Digitizing Patient Radiological Information to Improve Health Care efficiency in Kericho County

County:	Kericho		
Sector:	Health	Sub-sector/Theme:	Laboratory; performance management
Keywords:	Kercho; laboratory services; radiology; telemedicine		
Target Audience:	County Department of Health; CECM Health; Hospital administration; County laboratory staff		
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Context and Challenge

Kericho County Referral Hospital is the only referral facility in the county, serving a projected total population of 995,566 by 2018 (CIDP, 2017[1]) in Kericho county. In addition, it also serves clients from the wider region which includes Kisumu, Kisii, Bomet and Nakuru Counties. The hospital is the only referral facility for 196 public health facilities in the county and serves an estimated 97,000 clients per year. The hospital is served by a staff of 400, spread across 32 departments. Located as it is on the main Nakuru-Kisumu Highway, it also serves travelers on transit and those who may need emergency health services.

The Radiology Department provides services to clients requiring further diagnostic and treatment services and experiences high demand for its services. Established in 1976, the department has seen an increase in the number of clients it handles each year, from 900 per month in 2016 to about 2000 per month in 2018. Majority of the clients handled at the Radiology Department require Ultra Sound, General X-Ray. Over time, the department faced several challenges, which include the following:

a) **High radiation dose**: In cases where the film would not meet the quality threshold, a repeat film would be needed thereby adding to the already high cost incurred in the production of the first film and also the radiation dose to the patient is increased. In instances of damaged or lost film (which are usually in the clients' custody) a repeat take would also be needed and this called for additional money
b) **Patient waiting time reduction**. The patient do not have to wait for long for the processing of the image since it is digitized and is done almost immediately
c) **High cost of radiology services:** Before 2016, the hospital was using analogue technology which had cost implications to both the client and the hospital. One box of x-ray films (100 pieces) was 25,0000/= while 100 pieces of CDs is costing 2,500/= For example, a client would use Ksh 450 for the development of radiological material alone (this is minus the service charge). At the same time a CD can store multiple images while a film only takes one image
d) **Poor Image quality:** In cases where the film would not meet the quality threshold, a repeat film would be needed thereby adding to the already high cost incurred in the production of the first film and also the radiation dose to the patient is increased

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[1] Kericho County Integrated Development Plan 2017-2022

e) **Shortage of radiology experts and delays in getting the results:** Lack of radiologists to interpret the films led to delay in diagnosis and prolonged waiting time, resulting in poor patient outcomes. For instance, expectant high risk mothers who needed the radiology services had to be transferred to other facilities for timely care and this posed another challenge. Therefore, there was need for this problem to be solved and hence the introduction of telemedicine.

Response and Actions

In response to the above challenges, the hospital considered the following proposals:

a) To subsidize the cost of the films for clients. However, it was noted that this was not sustainable in the long term as the County would have to bear the additional costs, while it was itself grappling with financial challenges

b) To sensitize the general population on the need to enroll for NHIF cover, which would lower the cost of medical care. Unfortunately, uptake of this was low and the problem persisted.

c) To introduce a digital platform that would allow easy storage and retrieval of images and one that would also allow the use of telemedicine, while bringing down the cost substantially and making treatment efficient.

Of the three proposals, the digital platform solution was considered the most ideal for the county and it was adopted for implementation.

Implementation: Putting in place a digital storage and retrieval system for radiology images:
- A county taskforce, Managed Equipment Service Implementation Committee (MESIC) was set up to drive this project.
- The County Executive and County Assembly were engaged for support by writing a proposal and having sit-in meetings with them so that they accept the proposal and allocate the needed finances and support implementation of the project.
- Six radiology staff were trained on the use, operation and maintenance of the new technology, while other staff were sensitized on its benefits.
- Renovation was done to the facilities to accommodate the new system. For instance, the dark room was phased out to accommodate the server, and support the installation of a Digital X-ray Unit. Computers were also procured for and linked to all Out Patient clinics, Wards, Specialized Clinics and Casualty department from Radiology department
- Four facilities were identified to support the Kericho laboratory in a telemedicine system. The criteria used included Criteria for selection included: Facilities where telemedicine and digital X-Rays had worked in the past; and which had resources such as staff and the finances required to sustain the service with Kericho Laboratory. Using this criteria, four hospitals were chosen: Moi Teaching and Referral Hospital (MTRH); Kenyatta National Hospital (KHN); Aga Khan Hospital; and Kisumu X-Ray Services (private).

Outcomes and Results

Digitizing records has improved efficiency and effectiveness at the radiology department, and reduced patient complaints. Some of the results achieved include the following:

a) Costs for radiology services to both clients and the hospital have gone down considerably following adoption of compact discs (CDs) instead off traditional film; where the CD costs Ksh 25 per patient, the total costs associated with the films was Ksh 450 per patient.

b) Use of telemedicine platform eliminated the costs of referral and transport to another facility. Patients now do not have to incur these costs as treatment is now available at Kericho County Referral Hospital. The costs associated with consultation also reduced. It also enabled consultations with the remote-based radiologists on diagnosis/clinical decision-making and provided opportunities for second opinions. This led to quicker interventions and thus better patient outcomes.

c) With the shift from image processing in the traditional dark room associated with films, to digital files, the image quality improved, which also shortened the time taken to receive treatment. With the old method, once an image had been taken, it could not be manipulated further, eg image exposure. The new image processing allows exposure adjustment and image manipulation and thus overall quality improvement. It also eliminated incidents of damaged or lost films, with its associated inconveniences and costs. The new technology also removed the inconvenience to patients having carrying around bulky records as the records are now stored in digital form (compact and portable CDs).

d) Increased in In-referrals from various private health facilities for radiology services

Lessons Learned
- Digital systems allow for enhanced patient management, thus enabling counties to reduce mortalities.
- Digital systems also enable counties to benefit from facilities elsewhere through telemedicine, thus enhancing efficiency of referrals and quality of care;
- While the initial cost of implementation is high, the long-term cost is low and sustainable

Recommendations
The following recommendations can be made for other counties considering digitizing medical records:
- Health facilities should have proper systems in place for adoption and implementation of new technology.
- It is important to have trained personnel to handle digital imaging equipment which is sensitive and prone to damage.
- It is essential to have radiologists at the major facilities in the county or available online for consultation, so that the facilities can provide a good range of services on site, and to ensure radiology reports are available promptly.
- There is need for more support from the national and county governments for procurement of the equipment.

Link to video: Interview on Digitizing XRay Records at Kericho Lab