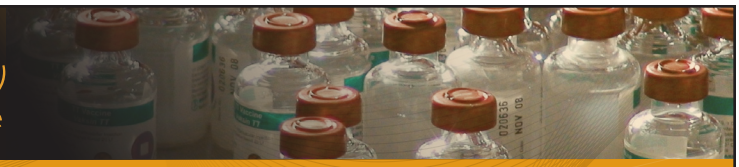
OP • TI • MIZE *(transitive v.)*
To make as effective or functional as possible



Issue 9, July 2011

Contents

Dear Colleagues,

As we continue our thematic exploration of the essential characteristics of future immunization supply systems, this newsletter focuses primarily on tenet 4 of the draft global vision: *"Information systems help staff plan and manage immunization activities and resources while ensuring that adequate quantities of vaccines are always available to meet demand."*

Fortunately, technological advances, such as improved internet access, expanding mobile networks, and devices such as new low-cost mobile phones and barcode readers, are making it easier to build information systems that reach across the vaccine supply chain from the international level to the point of service. These systems improve the reliability, accuracy, and timeliness of information, all of which help staff plan and manage immunization activities and resources more effectively.

As usual, we invite your comments and questions and encourage you to share information on the work that you are doing in these areas. We also encourage you to reach out directly to authors to learn more about their work.

Sincerely,
Michel Zaffran
Director, Project Optimize

Zambia develops user and system requirements for its logistics management information system

by David Lubinski, PATH; Wendy Bomett-Dodie, USAID | Deliver; and Chipopa Kazuma, Medical Stores Limited, Zambia

Photo: PATH

Zambian partners discuss user requirements at a workshop in February 2011.

In February 2011, Zambia's Ministry of Health invited partners involved in supply chain management to help them develop a shared vision, roadmap, and user requirements for a logistics management information system (LMIS) in the country. Doing so has made Zambia the first country to modify the global Collaborative Requirements Development Methodology (CRDM) to develop a country-specific set of requirements.

While the need for user input in developing information systems may be obvious, it is very rarely done in practice, particularly when users are spread across many different domains and have differing needs for information. In 2008, the Rockefeller Foundation funded PATH and the Public Health Informatics Institute to develop a framework that countries could use to identify common functional requirements for information systems in any domain of a health system. The CRDM became this framework. It was validated through the creation of a set of global common requirements for supply chains and logistics management information systems based on input from four countries.

Tailoring common requirements to country-specific scenarios

This year, Zambia was able to take the global common requirements and adapt them to their own national vision for a computerized LMIS system. Doing so has saved an immense amount of time and resources allowing the country to modify an existing product rather than create a new one from scratch.

Zambia will also contribute to the further development of the global CRDM. Currently, the global requirements address only 6 of the 11 processes that are typically found in supply chain systems: requisition, receiving, storage, dispatch, transport, and dispense/usage. The Zambian team recognized that it needed to include two additional processes in its LMIS and has, therefore, determined requirements for forecasting and purchasing to their national system. Because these processes were not included in the original CRDM for logistics, Zambia's requirements will now serve as the first version of the global standard for these two processes.

Flexible and expandable information systems

At present, Zambia's LMIS system is being designed for all health commodities except vaccines. Although vaccine experts contributed significantly to the global CRDM for logistics, Zambia's priority is to develop an LMIS for essential medicines, laboratory supplies, and medical supplies. Once the system is functioning effectively, then vaccines may be added at a later date. This flexibility is one of the advantages of the CRDM: it is robust enough to work for all health commodities, eliminates the need for multiple vertical systems, and can be expanded at a pace that meets the needs of each country.

Beyond LMIS

Now that Zambia is familiar with the CRDM, it can apply the methodology in other domains. Part of the value of completing the supply chain domain first is that the core technical group can easily see where the LMIS might interact or exchange data with other information systems like patient health records. If this group continues to apply the methodology, they will continue to fill out their own management information strategy and understand the linkages between domains.

Over time as CRDM is applied in each domain of the health system in Zambia, a national road map can be developed for a complete health management information system leading to a user-designed system that is comprehensive, scalable, and sustainable. We envision that such a system will enable health workers to simply deliver the services to patients and record what they did. From there, data is connected to the entire health system, not just logistics, and the system will know how to process the information and set in motion the correct procedures for action and decision-making.

For now, Zambia's core technical group is ready to take its common requirements from theory to practice and will begin seeking software solutions and/or developers to create the system they need. "The CRDM process has helped us envision a holistic information system, gather inputs from the right people, and move forward into system development with confidence," said Dr. G. Syakantu, Director-Clinical Care and Diagnostics Services.

To learn more about Zambia's process, please email David Lubinski (dlubinski@path.org).

Albania pilots electronic immunization registry

by Erida Nelaj, Albania Institute for Public Health and Jan Grevendonk, PATH

In May 2011, the Albanian Institute for Public Health (IPH) launched a new web-based immunization registry and vaccine ordering system in the district of Skodra. Based on the acceptability and success of the system in Skodra, the government is deciding when and how to roll out the software nationwide. After an initial training with nurses, the system appears to be working well, and acceptability is high.

A new electronic immunization registry is replacing cumbersome paper-based reporting systems in Albania

Photo: PATH/Jan Grevendonk

The project began in 2009 when IPH asked project Optimize to help develop a strategy for an electronic immunization registry and vaccine stock management system. Working with a local software developer, IPH and Optimize documented the key processes and requirements for the system and referred to them throughout the development process to ensure the project was on track. A year later, after several rounds of preliminary testing with users, the software and training materials are complete and have been deployed at 24 health centers in Skodra.

In many ways Albania is a difficult place to deploy a web-based information system. Few health centers are equipped with computers, electricity is unreliable in many areas, Internet access is limited, and even

mobile networks do not reach the more remote areas of the country. However, the system was designed to work around these issues by providing access through mobile phones and, when needed, paper-based reporting systems to complement online access.

After a month of use in the district, IPH and Optimize staff checked in with nurses in health centers across the district to learn how they liked the new system. They found that nearly everyone understands the system and finds it highly functional. Despite some frustrations with Internet access and electricity, nurses clearly see the value in the system, noting that it will save them a tremendous amount of time creating their monthly plans and make it easier for them to track and monitor vaccinations, even among families that move to and from other districts.

For now, nurses are simply playing with the system, and data are not being collected for use. In September, the system will be used for actual data collection, monitoring, and ordering.

Over time, additional features and capabilities will be added to the system, including the mobile-phone component that will allow nurses to download immunization schedules for children associated with their health post, find any child in the database, and register the vaccinations they administer from any location with connection to a mobile SMS (short message service) network. Nurses have also requested that the system be expanded to include additional functionality such as adverse events reporting and disease reporting.

As the Government of Albania prepares for nationwide introduction in the coming years, neighboring countries, too, are taking an interest in the system. In the fall, representatives from these countries will be invited to visit health centers in Skodra to understand how the system works.

Optimize will monitor the system for up to a year and conduct multiple evaluations, including a functional evaluation of its use and acceptability, impact on supply chain performance, and cost. For IPH, the success of the pilot will be measured by how well it can improve the quality of the monitoring system for immunization coverage, increase ordering accuracy, and decrease the administrative burden on health workers.

Photo: PATH/Jan Grevendonk

Currently, nurses in Albania record each vaccination on five different paper records.

For nurses who currently record each vaccination session on five different paper records, the benefits of the system are obvious. After completing the first training session, one nurse asked, “okay, just tell me when it is going to start.”

For administrators, the system will also bring value. Not only will coverage data be more accurate, but the data are disaggregated, which means that district officers and nurses can see that not only do five percent of children need vaccination, but they can see the individual names and locations of children who are due or overdue for vaccination. Combined, these benefits will accrue to families whose children will receive all the vaccines they need right on schedule.

Tracking last-mile consumption with mobile phones

by Jan Grevendonk and Elaine Griffith, PATH and Anup Akkihal, Logistimo

One of the perennial struggles in any supply chain is to deliver the right amount of product to the right place at the right time. This is especially true for essential medicines and temperature-sensitive products like vaccines. As the financial costs of maintaining excessive stock levels rise with the introduction of newer, more expensive products, the human cost of missing opportunities to vaccinate due to poor vaccine handling and management rises in turn. In this environment, managers need more precise tools to determine the quantity of product to store and deliver at a given point in time. Fortunately, an increasing number of tools are becoming available to help countries track and monitor consumption data at the service-delivery level. Some have been demonstrated in immunization programs, and others can be deployed relatively easily should the opportunity arise.

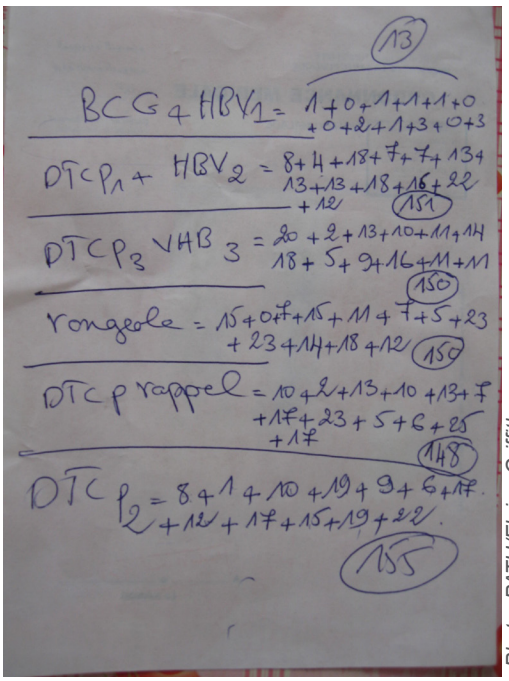


Photo: PATH/Elaine Griffith

Consumption data is frequently recorded by hand and manually transferred up the supply chain on paper.

Optimize is exploring the possibility of demonstrating a cloud-based software service called Logistimo which enables health workers to record and send consumption data, place orders, and check on the status of orders from any location using inexpensive mobile phones. At present, Logistimo is being used and demonstrated in a variety of applications both within and outside of health care. It is particularly relevant to immunization systems because it can improve reporting, inventory management, distribution, and forecasting for remote health programs by linking these functions directly to actual real-time consumption data. The tool is flexible enough to fit almost any logistic system and does not require a large software development effort.

How would it work?

An intuitive user interface would allow health workers to enter vaccine consumption data directly into inexpensive mobile phones following a vaccination session. The data would be uploaded immediately to a networked system that allows managers to review actual demand and stocks at the service-delivery level at any point in time. A real-time information system prevents the practice of estimating demand based on consumption at the district or subnational level which may or may not reflect actual consumption at the

service-delivery level. It also works quickly and efficiently enough to allow managers to use the data for placing and verifying orders.

Based on this consumption data and levels of existing stock, health centers can place an order with the district store. District health workers can compile all orders in the district, compare them to consumption data, and ship the orders to health centers along with other essential medicines. After delivering vaccines, the district health worker can create an accurate order for resupply from the national level.

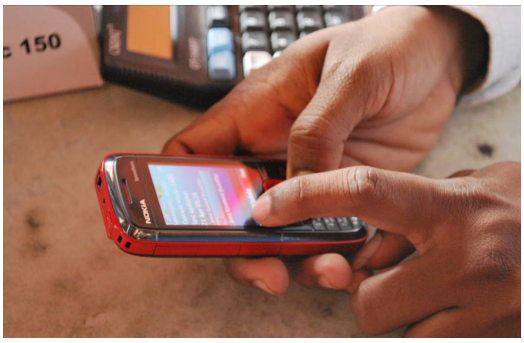


Photo: Logistimo

Health workers enter consumption data directly into their mobile phones.

Why is the last-mile so important?

All levels of the supply chain are designed to support a service at the endpoint of the chain. Information from this endpoint is therefore useful to ensure that the supply chain as a whole is delivering effectively. An information system that tracks consumption data can enable each level of the supply system to make evidence-based decisions using accurate, real-time information on availability of vaccine at different levels of the supply systems. Such a system can also track historical vaccine distribution patterns (seasonality) and trends to improve forecasts. Another significant advantage with a service like Logistimo is that there are no costs to the country on software development. If the system works, it can easily be scaled countrywide, requiring only 15 minutes of training to produce quality, actionable data, and one to two hours of training to use the web-based dashboard's intuitive features such as maps, graphs, charts, and tables. In addition, information systems which use mobile phones instead of computers are much more accessible financially and technically in remote areas.

To inquire about Logistimo, please contact Anup Akkihal. To inquire about other last-mile logistics solutions, please contact Jan Grevendonk.

Is it time to start barcoding vaccine labels?

by Drew Meek, WHO/QSS; Sheila Cattell, IFPMA; Joanie Robertson, PATH

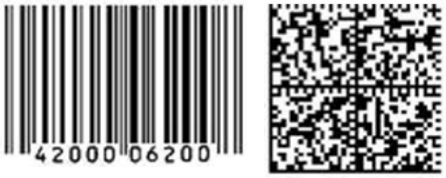
In the packaged food and consumer products industries, barcodes have become a way of life. Most large supermarkets around the world use barcode scanners at the checkout counter, and an average smartphone can now scan barcodes. Barcodes make it easy to track the flow of goods from their point of origin to their final destination, to recall products that may pose a safety hazard, and to link a product with a great deal of information such as where it was made, where it has been, ingredient lists, and instruction manuals in multiple languages. Given the ubiquity and utility of barcodes, why are they not widely used on vaccines?

In fact, barcodes are included on the labels of some vaccines sold in industrialized countries. Without information systems and hardware in developing-country immunization programs to scan and use barcode information and without a global barcode standard to follow for vaccine products, the application of barcodes on vaccine products destined for developing countries is happening much more gradually.

The need for global barcode standards

Global standards make it easier to correctly implement and interpret barcodes coming from any number of suppliers in different countries of origin. In the absence of global standards, the national regulatory

agencies of individual countries are forced to manage multiple different standards on different products or to come up with their own standard which leads to barcode information that is not compatible with systems in other locations.



Barcodes (left) and datamatrix codes (right) are symbols printed directly on a product or label that encode data that can be scanned with an appropriate reader device.

GS1 is a nonprofit entity leading the design and development of global standards for supply and demand chains, and their standard appears to be emerging as the leading global solution for product information. Their standard product numbering schema, called the Global Trade Item Number®, identifies the manufacturer and product. From there, depending on the type of barcode used, it is likely that vaccine lot numbers and/or expiry dates would be included in the barcode, and in higher-capacity barcodes perhaps other data as well. Most importantly, using a global standard identification barcode allows different countries and entities to link the product to a record in a product database containing all the information they need and ensures that the identification number will be unique.

Obtaining global agreement on a standard for the type of information that should be included, the type and format of barcode to use (one dimensional versus two dimensional), and the levels of packaging on which it should be included is a difficult but critical hurdle to overcome before a really useful system of barcoding for vaccines can be adopted.

Because most vaccines destined for low-income countries are prequalified by the World Health Organization and procured through the United Nations Children's Fund, these organizations have a powerful role to play in proposing a global standard for barcodes on all public-sector vaccines. The Vaccine Presentation and Packaging Advisory Group of the World Health Organization has initiated a discussion around the concept of primary-label barcodes and is gathering information from regulatory agencies for guidance, including the United States Center for Disease Control and Prevention. The additional complexity of placing a barcode on primary labels is the limited amount of available label space and the need for specific placement to compensate for vial curvature for some code formats. The goal is to contribute to the current global discussion on barcodes for vaccines and ensure that the anticipated needs of developing countries are considered alongside the needs of industrialized countries.

Country readiness for barcodes

Another major hurdle is the fact that most developing countries are not yet ready for barcodes on vaccines. Existing information management systems in most countries are not equipped to take full advantage of the added value and benefits of barcodes. Many countries are starting to build more sophisticated systems within their immunization programs as an increasing number of cost-effective software and hardware solutions are becoming available along with technical capability to support implementation and long-term management. In the short term, however, demand for vaccine barcodes in developing countries is still quite low.

A handful of countries have begun to demonstrate the value of barcodes on vaccines. For example, Health Canada is in the process of adopting GS1 standards for vaccine product identification and recently recommended piloting a two-dimensional format with information on lot number and expiry dates on both primary and secondary packaging. This effort will make it possible for Health Canada to develop complete electronic health records, reduce immunization errors, improve inventory management and forecasting, and maintain more accurate immunization coverage rates.

If a similar effort was successfully deployed in developing countries, barcodes could also help facilitate

lot recalls, allowing the health system to identify specific children that were vaccinated with a particular lot and determine where leftover stock is sitting. Barcodes linked to a database could also be used to provide relevant information about the vaccine, proper administration, and safety warnings in local languages to users. All of this is possible with barcodes but only if the necessary systems and infrastructure are in place and functional enough to support proper use.

Over the next decade, as more and more developing-country governments become interested and are ready to implement barcode tracking systems in their immunization systems, it will be critical for vaccine products with barcodes to be ready in the public-sector supply chain. For this to happen, both global- and national-level decision-makers can take positive steps toward a future where barcodes are an essential component of vaccination programs.

Open-source logistics management information system solutions

by Leah Hasselback, VillageReach and Jan Grevendonk, PATH

As more and more countries consider the move from paper-based systems to electronic health information systems, there is a pressing need for global coordination and collaboration among efforts. This is particularly true in the emerging and fragmented field of logistics management information systems (LMIS). Over the past decade, a myriad of LMIS have been developed under the sponsorship of the global health community. Yet in most cases these systems address only a particular layer of the supply chain and are unable to connect with information systems in other domains of the health care system. Moreover, they struggle to take advantage of local technological advances, including improved regional internet access and expanding mobile networks. These advances enable rapid scaling at minimal cost and provide new low-cost devices that make it possible to present robust LMIS functionality at the “last mile” or service-delivery level of the supply chain. OpenLMIS was designed to gather LMIS knowledge in one place and disseminate up-to-date systems and tools for free.

OpenLMIS is a software development initiative focused on health system supply chains in low-income countries. It seeks to encourage the creation and implementation of a basic open-source LMIS that collects data efficiently and reliably, can scale to national-level coverage, operates in a variety of environments with different levels of network connectivity, and communicates with other components of the broader health information system. The basic LMIS can then be modified and improved upon over time. The initiative utilizes a practical, inexpensive approach to improving the distribution of medical goods by leveraging open standards, using a community-based open-source approach, and embracing available information technologies and skills.

The initiative came into being after nongovernmental organization VillageReach invested heavily in an LMIS to support health system supply chains from the intermediate warehouse to service-delivery level in Mozambique. Recognizing that collaboration was required across the entire supply chain, VillageReach expanded its information system and licensed the software application as open source in 2009.

OpenLMIS is envisioned to be a collaboration nexus for experts in logistics and supply chains, e-Health information systems, software development for low-resource settings, and process improvement. Like other open initiatives, the intention is to become a place for sharing information about LMIS planning, identifying common requirements and system design, promoting interoperability between systems, developing open-source solutions where appropriate, establishing and following international standards in supply chain and health informatics, and galvanizing interest in a shared vision for effective, scalable,

and sustainable LMIS solutions. Already, partners like the World Health Organization, PATH, and USAID | Deliver have joined the OpenLMIS community. As awareness of this initiative grows, the goal is to engage academia, other global health organizations, pharmaceutical companies, private-sector logistic companies, technology groups, funders, and global health alliances.

Over the next decade, OpenLMIS hopes to have a community of developers working on a series of implementation projects in countries that can share existing software components, solutions, and approaches to meet user functionality requirements. From this work, OpenLMIS will be able to provide more than just software; it can be a place to go for guidance on LMIS system development, leads on local developers, best-fit solutions that are most relevant to the country, cost and impact data, design documents, and tools.

In concert with the 2020 Vision of Immunization Logistics and Supply Systems, OpenLMIS is encouraging the development of LMIS design frameworks and unique applications that are:

- Internet enabled to allow for data visibility to multiple users at various decision points throughout the supply chain.
- Platform independent to allow usage through low-cost devices and to take advantage of competitively priced consumer electronics.
- Based on open standards that allow for interoperability between other information systems (e.g., an LMIS that can send and receive data to and from a medical records system).
- Open source to allow other developers and implementers using LMIS systems to communicate with each other, problem solve together, and collaborate on software improvements.

To join OpenLMIS or learn more about it, please visit the website or email info@openlmis.org.

Extending the useful life of export packaging

by Dmitri Davydov, UNICEF Supply Division and John Lloyd, PATH

In partnership with the United Nations Children's Fund (UNICEF), the Danish Technical University has begun a pro bono study on vaccine export packaging designs that would extend the safe, useful life of export packaging to allow for distribution beyond government central stores. Currently, vaccine packaging used for international distribution is not designed for journeys longer than 48 hours. However, vaccines are at risk where international transportation to hard-to-reach consignees exceeds the validated packaging performance limits, especially in the case of shipments to the West Bank and Gaza, Somalia, South Sudan, Lesotho, Timor Leste, and North Korea. In addition, countries lacking adequate cold transport capacity often reuse the packaging for in-country distribution, inadvertently putting vaccines at risk of thermal damage, reducing vaccine potency and effectiveness.

Rather than making it more difficult for countries to reuse the export packaging, UNICEF, PATH, and the World Health Organization (WHO) are working on ways to extend its useful life so that it can be more safely reused to deliver vaccines from the government central stores to subnational locations. The Danish Technical University study is a first step in that direction, as it will identify engineering design concepts that address the needs of users at both the supplier and country levels and increase sustainability and shipping efficiency requirements (including sustainable alternatives to dry ice and efficient bulk factors). Further research will be made into options to reduce the total systems cost to the child, leveraging public-private partnership and innovative business models for manufacturing new designs, if applicable.

Validated designs and a choice of acquisition mechanisms will be made available to the industry on an open-platform basis.

Why longer-lasting export packaging is needed

Each year UNICEF Supply Division oversees nearly 1,800 vaccine shipments to over 80 countries located mostly in Africa, Asia, and Eastern Europe. Sixteen suppliers use their own boxes based on WHO guidelines to pack and ship vaccines from their facilities on all continents except Australia directly to the recipient countries. Shipping boxes represent half of the total weight of vaccine shipments, as well as a share in vaccine cost. UNICEF pays for vaccine, its packaging, and for each kilo of air freight.

Shipping boxes are designed to use passive coolants (e.g., gel/cool packs, ice packs, or dry ice, depending on the requirements for the particular vaccine and supplier choice) to maintain appropriate temperatures set by WHO guidelines on safe vaccine shipments (48 hours). Most suppliers use boxes that do not perform beyond 72 hours of temperature maintenance.

Upon arrival, national ministries of health unpack vaccines for warehousing at central cold stores before repacking them again for in-country distribution (often combining more than one vaccine type in the same box). Countries are expected to procure and keep stock of reusable WHO Performance, Quality and Safety (PQS)-listed cold boxes for this purpose. However, with increased quantities of vaccines and bulkier packaging, countries need larger boxes for efficient distribution. Countries are partially solving this problem by reusing export packaging, but since the packaging is not currently designed for extended use, the practice can put vaccines at risk of exposure to heat or cold. While the presence of vaccine vial monitors on each vial helps detect undue exposure to heat, the damaging exposure to freezing temperatures continues to represent a serious risk to vaccine during in-country distribution.

Expected impact of the solution

Improved export packaging will provide many countries with a cost-effective and safe option for transporting vaccines from the national to subnational levels while simultaneously reducing the overall cost of distribution to the child. By extending the life span of shipping solutions, eliminating the need for redundant cold boxes, reducing weight/volumes per dose, and providing options for environmentally friendly disposal, the solution is environmentally sound as well.

Announcement

GAVI Alliance donors commit US$4.3 billion additional funds to enable GAVI to reach more children and to work with partners and countries to accelerate the introduction of new vaccines. Read the press release.

Resources

Outsourcing the vaccine supply chain and logistics system to the private sector: The Western Cape experience in South Africa. This report examines Western Cape Province's experience outsourcing procurement, warehousing, inventory management, and the distribution of vaccines to health centers to a third-party private-sector company.

Assessing the potency of oral polio vaccine kept outside of the cold chain during a national immunization campaign in Chad.
[Read the article]*

**Published in Vaccine. Subscription or purchase required for full article.*

Developing a vision for supply systems in 2020: landscape analysis summaries
This document describes the ongoing work taking place within each tenet area and the gaps that need to be addressed before the 2020 vision can be achieved.

OPTIMIZE

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