of OCVs have been used in mass vaccination campaigns. The campaigns have been implemented in areas experiencing an outbreak, in areas at heightened vulnerability during humanitarian crises, and among populations living in highly endemic areas, known as "hotspots"[19].

In Lebanon, the OCV vaccination campaign was initiated on November 12th, 2022 as part of the outbreak mitigation efforts. The aim of the campaign was to restrain the spread of cholera in Lebanon particularly among vulnerable populations (refugees and hosting communities) living in areas identified as hotspot areas with confirmed cases.

According to the WHO, although the campaign is built around preventive and reactive vaccination strategies in a continuous rollout, a hotspot mapping approach was adopted to facilitate the logistics of dose distribution and to allow the best disease prevention outcomes. Districts and cadasters were thus categorized into three phases using a set of criteria relevant to cholera circulation and risk factors for transmission as follows:

Table 1: OCV vaccination campaign rollout

Phase	Status	Deployed Doses	Regions Covered
Pre-Phase I	Complete	13,440 doses of Shanchol®	Target populations (prisoners and healthcare workers)
Phase I	Complete	600,000 doses of Euvichol-Plus®	North, Akkar, Bekaa, Baalbeck-Hermel
Phase II	Complete	901,800 doses of Euvichol-Plus®	North, Akkar, Bekaa, Baalbeck-Hermel
Phase III	Ongoing		Mount Lebanon, Keserwan-Byblos

The first campaign was considered as Phase I and covered the period of November 12th till December 7th, 2022. It deployed 600,000 doses of the Euvichol-Plus® OCV supplied by the WHO. The aim of Phase I was to reduce morbidity and mortality, break the chain of transmission to limit the outbreak, and to reduce the strain on the health system by reducing the need for hospitalization. UNHCR provided ongoing support for operational cost and coordination for the OCV campaign in partnership with MEDAIR, AMEL, LRC, and MSF Swiss and Belgium.

With the same aims as Phase I, Phase II was initiated on the 17th of December 2022 and was assigned to the same governorates as Phase I with extended districts and cadasters to maximize coverage. Phase II of the immunization campaign was planned to deploy the 901,800 doses of Euvichol-Plus® provided by the WHO.

Although outside of the scope of the present report, it should be noted that phase III of the campaign is currently ongoing to continue the deployment of the doses remaining from the 901,800 doses of Euvichol-Plus® provided by the WHO initially with Phase II. Therefore, the number of vaccinated individuals continues to increase daily.

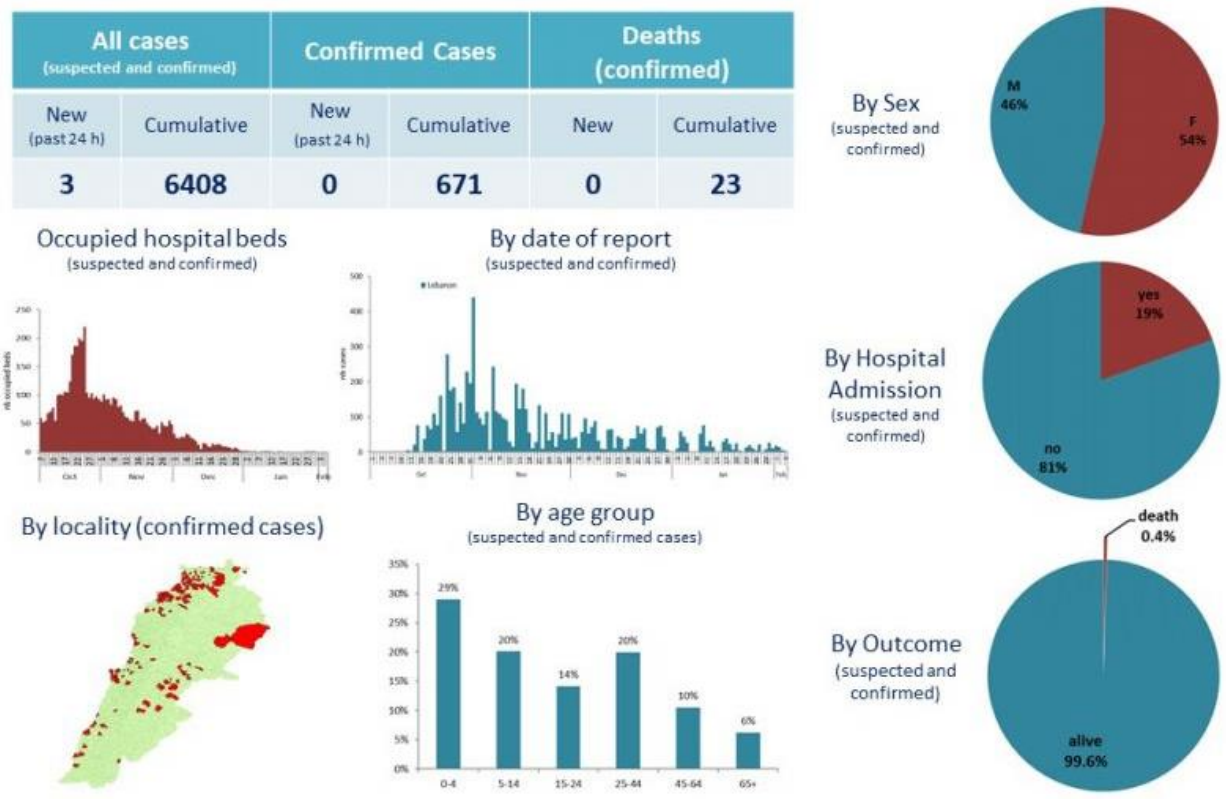

Figure 1: MoPH Cholera Surveillance extracted on February 5th, 2023

1.2.1. Euvichol-Plus® Overview

Since the LNPVP only received reports of adverse reactions resulting from Euvichol-Plus® which was the main vaccine administered during Phases I and II, the following section will be concerned with this specific OCV, knowing that Shanchol® was also deployed in a pre-Phase I stage targeting specific populations (prisoners and healthcare workers).

Euvichol-Plus® is indicated for active immunization against *Vibrio cholerae*. It is a liquid formulation (1.5 mL mono-dose) of Oral Cholera Vaccine containing O1 and O139 of *Vibrio cholerae* inactivated by heat or formalin. The vaccine should be administered orally to anyone above the age of 1 year. However, it should not be administered to persons with either known hypersensitivity to any component of the vaccine, or having shown signs of severe reaction due to the previously taken dose. No specific clinical studies have been conducted to evaluate the

efficacy and safety of Euvichol-Plus® in pregnant and lactating women, nor in infants (less than 1 year of age). Therefore, the vaccine is not recommended for use in these populations[22].

1.2.2. Euvichol-Plus® Safety Profile

Overall, Euvichol-Plus® has a good safety profile. In a clinical study conducted to evaluate the safety of the vaccine, only 102 (3.40 %) out of 2,999 enrolled subjects reported AEFIs during the first 7 days. The most frequent reported AEFIs included headache, fever, diarrhea, nausea/vomiting, and myalgia. While after 28 days, 69 subjects (2.30 %) reported adverse events where gastrointestinal disorders including diarrhea, abdominal pain, and vomiting were the most frequently reported AEFIs. No serious adverse events were reported during the clinical trial period[22].

Figure 2: Euvichol-Plus®

2. Cholera Surveillance in Lebanon

2.1. Reporting Overview

Within the scope of the AEFIs surveillance related to the deployed OCVs in Lebanon, the LNPVP established a multi-step protocol for the management of the reported AEFIs. Vaccine recipients experiencing any AEFIs can report through one of the following means: 1787 Hotline Call Center, "KoboToolbox: AEFIs Software for reporting", or by direct contact with the PV program through the available landline (01-830254). All received case reports are screened and validated for data completion and accuracy. Direct follow-up with the reporters is initiated in the aim of retrieving all relevant information to properly complete the case narrative. The case reports are then classified as serious or non-serious cases, as per the WHO seriousness criteria. Each category will be handled following a specific protocol developed by the LNPVP, as detailed in the following sections.

The non-serious case reports are entered directly into VigiFlow after being validated and cleaned, while serious cases go through investigation and causality assessment before they are entered into VigiFlow. The surveillance aims to establish a rigorous safety profile regarding the cholera vaccine administered in Lebanon.

Between November 12th and January 22nd, 2023, the LNPVP has managed 38 cases associated with 97 AEFIs following the immunization with the OCV Euvichol-Plus®.

An Adverse Event Following Immunization (AEFI) is defined as any untoward medical event that follows immunization and that does not necessarily have a causal relationship with the usage of the vaccine. The adverse event may be any unfavorable or unintended sign, abnormal laboratory finding, symptom or disease[23]. It is important to note that a given case report can include more than one AEFI.

Table 2 details the 38 case reports that have been received by the LNPVP, cleaned, validated and assessed since the initiation of the cholera national immunization campaign on the 12th of November 2022, till the end of Phase II on the 22nd of January, 2023:

Table 2: Overview of the 38 case reports following immunization with Euvichol-Plus®, from November 12th, 2022, till January 22nd, 2023

Phase I – Non-Serious Cases

	Patient Details					Vaccine Details			AEFI Details							Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination Date	Dose	AEFI	Date of Onset of AEFI	Time Interval Between Vaccine and AEFI (days)	Seriousness	Date of Outcome	Updated Outcome	Date of Updated Outcome	Narrative Text/ Special Consideration
OCV01	MKB	Male	3	Lebanese	Hotline (1787)	Euvichol-Plus	12/11/2022	1st and 2nd	Overdose	-	-	Non-Serious	-	Recovered	16/11/2022	MKB is a 3 year old boy who received the dose of Euvichol-Plus on 12/11/2022. No symptoms were reported. The following day, 13/11/2022, the child was at his grandparents house, a second dose of OCV (Euvichol-Plus) was given to him, the grandparents were not aware that the child already received a dose and the team gave the dose before registering the patient on the system. The uncle AMK reached out to the Pharmacovigilance Team. Follow up was conducted on 14/11/2022. No symptoms were reported. Another follow up was conducted on 16/11/2022, no symptoms were reported. The child is doing good.
OCV02	AAA	Female	4	Syrian	Hotline (1787)	Euvichol-Plus	14/11/2022	1st	Nausea Vomiting Abdominal pain Tiredness Fever	15/11/2022	-	Non-Serious	-	Recovered	17/11/2022	AASA is a 4 year old girl who received the dose of OCV Euvichol-Plus on14/11/2022. Father of the patient reported that his daughter started having symptoms of fever, shortness of breath and tiredness (the onset of symptoms was not specified). Patient was treated with cold compresses and anti-inflammatory medications. Note: The father of the patient was not cooperative. He affiremed that he cannot afford to take his daughter to the primary healthcare center.
OCV03	NS	Male	26	Lebanese	Landline	Euvichol-Plus	21/11/2022	1st	Tachycardia Paresthesia of limbs Dizziness	21/11/2022	5 mins	Non-Serious	21/11/2022	Recovered	23/11/2022	NS is a 26 year old male who experienced tachycardia, paresthesia of the limbs, and dizziness 5 mins after receiving his 1st dose of OCV on the 21st of November 2022. On the same day, the patient went to his doctor and he told him it is an anxiety related reaction. The patient was recovered on the same day.
OCV04	IMA	Female	7	Syrian	KoboTool -box	Euvichol-Plus	17/11/2022	1st	Diarrhea Abdominal Cramps	19/11/2022	2	Non-Serious	19/11/2022	Recovered	23/11/2022	IMA is a 7 year old female who received her 1st dose of OCV on 17/11/2022. Noting that, the patient was having a diarrhea and abdominal pain for 2 days pre-vaccination. On 19/11/2022, 2 days after vaccination, the patient had exagerrated diarrhea and abdominal pain that got recovered on the next day (20/11/2022).
OCV05	MMA	Female	11	Syrian	Landline	Euvichol-Plus	17/11/2023	1st	Abdominal Pain	19/11/2022	2	Non-Serious	19/11/2022	Recovered	23/11/2022	MMA is an 11 year old female who received her 1st dose of OCV on 17/11/2022. On 19/11/2022, 2 days after vaccination, the patient had abdominal pain that got recovered on the next day (20/11/2022).

	Patient Details					Vaccine Details			AEFI Details						Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination Date	Dose	AEFI	Date of Onset of AEFI	Time Interval Between Vaccine and AEFI (days)	Seriousness	Date of Outcome	Updated Outcome	Date of Updated Outcome	Narrative Text/ Special Consideration
OCV06	MA	Male	49	Syrian	Landline	Euvichol-Plus	17/11/2022	1st	Abdominal Pain	19/11/2022	2	Non-Serious	19/11/2022	Recovered	23/11/2022	MAA is a 49 year old male who received his 1st dose of OCV on 17/11/2022. On 19/11/2022, 2 days after vaccination, the patient had abdominal pain that got recovered on the next day (20/11/2022).
OCV07	NH	Female	49	Syrian	Landline	Euvichol-Plus	17/11/2022	1st	Abdominal Pain	19/11/2022	2	Non-Serious	19/11/2022	Recovered	23/11/2022	NH is a 49 year old female who received her 1st dose of OCV on 17/11/2022. On 19/11/2022, 2 days after vaccination, the patient had abdominal pain that got recovered on the next day (20/11/2022).
OCV08	KMA	Male	23	Syrian	Landline	Euvichol-Plus	17/11/2022	1st	Flu Like Symptoms Abdominal Pain	19/11/2022	2	Non-Serious	19/11/2022	Recovered	23/11/2022	KMA is a 23 year old male who received his 1st dose of OCV on 17/11/2022. On 19/11/2022, 2 days after vaccination, the patient had flue like symptoms and abdominal pain that got recovered on the next day (20/11/2022).
OCV09	AMA	Male	21	Syrian	Landline	Euvichol-Plus	17/11/2022	1st	Abdominal Pain	19/11/2022	2	Non-Serious	19/11/2022	Recovered	23/11/2022	AMA is an 21 year old male who received his 1st dose of OCV on 17/11/2022. On 19/11/2022, 2 days after vaccination, the patient had abdominal pain that got recovered on the next day (20/11/2022).
OCV10	MAA	Female	31	Syrian	Hotline (1787)	Euvichol-Plus	17/11/2022	1st	Ongoing Diarrhea Abdominal Cramps	18/11/2022	1	Non-Serious	19/11/2022	Recovered	13/12/2022	MAA is a 31 year old female who received her 1st dose of OCV on 17/11/2022. On the next day, on 18/11/2022, the patient experienced diarrhea and abdominal cramps. On 23/11/2022, a follow up with the patient was done and the reactions were ongoing. She was adviced to seek medical care. On the next day, the patient went to a PMC and they gave her ORS and other drugs (she doesn't know their names). She got recocvered on that day.
OCV11	MGS	Female	43	Lebanese	Hotline (1787)	Euvichol-Plus	16/11/2022	1st	Headache Bitter Taste Epigastric Pain	18/11/2022	1	Non-Serious	18/11/2022	Recovered	24/11/2022	MGS is a 43 year old female who received her 1st dose of OCV on 16/11/2022. On 18/11/2022, 2 days after receiving the vaccine, the patient started to have headache, epigastric pain, and bitter taste. The patient took Gastrimut and she is recovering.
OCV12	RAM	Male	4	Syrian	Hotline (1787)	Euvichol-Plus	24/11/2022	1st	Fatigue Vomiting Abdominal Pain	26/11/2022	1	Non-Serious	29/11/2022	Recovered	28/11/2022	RAM is a 4 year old male who received his 1st dose of OCV on 24/11/2022. After 2 days, he started to have fatigue, vomiting and abdominal pain. He recovered on the next day.

	Patient Details					Vaccine Details			AEFI Details						Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination Date	Dose	AEFI	Date of Onset of AEFI	Time Interval Between Vaccine and AEFI (days)	Seriousness	Date of Outcome	Updated Outcome	Date of Updated Outcome	Narrative Text/ Special Consideration
OCV13	AAA	Male	7	Syrian	Landline	Euvichol-Plus	24/11/2022	1st	Fever Vomiting	25/11/2022	1	Non-Serious	29/11/2022	Recovered	28/11/2022	AAA is a 7 year old male who received his 1st dose of OCV on 24/11/2022. After 1 day, he started to have fatigue, vomiting, and abdominal pain. he recovered the next day.
OCV14	EAE	Female	51	Syrian	Landline	Euvichol-Plus	26/11/2022	1st	Fatigue Vomiting	25/11/2022	1	Non-Serious	29/11/2022	Recovered	28/11/2022	EAE is a 51 year old female who was vaccinated with her 1st of OCV vaccine on 25/11/2022. On the next day, she had fatigue and vomiting. Patient recovered.
OCV15	AHR	Female	2	Syrian	Hotline (1787)	Euvichol-Plus	27/11/2022	1st	Fever Vomiting Diarrhea (x3/day)	28/11/2022	1	Non-Serious	30/11/2022	Recovered	30/11/2022	AHR is a 2 year-old female who recieved her 1st dose of Euvichol-Plus vaccine on the 27th of November 2022. One day after receiving the vaccine, the patient started to have fever, vomiting, and diarrhea (three times per day). These symptoms lasted for few days and she recovered completely without any intervention.
OCV16	ZHR	Female	9	Lebanese	Landline	Euvichol-Plus	27/11/2022	1st and 2nd	Overdose	28/11/2022	1	Non-Serious	28/11/2022	Recovered	12/12/2022	ZHR is a 9 year old female who received his 1st dose of Euvichol-Plus vaccine through a mobile clinic on 27/11/2022. On the next day after receiving the vaccine, while she was at school, a mobile clinic vaccinated her with the 2nd dose. So the patient took 2 doses in 2 consecutive days. Patient did not encounter any ADR.
OCV17	YAC	Male	8	Lebanese	Hotline (1787)	Euvichol-Plus	7/12/2022	1st	Fever Abdominal Pain Fatigue Nausea	Unknown	1	Unknown	Unknown	Unknown	Unknown	Unable to reach the patient due to wrong phone number

Phase II – Non-serious Cases

	Patient Details					Vaccine Details			AEFI Details							Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination Date	Dose	AEFI	Date of Onset of AEFI	Time Interval Between Vaccine and AEFI (days)	Seriousness	Date of Outcome	Updated Outcome	Date of Updated Outcome	Narrative Text/ Special Consideration
OCV18	MAY	Male	73	Lebanese	Hotline (1787)	Euvichol-Plus	15/12/2022	1st	Hyperglycemia (BG: 500)	15/12/2022	few hours	Non-Serious	15/12/2022	Recovered	19/12/2022	MAY is a 73 year-old male with a history of diabetes and maintained on medications. The patient received his first dose of Euvichol-Plus on the 15th of December 2022. Few hours after receiving the vaccine, the patient felt unwell so he measured his blood glucose and it was elevated (around 500). Attempting to decrease his blood glucose, he took a shot of insulin (unknown dose), and remeasured his blood glucose and it was normal. He recovered spontaneously and didn't experience any other side effects.
OCV19	ASK	Male	2	Lebanese	Hotline (1787)	Euvichol-Plus	18/12/2022	1st	Fever	18/12/2022	few hours	Non-Serious	20/12/2022	Recovered	28/12/2022	ASK is a 2 year-old male who received his 1st dose of Euvichol-Plus on the 18th of December 2022. Few hours after receiving the vaccine, the patient felt unwell and had eleveated body temperature. His mother took him to a physician and he prescribed him Panadol. The patient recovered completely after 2 days and didn't experience any other side effects.
OCV20	AZ	Female	25	Lebanese	Hotline (1787)	Euvichol-Plus	23/12/2022	1st	Fever Chills Headache Myalgia	24/12/2022	1	Non-Serious	24/12/2022	Recovered	28/12/2022	AZ is a 25 year-old female who got recived her 1st dose of Euvichol-Plus on the 23rd of December 2022. One day after receiving the vaccine, the patient started to have fever, headache, myalgia, and chills. She took paracetamol and recovered within 2 days. The patient didn't complain of any other side effects since then.
OCV21	WME	Female	36	Lebanese	Landline	Euvichol-Plus	21/12/2022	1st	Vomiting Abdominal Pain	21/12/2022	few hours	Non-Serious	22/12/2022	Recovered	28/11/2022	WME is 36 year-old female with a history of hypertension maintained on Amlor and Concor. The patient received her 1st dose of Euvichol-Plus on the 21st of December 2022. After 45 minutess of receiving the vaccine, the patient started to suffer from vomiting and abdominal pain. The patient recovered within 2 days without any intervention.

	Patient Details					Vaccine Details			AEFI Details						Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination Date	Dose	AEFI	Date of Onset of AEFI	Time Interval Between Vaccine and AEFI (days)	Seriousness	Date of Outcome	Updated Outcome	Date of Updated Outcome	Narrative Text/ Special Consideration
OCV22	ZAA	Female	27	Lebanese	Hotline (1787)	Euvichol-Plus	29/12/2022	1st	Fatigue Nausea Chills Myalgia Headache Loss of Taste	1/1/2023	2	Non-Serious	1/1/2023	Recovered	6/1/2023	ZAA is a 27 year-old female who received her 1st dose of Euvichol-Plus on the 29th of December 2022. After 48 hours from receiving the vaccine, the patient started to have loss of taste, fatigue, chills, myalgia, and headache. She didn't receive any medications and recovered within 4 days.
OCV23	MFA	Male	1 year 3 month	Lebanese	Hotline (1787)	Euvichol-Plus	28/12/2022	1st	Fever Fatigue	29/12/2022	1	Non-Serious	29/12/2022	Recovered	3/1/2023	MFA is a 15-month old male who received his 1st dose of Euvichol-Plus on the 28th of December 2022. One day after receiving the vaccine, the patient started to have fever and fatigue. The patient's mother gave him paracetamol. He recovered after a few days.
OCV24	RA	Female	36	Lebanese	Hotline (1787)	Euvichol-Plus	29/12/2022	1st	Headache, Loss of Taste, Loss of smell	3/1/2023	3	Non-Serious	Unknown	Unknown	Unknown	No answer from the patient after several follow-up attempts
OCV25	MI	Male	71	Lebanese	Hotline (1787)	Euvichol-Plus	6/1/2023	1st	Fever Dyspnea Synope Fatigue Diarrhea	7/1/2023	1	Non-Serious	8/1/2023	Recovered	12/1/2023	MI is a 71 year-old male who received his 1st dose of Euvichol-Plus on the 6th of January 2023. One day after receiving the vaccine the patient had dyspnea, syncope, fever, fatigueand diarrhea. He went to the pharmacy and the pharmacist prescribed him Tavanic, a cough syrup, and Panadol extra. He started to feel better on the next day, and recovered within 4 days.
OCV26	MS	Female	8	Lebanese	Landline	Euvichol-Plus	19/12/2022	1st	Chest Pain Dizziness Nausea Dyspnea	22/12/2022	Unknown	Non-Serious	Unknown	Unknown	Unknown	Unable to follow-up with the patient since she was not cooperative
OCV27	JIA	Female	1	Lebanese	KoboTool-box	Euvichol-Plus	19/12/2022	1st	Diarrhea Vomiting	19/12/2022	0	Non-Serious	23/12/2022	Recovered	19/12/2022	No answer from the patient after several follow-up attempts.

	Patient Details					Vaccine Details			AEFI Details							Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination Date	Dose	AEFI	Date of Onset of AEFI	Time Interval Between Vaccine and AEFI (days)	Seriousness	Date of Outcome	Updated Outcome	Date of Updated Outcome	Narrative Text/ Special Consideration
OCV28	ACB	Male	4	Lebanese	KoboTool-box	Euvichol-Plus	21/12/2022	1st	Diarrhea Fever Vomiting	21/12/2022	0	Non-Serious	23/12/2022	Recovered	21/12/2022	No answer from the patient after several follow-up attempts.
OCV29	JAA	Female	47	Lebanese	Hotline (1787)	Euvichol-Plus	12/1/2023	1st	Nausea Vomiting	13/1/2023	1	Non-Serious	13/1/2023	Recovered	16/1/2023	JAA is a 47 year-old female who received her 1st dose of Euvichol-Plus vaccine on the 12th of January 2023. The patient started to have nausea and vomiting 24 hrs post-vaccination. The symptoms persisted for 2 days, so she started to take Motilium. She got recovered within 3 days after taking the medication.
OCV30	BEA	Female	32	Syrian	Hotline (1787)	Euvichol-Plus	17/1/2023	1st	Abdominal Pain	17/1/2023	0	Non-Serious	17/1/2023	Recovered	17/1/2023	No answer from the patient after several follow-up attempts.

Phase I - Serious Cases

	Patient Details					Vaccine Details			AEFI Details							Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination date	Dose	AEFI	Date of onset of AEFI	Time interval between vaccine and AEFI (days)	Seriousness	Date of outcome	Updated outcome	Date of updated outcome	Narrative text/ Special consideration
OCVSC01	MK	Female	39	Lebanese	Hotline (1787)	Euvichol -Plus	13/11/2022	1st	Allergic reaction	14/11/2022	0	Serious	14/11/2022	Recovered	20/11/2022	MK is a 39 year old female that received her 1st dose of Euvichol-Plus Oral Cholera Vaccine on 13/11/2022 at 11:00 am. The same day at 4:00 p.m., she experienced ear pain, chills, fever (39C), and constipation. At night, patient expressed symptoms of angioedema. The next day on 14/11/2022, she reported her first symptoms to the nearest infirmary (Ausrati Governmental Clinic), and the treating physician prescribed Dexamethasone IM immediately. Patient was then discharged on Loratine (loratadine) tablets 2x/d. On the same day after taking the second tablet of Loratadine, the patient experienced flushing and a systemic rash with burning sensation namely in the genital area. MK reported her symptoms to the MoPH by calling 1787 hotline. The physician advised her to continue her treatment and to follow-up after 3 days (Nov 16 th 2022). On 16/11/2022, patient's symptoms started resolving, but the patient reported experiencing new symptoms of shortness of breath. On 17/11/2022, as per the physician's initial recommendation, the patient discontinued the Loratadine treatment but refrained from following up with her physician due to financial reasons.
OCVSC02	AEC	Male	14	Lebanese	Hotline (1787)	Euvichol -Plus	17/11/2022	1st	Vomiting Epigastric Pain Chills	18/11/2022	1	Serious - ER Visit	21/11/2022	Recovered	23/11/2022	AHE is a 14 year old male who was vaccinated with the 1st dose of OCV on 17/11/2022. On 18/11/2022, patient started experiencing severe vomiting. The vomiting persisted for several days, so on 21/11/2022, he was admitted to the ER. At the ER, CBC and Electrolytes tests were done and they revealed normal results. IV hydration was given and the patient got recovered and discharged with a prescription of ORS.
OCVSC03	TAF	Male	74	Lebanese	KoboTool -box	Euvichol -Plus	18/11/2022	1st	Severe Diarrhea	18/11/2022	0	Serious - ER Visit	18/11/2022	Recovered	19/11/2022	TSF is a 74 year old male who was vaccinated with his 1st dose of OCV on the 18th of November 2022. On the same day after few hours, the patient had severe diarrhea. His son transferred him the ER at Al Batoul and he was received the appropriate treatment. The patient started to feel better on the next day.

	Patient Details					Vaccine Details			AEFI Details							Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination date	Dose	AEFI	Date of onset of AEFI	Time interval between vaccine and AEFI (days)	Seriousness	Date of outcome	Updated outcome	Date of updated outcome	Narrative text/ Special consideration
OCVSC04	NZ	Female	78	Lebanese	Hotline (1787)	Euvichol -Plus	23/11/2022	1st	Cardiac Arrest	24/11/2022	1	Fatal	24/11/2022	Died	24/11/2022	NZ is a 78 year old female (weight: 60 kg, height: 155 cm) with a history of heart failure and arrhythmias maintained on Lasix 40mg, Concor 5mg, Lanoxin 0.25mg, and Aspirin 81mg. She was vaccinated with a 1st dose of Euvichol-Plus Oral Cholera Vaccine on 23/11/2022. On the same day at 4:00 p.m, she experienced diarrhea. The diarrhea was severe at the beginning, but later throughout the day, the severity decreased with a frequency of three times per day. The next day on 14/11/2022, the diarrhea persisted so her children decided to give her a hydration treatment. They contacted a nurse and she administered IV hydration with NaCl 0.9% and Vitamin B Complex Ampoule. The patient received 100 mL (over around 15 minutes) only of IV hydration before passing away. A cardiologist was contacted and he confirmed her death secondary to cardiac arrest on 24/11/2022.
OCVSC05	AHR	Male	14	Lebanese	Hotline(1787)	Euvichol -Plus	27/11/12022	1st and 2nd	Overdose Watery Diarrhea Vomiting Dehydration	28/11/2022	1	Serious - ER Visit	29/11/2022	Recovered	8/12/2022	AHR is a 14 year old male who received his 1st dose of Euvichol-Plus vaccine through a mobile clinic on the 27/11/2022. On the next day after receiving the vaccine, while he was at school, a mobile clinic vaccinated him with a 2nd dose. So the patient took two doses in two consecutive days. He immediatly started to have diarrhea and vomiting on the same day. The diarrhea was severe as he started to have dehydration, so he was given IV hydration treatment 5 times during the week. Patient was admitted to the ER and multiple primary healthcare centers. He did not recover, and a follow-up will be performed in the upcomming days. The patient was referred to Al Batoul PMC by the MoPH. 13/12/2022: Follow-up was performed by phone, the patient recovered.

Phase II – Serious Cases

	Patient Details					Vaccine Details			AEFI Details						Assessment at LNPVP Level
Code	Initials	Gender	Age (years)	Nationality	Case Sent By	Vaccine Name	Vaccination date	Dose	AEFI	Date of onset of AEFI	Time interval between vaccine and AEFI (days)	Seriousness	Date of outcome	Updated outcome	Date of updated outcome	Narrative text/ Special consideration
OCVSC06	MRA	Female	13	Syrian	Hotline (1787)	Euvichol -Plus	30/11/2022	1st	Fever Severe diarrhea Vomiting Vertigo Headache	5/12/2022	5	Serious - ER Visit	5/12/2022	Recovered	9/12/2022	MRA is a 13 year-old female who received her 1st dose of Euvichol-Plus on the 30th of November 2022. Five days after receiving the vaccine, the patient started to have fever, vomiting, severe diarrhea, headache and vertigo. The symptoms persisted so she was admitted to the ER where she was given IV hydration therapy. She recovered and was discharged on the same day.
OCVSC07	ARA	Female	16	Syrian	Hotline (1787)	Euvichol -Plus	30/11/2022	1st	Fever Severe diarrhea Vomiting Vertigo Headache	5/12/2022	5	Serious - ER Visit	5/12/2022	Recovered	9/12/2022	ARA is a 16 year-old female who received her 1st dose of Euvichol-Plus on the 30th of November 2022. Five days after receiving the vaccine, the patient started to have fever, vomiting, severe diarrhea, headache and vertigo. The symptoms persisted so she was admitted to the ER where she was given IV hydration therapy. She recovered and was discharged on the same day.
OCVSC08	NMJ	Female	28	Syrian	Hotline (1787)	Euvichol -Plus	30/11/2022	1st	Fever Severe diarrhea Vomiting Vertigo Headache	5/12/2022	5	Serious - ER Visit	5/12/2022	Recovered	9/12/2022	NMJ is a 28 year-old female who received her 1st dose of Euvichol-Plus on the 30th of November 2022. Five days after receiving the vaccine, the patient started to have fever, vomiting, severe diarrhea, headache and vertigo. The symptoms persisted so she was admitted to the ER where she was given IV hydration therapy. She recovered and was discharged on the same day.

2.1.1. Case Reports per Means of Reporting

Table 3 summarizes the received case reports by reporting means, which include: 1787 Hotline Call Center, "KoboToolbox: AEFIs Software for reporting", and the LNPVP landline.

Table 3: Summary of case reports by means of reporting

Means of Reporting	Count N=38	Percentage
1787 Hotline Call Center	23	60.5%
Landline 01/830244	11	29.0%
KoboToolbox AEFIs: AEFIs Software for Reporting	4	10.5%

The majority (60.5%) of the case reports were reported through the hotline accounting for 23 cases, followed by the landline which received 29.0% of the cases (11 cases). The 4 remaining cases were reported through the KoboToolbox: AEFIs Software for Reporting, which is specified for healthcare professionals present on field or any other healthcare professional.

2.2. Demographics

All cases were reported by consumers i.e. non health professionals.

2.2.1. Case Reports per Gender

Table 4 summarizes the case reports by gender.

Table 4: Summary of case reports by gender

Patient Gender	Count N=38	Percentage
Female	23	60.5%
Male	15	39.5%

Out of the 38 received cases, 23 (60.5%) were females, while 15 (39.5%) were males.

2.2.2. Case Reports per Age Group

Table 5 summarizes the case reports by age group.

Table 5: Summary of case reports by age group

Patient age	Count N=38	Percentage
28 days to 23 months*	1	2.6%
2 - 11 years	13	34.2%
12 - 17 years	4	10.5%
18 - 44 years	13	34.2%
45 - 64 years	3	8.0%
65 - 78 years	4	10.5%

** To note that the patient in this category was 15 months old which is within the age specification of the vaccine (> 1-year-old).*

The majority (34.2%) of the cases were reported by patients between the ages of 2 and 11 years old and between 18 and 44 years old with 13 patients in each category, followed by the categories between 12 and 17 and between 65 and 78 years old with 4 patients each (10.5%). Patients between 45 and 64 years old reported 3 cases (8 %), and a patient between 28 days and 23 months reported 1 case (2.6%).

2.2.3. Case Reports per Governorate

Table 6 summarizes the distribution of the case reports, received by the LNPVP, over the four governorates of Lebanon where the immunization campaign was deployed in the two phases covered by this report (North Lebanon, Akkar, Bekaa and Baalbeck-Hermel).

Table 6: Summary of case reports by governorate

Governorate	Count N=38	Percentage
Baalbeck-El Hermel*	14	36.9%
Bekaa**	12	31.6%
North***	7	18.4%
Akkar	4	10.5%
Mount Lebanon	1	2.6%

**Baalbeck-El Hermel governorate includes cases in: Baalbeck district*

***Bekaa governorate includes cases in: Zahle and West Bekaa districts*

****North Lebanon governorate includes cases in: Tripoli, Zgharta, and El Minieh-Dennie districts*

The majority of the received cases were reported from Baalbeck-El Hermel accounting for 36.9% of the total cases, followed by the Bekaa governorate which accounted for 31.6%, then by the North governorate accounting for 18.4% of the total received case reports. To note that the only case received from Mount Lebanon was part of a school vaccination campaign.

2.3. Adverse Events Following Immunization Classification

Keeping in mind that a case report may include multiple AEFIs, the following section is concerned with the 97 AEFIs that have been reported with the 38 received cases, which explains why the total count of AEFIs exceeds the total number of cases received.

When a report is entered into VigiFlow, the relevant Medical Dictionary for Regulatory Activities (MedDRA) terms are assigned to describe the adverse event and other medical terms as necessary. MedDRA is a medical terminology used to categorize information related to adverse events associated with the use of medical products including vaccines. MedDRA terms are classified into a hierarchy from System Organ Class (SOC) which includes the most general terms, to the Low-Level Terms (LLT) which consists of more specific terminologies[24].

2.3.1. Case Reports Related to the OCV: Euvichol-Plus® by System Organ Class

Table 7 summarizes the received case reports per SOC, which is the highest level of the MedDRA terminology, distinguished by anatomical or physiological system, etiology or purpose.

To note, a given case report can belong to multiple SOCs.

Table 7: Case reports by System Organ Class (SOC) related to the OCV Euvichol-Plus®, from November 12th, 2022, till January 22nd, 2023

Reaction (MedDRA) (SOC)	Count*	Percentage
Gastrointestinal disorders	28	73.7%
General disorders and administration site conditions**	17	44.7%
Nervous system disorders	10	26.3%
Respiratory, thoracic and mediastinal disorders	4	10.5%
Injury, poisoning and procedural complications	3	7.9%%

Cardiac disorders	2	5.3%
Ear and labyrinth disorders	2	5.3%
Metabolism and nutrition disorders	2	5.3%
Musculoskeletal and connective tissue disorders	2	5.3%
Immune system disorders	1	2.6%
Skin and subcutaneous tissue disorders	1	2.6%

**One case report can contain more than one AEFI*
One case report can include AEFIs belonging to different SOCs
***General disorders: a SOC containing terms that do not readily fit into any other SOC, or are nonspecific disorders that impact several body systems or sites.*
Administration site reactions: a SOC including reactions related to type of administration: application, implant, and injection site[25]

The reported reactions spanned a total of 11 SOCs. Gastrointestinal disorder was the SOC associated with the most reactions, accounting for 28 out of the 38 case reports (73.7% of the received cases). These findings are consistent with Euvichol-Plus's® safety profile stating that gastrointestinal disorders are the most commonly encountered reactions following OCVs[22].

The second most reported SOC was the General disorders and administration site conditions, which accounted for 17 case reports (44.7%). This was followed by the Nervous system disorders SOC which accounted for 10 cases (26.3%) of the total received case reports.

2.3.2. AEFIs Related to the OCV: Euvichol-Plus® by Preferred Term

Table 8 summarizes the AEFIs by their Preferred Term (PT), which is the second most specific level in the MedDRA hierarchy, and that is a distinct descriptor (single medical concept) for a symptom, sign, disease diagnosis, indication, investigation, surgical or medical procedure, and medical social or family history characteristic[24]. To note, a given case report can contain multiple AEFIs i.e. multiple PTs.

Table 8: AEFIs by reported Preferred Terms (PTs) related to the OCV Euvichol-Plus®, from November 12th, 2022, till January 22nd, 2023

Reported Preferred Terms (MedDRA) (PT)	Count* N=97	Percentage
Vomiting	13	34.2%
Abdominal pain	12	31.6%
Pyrexia	12	31.6%
Diarrhea	10	26.3%
Fatigue	7	18.4%
Headache	6	15.8%
Nausea	4	10.5%
Dyspnea	3	7.9%
Overdose**	3	7.9%
Abdominal pain upper	2	5.3%
Ageusia	2	5.3%
Chills	2	5.3%
Dizziness	2	5.3%
Myalgia	2	5.3%
Vertigo	2	5.3%
Angioedema	1	2.6%
Anosmia	1	2.6%
Burning sensation	1	2.6%
Cardiac arrest	1	2.6%
Chest pain	1	2.6%
Dehydration	1	2.6%
Dysgeusia	1	2.6%
Hyperglycemia	1	2.6%
Hypersensitivity	1	2.6%
Influenza like illness	1	2.6%
Paraesthesia	1	2.6%
Rash	1	2.6%
Rhinorrhea	1	2.6%
Syncope	1	2.6%
Tachycardia	1	2.6%

**One case report can contain more than one AEFI*
*** Overdose case reports were immunization errors*

The most reported reaction following immunization with Euvichol-Plus® was vomiting, accounting for 13 AEFIs (34.2% of the received case reports), closely followed by abdominal pain and pyrexia which accounted for 12 AEFIs each (31.6%), and thirdly diarrhea which accounted for 10 AEFIs (26.3%). These

findings are consistent with the safety profile of Euvichol-Plus® , stating that gastrointestinal disorders are the most commonly encountered reactions following OCVs[22].

To note that 3 out of the 38 received case reports, listed in table 8 as overdose case reports, resulted from immunization errors which were reported during phase I of the OCV immunization campaign. The recipients accidentally received two doses of the OCV in two consecutive days. One case was associated to severe dehydration and recovered (case OCVSC05, Table 2), while the other 2 cases had no associated adverse events (cases OCV01 and OCV16, Table 2). There were no reported immunization errors during Phase II.

2.4. Serious Adverse Events Following Immunization

According to the WHO, a serious AEFI is an event that results in death, hospitalization, or prolongation of an existing hospitalization, persistent or significant disability or incapacity, congenital anomaly/birth, defect or is life-threatening[26].

Table 9 summarizes the received cases by seriousness criteria.

Table 9: Summary of case reports by seriousness

Seriousness	Count	Percentage
No	30	78.9%
Yes	8	21.1%
Total	38	100.0%

Out of the 38 received cases, 8 (21.1%) cases were classified as serious since they all required ER visits to manage their AEFIs with OCV, while the remaining 30 cases (78.9%) were non-serious as per the WHO definition of serious criteria.

2.4.1. Handling of Serious AEFIs

Figure 3: Handling of serious case reports in the context of Oral Cholera Vaccines

The serious case reports undergo a longer process before they are entered into the central database (Figure 3).

AEFIs are classified as serious according to the seriousness criteria of WHO. These cases either require a phone call only or an investigation followed by a causality assessment to evaluate the potential relationship between the AEFI and the vaccine and to implement the appropriate follow-up actions. The investigation is carried out by the PV team members. It includes an extensive and rigorous scientific evaluation based on available information about the vaccination process, the patient's medical records, laboratory results, and information retrieved from the recipient or his/her relatives. After collecting all the available information, the investigation report is filled, and a causality assessment is performed to review the potential causal association between the AEFI and the vaccine. WHO forms and tools are used to carry out both the investigation and the causality assessment[27]. In the period of time covered by this report, there were 8 case reports classified as serious per the WHO-UMC definition that resulted in either hospitalization or death, representing 21.1% of all case reports.

The cases are classified as coincidental, indeterminate, or consistent (Table 10).

*Table 10: Causality assessment classification**

A. Consistent causal association to immunization	B. Indeterminate	C. Coincidental causal association to immunization
1. Vaccine product-related reaction 2. Vaccine quality defect-related reaction 3. Immunization error-related reaction 4. Immunization anxiety-related reaction	1. Consistent temporal relationship but insufficient evidence for causality 2. Conflicting trends of consistency and inconsistency with causality	1. Underlying or emerging condition(s), or condition(s) caused by exposure to something other than the vaccine

**Retrieved from the Global manual on surveillance of adverse events following immunization by the WHO*[23]

2.4.2. Overview of Serious AEFIs

In the period covered by this report, the LNPVP has received a total of 8 serious cases (Table 9). Tables 11 (serious case reports received during phase I) and 12 (serious case reports received during phase II) summarize those cases by patient details, medical history, AEFI details, and performed assessments.

During Phase I, while the LNPVP followed-up, assessed and validated all 5 serious case reports, investigation was only initiated to two out of the five cases (case 1 and case 4 in Table 11). This decision was made due to the full prompt recovery of cases 2, 3 and 5 after their discharge from the ER.

Table 11: Summary of the reported serious cases during phase I

Serious case		Case 1	Case 2	Case 3	Case 4	Case 5
Patient details	Gender	Female	Male	Male	Female	Male
	Age (years)	39	14	74	78	14
	Means of reporting	Hotline	Hotline	KoboToolbox by the mobile clinic	Hotline	Hotline
Medical history	Previous intervention	-	-	Myocardial Infarction	Hospitalization due to Pneumonia 6 months pre-vaccination	-
	Underlying condition	-	-	Dyslipidemia Hypertension Myocardial Infarction	Heart Failure Arrhythmias	-

	Concomitant medication	-	-	Concor Simvastatin Ribavan	Lasix 40 mg 1 tab per day Aspirin mg 81 1 tab per day Concor 5 mg 1 tab per day Lanoxin 0.25 mg 1 tab per day	-
AEFI details	**AEFI**	Allergic reaction	Vomiting Epigastric Pain Chills	Severe Diarrhea	Cardiac Arrest	Overdose Watery diarrhea Vomiting Dehydration
	Date of onset	13/11/2022	18/11/2022	18/11/2022	24/11/2022	28/11/2022
	Time interval between vaccine and AEFI	5 hours	1 day	3 hours	1 day	1 day
	Seriousness	Serious - ER Visit	Serious - ER Visit	Serious – ER Visit	Serious-Fatal	Serious – ER visit
	Outcome	Recovered	Recovered	Recovered	Fatal	Recovered
Assess-ment	**Investigation**	Yes	No	No	Yes	No
	Causality assessment	Consistent	-	-	Coincidental	--

After completing the full investigation protocol, case 1, which is an allergic reaction following the OCV, was concluded to have a consistent causal association with the vaccine. Details of the investigation initiated for case 1 can be found in Annex I of OCV Report 1. Case 4 which was a fatal cardiac arrest, had a coincidental causal association to the vaccine since the patient 4 was an elderly patient with predisposing comorbid diseases. These findings were aligned with the final decision of the Serious AEFI Special Committee. To note that case 5 resulted from an immunization error.

During Phase II of the vaccination campaign, 3 new cases were classified as serious to reach a total of 8 serious case reports during the report period. The LNPVP followed-up, assessed and validated all 3 cases but no investigation was initiated since the patients were admitted to and immediately discharged from the ER after prompt recovery. Table 12 summarizes these serious cases reported during Phase II as follows:

Table 12: Summary of the reported serious cases during phase II

Serious case		Case 6	Case 7	Case 8
Patient details	Gender	Female	Female	Female
	Age (years)	13	16	28
	Means of reporting	Hotline	Hotline	Hotline
Medical history	Previous intervention	-	-	-
	Underlying condition	-	-	-
	Concomitant medication	-	-	-
AEFI details	AEFI	Fever Vomiting Severe Diarrhea Vertigo Headache	Fever Vomiting Severe Diarrhea Vertigo Headache	Fever Vomiting Severe Diarrhea Vertigo Headache
	Date of onset	5/12/2022	5/12/2022	5/12/2022
	Time interval between vaccine and AEFI	5 days	5 days	5 days
	Seriousness	Serious - ER Visit	Serious - ER Visit	Serious – ER Visit
	Outcome	Recovered	Recovered	Recovered
Assessment	Investigation	No	No	No
	Causality assessment	-	-	-

2.4.3. Serious AEFIs by Seriousness Criteria

During the period covered by this report, out of the 8 reported serious cases, 1 case resulted in death (coincidental association with OCV), while the remaining 7 cases required ER visits only.

3. Conclusion

In Lebanon, from November 12th, 2022, till January 22nd, 2023, a total of 6,408 confirmed cholera cases have been reported, with 23 deaths declared to the MoPH.

This report covers the two first phases of the national cholera immunization campaign: Phases I and II.

Euvichol-Plus® is the only cholera vaccine currently available in Lebanon. Until the date of this report, 1,025,000 doses have been administered to the target population.

In the period of time covered by this report, 78.9% of the cases reported were classified as non-serious, and 21.1% were classified as serious.

The Lebanese National Pharmacovigilance Program at the Ministry of Public Health is the reference entity concerned with receiving reports related to AEFIs with OCVs. In collaboration with its partners, the PV team continues to conduct constant monitoring for the safety of the vaccines. Reporting of any encountered AEFI is highly encouraged to contain the outbreak and to reduce the strain on the health system.

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5. Annex I: AEFI Reporting Form for OCV

Reporter, patient & institution identities will remain confidential Questions with an asterisk (*) sign are mandatory				
1) Patient Details *				
Name (or initials)				
Address				
Phone				
Gender		□ Male	□ Female	□ Pregnant □ Lactating
Date of Birth		**Weight (kg):**		**Height (cm):**

2) History of chronic diseases*	□ No	□ Yes, specify:

3) Product(s) Details *

Health Facility / Vaccination Center Name & Address :

Brand Name of Vaccine	Manufacturer	Expiry Date	Batch Number	Dose Number	Date of Vaccination	Time of Vaccination

4) Adverse Event *

Suspected Adverse Event Following Immunization		Onset Date				Recovery Date (if applicable)			
		Time (Hr, Min)	Day	Month	Year	Time (Hr, Min)	Day	Month	Year
Abdominal Pain	□								
Diarrhea	□								
Nausea	□								
Vomiting	□								
Headache	□								
Loss of Appetite	□								
Tiredness	□								
Fever≥ 38ºC	□								
Other/ Specify:									

Adverse Event Description / Case Narrative (Development, Symptoms, Management, etc.)

Relevant Laboratory and Diagnostic Tests Performed	Result	Date

Did the patient have a similar reaction to the same or other vaccines in any previous exposure? *

□ Yes/ Specify:	□ No	□Unknown

5) Seriousness of the Adverse Event *:	□ Yes			□ No	
If yes, specify if the Adverse Event led to:	□ Death	Date of death		□ Life Threatening Situation	
		Cause of death			
	□ Hospitalization			□ Prolongation of Hospitalization	Specify additional duration:
	□ Surgical Intervention			□ Congenital Anomaly	
	□ Persistent or Significant Disability or Incapacity			□ Other Serious Consequences	

6) Outcome of Adverse Event *				
Actual Status of Patient	□ **Recovered**			□ **No Improvement**
	□ **Recovered with Sequalae**	**Specify Sequalae**		□ **Fatal**
	□ **Is Recovering**			□ **Unknown**

7) Reporter *	
Name (or initials)	
Profession or Specialty	
Facility Name	
Email Address	
Phone Number	
Signature	
Date	

الأسئلة مع إشارة النجمة (*) هي إلزامية / المعلومات المتعلقة بالمرسل والمريض والمؤسسة سوف تظل سرية			
١- بيانات المريض *			
الاسم (أو الأحرف الأولى)			
العنوان			
الهاتف			
الجنس	□ ذكر	□ أنثى	□ حامل □ مُرضعة
تاريخ الولادة		**الوزن (كغ):**	**الطول (سم):**

٢- هل تعاني من أمراض مزمنة؟*	لا □	نعم ، حدّد: □

٣ - بيانات المستحضر*						
مركز التطعيم: إسم وعنوان المرفق الصحي/						
اسم اللقاح	**الشركة المصنعة**	**تاريخ انتهاء الصلاحية**	**رقم التشغيلة**	**الجرعة (الأولى، الثانية...)**	**تاريخ التطعيم**	**وقت التطعيم**

٤ - الحادث الجانبي *									
التابع للتطعيم المشتبه به الحادث الجانبي		**تاريخ ظهوره**				**تاريخ توقفه (إذا وجد)**			
		الوقت (الساعة و الدقيقة)	**اليوم**	**الشهر**	**السنة**	**الوقت (الساعة و الدقيقة)**	**اليوم**	**الشهر**	**السنة**
مغص	□								
إسهال	□								
غثيان	□								
تقيؤات	□								
صداع	□								
فقدان و/أو انعدام الشهية	□								
ارهاق	□								
حرارة ≤٣٨ °C	□								
عوارض أخرى، حدد:									
(تطوره، أعراضه، طريقة المعالجة ، وصف للحادث الجانبي ...)									

الفحوص المخبرية و التشخيصية المتعلقة بالحادث	**تاريخ إجراء الفحص**	**نتائج الفحص**

هل كان للمريض تفاعل مماثل مع نفس الدواء أو الأدوية /اللقاح أو اللقاحات المشابهة في أي تعرض سابق؟*		
نعم □	لا □	□ غير معروف

٥ - خطورة الحادث الجانبي *	نعم □	لا □
اذا كان الحادث الجانبي خطيرا، أدى إلى:		
□ الوفاة	تاريخ الوفاة: سبب الوفاة:	□ دخول المستشفى	□ إطالة مدة الإقامة في المستشفى	تحديد مدة الإقامة:
□ تهديد حياة المريض		□ الحاجة لعملية جراحية	
□ ظهور عيب خلقي	□ ظهور إعاقة أو عجز	□ تبعات أخرى

٦- نتيجة الحادث الجانبي*: الوضع الحالي للمريض:			
□ تعافى	□ تعافي مع مضاعفات	تحديد المضاعفات:	
□ ما زال يتعافى	□ لا تحسن	□ الحالة مميتة	□ غير معروف

٧ - مُقدم الإبلاغ *	
الإسم أو الأحرف الأولى	
المهنة	
عنوان العمل	
البريد الإلكتروني	
الهاتف	
التوقيع	
التاريخ	