

# THE USE OF EMR SUPPLY CHAIN MODULE TO IMPROVE SUPPLY CHAIN MANAGEMENT

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## ABSTRACT

### Issues:

Supply chain management in healthcare is inefficient and laborious. In part because tools developed for inventory management of consumables are too simple and ineffective, or, conversely, too detailed, convoluted and costly. Additionally, there is a scarcity of tools that connect inventory management to patient care and program management, through seamless linkage of clinical data collected at patient encounter points, inventory managed by pharmacists and lab managers, and finances controlled by accountants and program managers.

### Description:

With support from health care providers at partnering institutions, including the pharmaceutical and supply chain team at University of Maryland School of Medicine Kenya, Futures Group has developed a robust open source electronic medical records system (EMR), IQCare. IQCare is nationally accredited by Kenya National AIDS & STI Control Program as a 'national' EMR, to capture data for HIV services within ministry of health treatment facilities. One of IQCare's major features is a Supply Chain Management Module (SCM).

The SCM feature is highly configurable and comprehensive. Organizations can use the SCM to manage any kind of inventory, from drugs to lab reagents to office supplies. Integrated into the SCM is the cost of goods. Aggregated facility expenditures are available in data and graph format in the facility reports of IQCare. These reports include Facility Monthly ARV Summary Report, Commodities and Consumption Data Reports and ARV Patient Summaries.

### Lessons learnt:

The SCM has been successfully deployed to manage HIV related medications in select program supported facilities. The success and ease of use of the module will justify its expansion into other, non-HIV related, and health system strengthening interventions. Close collaboration with pharmacy experts improved the work flow and data requirements resulting in better acceptance of the SCM.

### Next steps:

Improve SCM coverage within health facilities running IQCare to improve integrated patient management. Modifications should be anticipated as pharmacy/laboratory technicians and others implement the system and identify enhancements to improve usability.

## KEY WORDS

Supply, Chain, Public, Health Informatics, Health Infrastructure and Operating Systems

## 1. INTRODUCTION

A supply chain by definition is the physical and informational resources required to deliver a particular service to the client<sup>[1]</sup>.

Supply chain management in healthcare still remains for the most part inefficient and laborious especially in resource limited settings. This may be in part because tools developed for inventory management of consumables are either too simple or ineffective, or, conversely, too detailed, convoluted and costly. Additionally, there is a scarcity of tools that connect inventory management to patient care and program management through seamless linkage of clinical data collected at patient encounter points, inventory managed by pharmacists and lab managers, and finances controlled by accountants and program managers.

Two main systems are in use in typical EMR based clinics in Kenya who deliver HIV care and treatment services:

1. EMR for patient management and monitoring (PMMS).
2. Pharmacy commodities tool or ARV dispensing tool (ADT).

The step of using dual systems at facility level is the basis of the design of the integrated system in IQCare.

There is an inherent disadvantage to running dual electronic medical records systems especially when there is an overlap in one or two of the systems functionalities but each having a limited scope.

- Dual system may mean both systems are not up to date at the same instance, e.g. care terminations and missed appointments
- Increased work load from duplication
- Reporting discrepancies

IQCare PMMS was developed in such a way that there is an interaction between the clinical and the pharmacy modules both in paperless and paper based environments. However, regardless of how well the EMR is at patient monitoring and management bearing in mind the complex nature of HIV care and treatment, there is a gap that exists in terms of integration. There exists separate electronic records systems to track Antiretroviral (ARV) consumption that is recommended by the (Kenya) National AIDS and STI Control Program NASCOP and where the two systems are in use at the same facility, there is an additional step to validate the clinical patient data versus the pharmacy dispensing tool (ADT) data.

## 2. DESCRIPTION

There are 3 main pipeline agencies for medical supplies in Kenya

1. Kenya Pharma consortium run USG pipeline which brings in all ARVs through packing and distribution of basic care packages (BCP) kits.
2. Mission for Essential Drugs Supplies (MEDS) is the pipeline for non-ARV drugs used mostly by faith based facilities in the AIDSRelief transition partners programs.
3. Kenya Medical Supplies Agency (KEMSA) is the national pipeline used by all facilities for all types of drugs and medical supplies.

Drugs and medical supplies come in to Kenya and are warehoused by supply agencies until requested by facilities. Facilities use the pipe lines systems to make a purchase order request.

The agencies monitor the requests and channel the supplies/drugs through agency vehicles, up until the point facilities and/or central site distribution points receive the supplies. It is at this point that the agencies seize to have direct supply chain management.

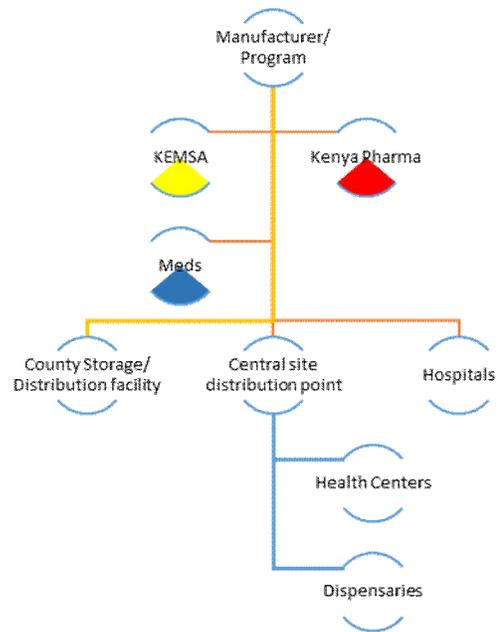


Figure 1 Basic outline of drug distribution in Kenya

When the drugs get to the facilities they use electronic records systems for inventory.

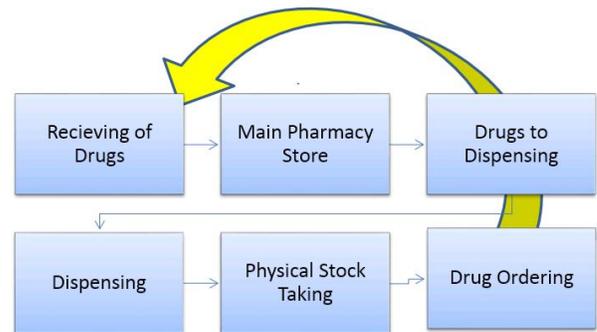


Figure 2 Typical Pharmacy Work Flow

IQCare is an open source system that was developed specifically to address a gap in capture of longitudinal HIV patient clinical data but has developed over the years to accommodate other service areas beyond HIV to include TB, antenatal, maternity and postnatal care, cervical cancer screening, and transient patient modules. Nationally it has been ranked as one of the preferred EMR systems for HIV care and features as such is one of three Kenya national health management information systems (KeHMIS) EMRs.

Catholic Relief Service and the University of Maryland, Baltimore had input in further developing IQCare to integrate a program and supply chain management module.

Kenyan pharmacists and Kenyan program managers gave input on the business rules and requirements for the system. Consequently the system was built with the aim

of bolstering efficiencies by addressing specific gaps in the existing supply chain systems.

The IQCare SCM module works by leveraging the patient data already existing in the PMMS data base and plugging in the supply chain module to manage inventory. This has been built bearing in mind the complex nature of ARV therapy for HIV positive patients.

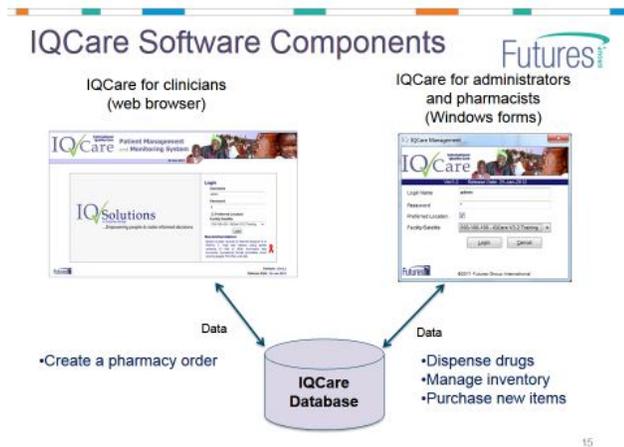


Figure 3 Integrated PMMS and SCM

The module can be used in both paper based and paperless environments to track inventory, expiration dates of medicines, batch numbers, handle all consumables (gloves, needles etc.) and manage laboratory supplies based on specific tests. Built into the design is the capability to calculate the revenue/loss or in-kind donation of items (when a facility receives stock they know the unit cost and how much it will be sold for. IQCare SCM module can calculate the transition).

In October 2011 the SCM module was conceptualized and development and testing following shortly thereafter. In July 2012 a pilot was run in Riruta Health Center, Nairobi. It is a small but busy clinic that runs a comprehensive care center (CCC) with approximately 7,000 cumulative HIV care and treatment clients and 3,000 ART patients active on treatment.

The positive outcome of the pilot lead to the deployment of the IQCare SCM module to 6 additional CCC sites as of June 2014 including Kenyatta National Hospital, Kiambu district hospital, Mbagathi District hospital, Medecins sans frontieres Clinic Kibera, Makeni district hospital and Narok district hospital.

Kenyatta Hospital in Nairobi is the largest referral hospital in East and Central Africa. It has the largest CCC in the country with 17,000 cumulative HIV care and treatment patients, 7,664 active patients of whom 6,855 (~90%) are active on ART. The module has worked well at this facility which is also one of the first fully paperless public clinics alongside Mbagathi district hospital in

Nairobi and Port Reitz Hospital in Mombasa (Kenya's second largest city) which are both relatively high volume facilities in the heart of the respective cities. The remaining facilities are all paper based running the SCM module to handle pharmacy commodities management and supply chain.

NASCOP requires all health facilities to submit on a monthly or quarterly basis patient and facility summary reports that have indicators including cumulative in care, active in care and active on ART, number of defaulters just to name but a few. While the PMMS can report this from the clinical side, there is need to submit pharmacy consumption reports as well, and this is also true for laboratory reports.

Prior to the implementation of the SCM module in IQCare this was a 2-step process, but the SCM module allows for the merging of these two reporting functions.

The success thus far has been largely due to the fact that:

1. SCM is integrated with IQCare (i.e. patient monitoring and management system) while the de facto system is a standalone system that only works within the pharmacy and is not integrated with patient records.
2. SCM can work in both paper based and paperless clinic environments while the old system is only paper based. It is a networked system that supports point of care data entry.
3. SCM in IQCare has a system architecture that allows for full scalability and can be used in the smaller dispensary clinic level to the national referral hospital level. It also allows for IQCare to be customized to capture clinical data far beyond HIV care for both chronic and acute disease management.
4. By default IQCare comes with a list of common tests that are done in most facility's, tests not in this list can be added
5. IQCare is a nationally recognized and endorsed HIMS system in Kenya.
6. Because it is integrated with patient data, linking the two data components is easier and results in consistency in pharmacy and CCC reports
7. No additional installation requirements as the SCM comes as part of the default IQCare system.
8. IQCare SCM allows the user to auto generate the 2 standard reports required by the Kenya Ministry of Health:
  - a. Consumption Data Record and Request Report (CDRR)
  - b. Facility monthly antiretroviral patient summary (FMAPS)

9. Can create custom reports and bin reports as per user needs.
10. Ability to support multiple stores in one database

Beyond just tracking ARV, opportunistic infection related medications, and essential medicines the module has been used to track TB treatment as IQCare also incorporates a TB module. Isoniazid preventative treatment is routinely administered through the CCC as well.

### 3. CONCLUSION, LESSONS LEARNT AND THE NEXT STEPS

Having SCM data is a resource that can be used for forecasting by the department of pharmacy and poisons boards, program managers, technical assistance teams and facility level planning. The efficiencies afforded by an integrated supply chain module coupled to a PMMS have the potential to boost accountability, reporting quality and accuracy and help institutions to better manage their resources and plan better for the future.

Although health care providers are not the only inefficient link in the supply chain, from all indications, they represent the most significant opportunity for dramatic cost reduction. [3].

The SCM has been successfully deployed to manage HIV related medications in select program supported facilities. The success and ease of use of the module will justify its expansion into other, non-HIV related, and health system strengthening interventions. Close collaboration with pharmacy experts improved the work flow and data requirements resulting in better acceptance of the SCM.

Improve SCM coverage within health facilities running IQCare to improve integrated patient management. Modifications should be anticipated as pharmacy/laboratory technicians and others implement the system and identify enhancements to improve usability.

There are a few challenges with running the SCM module in IQCare:

1. Obtaining the drug list for configuration in some facilities can be difficult due to human resource limitations.
2. Information on the cost of drugs is not always easily available in some facilities due to a lack of documentation.
3. The change over from a paper based system or other electronic system requires buy in there is always an inherent inertia to change that must be overcome.

The figure below illustrates the next steps for the progress of the SCM module in a broader scope.

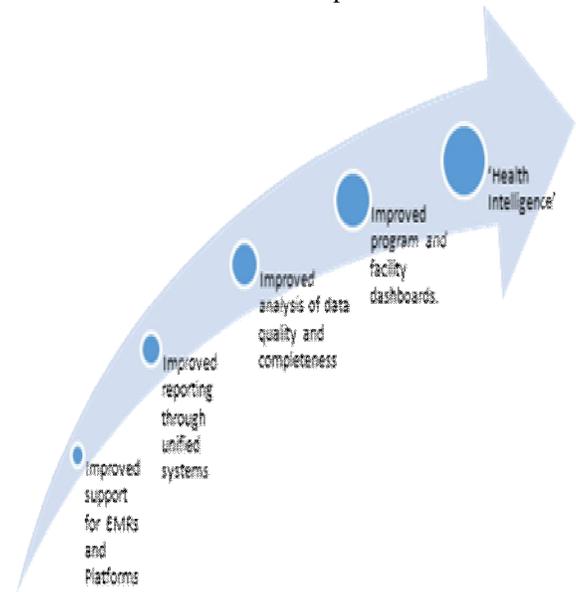


Figure 4 Next Steps

### ACKNOWLEDGEMENTS

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