

The utilisation of modern transport and telecommunications platforms to assist in the remote provision of pediatric cancer diagnostics in Tanzania.

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Introduction

The acquisition of a pathologic diagnosis represents a critical point in the management of children with malignant disease, allowing staff to plan a therapeutic pathway. In resource poor settings, diagnoses help to identify children who will benefit from the limited interventions available and those who will not. Access to timely diagnoses can be a challenge in low and middle income countries. While enhanced local laboratory capacity is the ultimate answer, interim solutions are needed to assist programs with existing deficits. Modern transport and telecommunications technology can facilitate this process.



Tanzania superimposed on the USA for size comparison

Methods

Muhimbili University, Dar es Salaam, provides a paediatric cancer program for Tanzania, a large, geographically challenging East/ African country with an estimated population of 54 million. At its inception, laboratory support for the program was sub-optimal, with delayed diagnosis a particular obstacle to optimal care. As part of a formal twinning arrangement, laboratory staff in Dublin have provided interim diagnostic services while helping to develop local paediatric cancer diagnostic capacity in Tanzania. Samples are transported free via DHL® couriers. Preliminary reports are communicated to local clinical staff via WhatsApp with final reports scanned and e-mailed.



Results

Remote support

Since 2008, almost 1000 cancer samples have been transported from Dar to Dublin. Transport time is two working days. In 92% of cases, a preliminary communication regarding specimen adequacy and provisional diagnosis was communicated via WhatsApp the day after receipt. In 90%, final diagnosis was proffered in 48 hours or less with average time to final report just 2.9 days. Marrow samples delivered in cellular antigen stabilising reagent (Transfix ®) showed some loss of cytoplasmic antigens but sufficiently preserved membrane antigens to permit interpretation.



Dublin Medical Laboratory Scientists on site in Muhimbili



Capacity building

Multiple visits by scientific and clinical staff have sought to establish local laboratory diagnostic capacity. Flow cytometric methods for leukaemia diagnosis are now established in Dar with technical and interpretative support continuing via remote access to local analysers from Ireland.

Results from solid tumour tissue samples submitted to date indicate that 95% of cases could be reliably classified using a handful of antibodies (*Tdt, CD20, CD3, CLA, CD30, ALK, CD99, desmin, myogenin, NB84, WT-1*). Immunohistochemistry is being developed in Dar with installation of automated equipment in redeveloped laboratory space imminent. Training for local scientific staff is planned through sponsored placement in Dublin and quality assurance will be supported through slide exchange program.

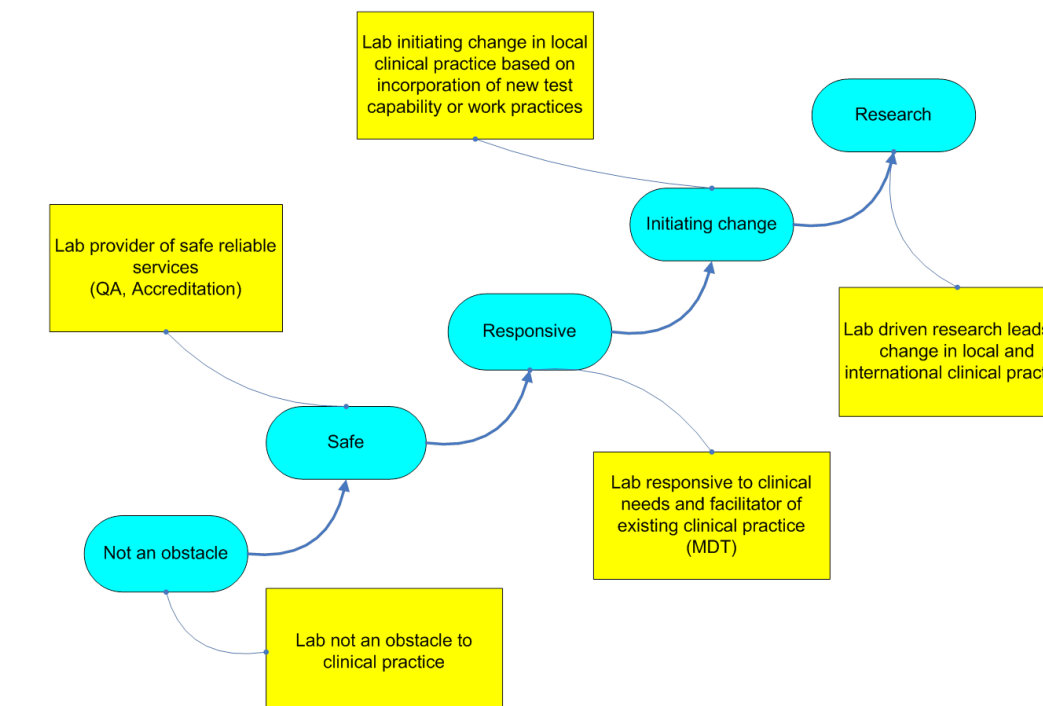
Discussion

The remote provision of diagnostic support has been an important component of the exponential growth and success of to an East African paediatric cancer program based in Dar es Salaam. The program which began in 2008 with fewer than 100 annual attendances, now treats over 500 children annually and has delivered substantial improvements in outcomes for many cancers. Recently, it has established satellite centres in other parts of the country in an effort to export the success to a geographically dispersed population.

An accurate pathologic diagnosis is a key determinant of treatment pathway for any child with cancer. Conversely, an incorrect diagnosis leads to an expensive and ultimately futile journey in the wrong direction. The majority of patients whose samples were transported to Dublin had not received a prior pathologic diagnosis in Tanzania. However, an audit of a single year indicated that, where a diagnosis had been offered, review in Dublin led to a significant change in the interpretation in over 50% of cases. In addition to accuracy, paediatric oncology programs also require diagnoses to be available quickly to facilitate prompt therapeutic intervention. Turn around time is also important to families with a recent Canadian survey placing pathology TAT as one of the top 5 quality indicators for parents (1). It is therefore very reassuring that, despite the long distances involved, TAT for these samples proved satisfactory, greatly improving on those previously available in Dar es Salaam and comparing favourably with published international comparisons (2).

The construction of local laboratory capacity is the long term goal of the collaboration. This process involves the recruitment of a coalition of the willing, to provide infrastructure, equipment, a robust sustainable supply of reagents and training to staff who will undertake and interpret the testing. These are not small tasks but the remote interim solution described here has facilitated the provision of a paediatric cancer service while that process develops. Meanwhile, the laboratory in Crumlin has accrued several unanticipated benefits from its involvement in this remote service. The Tanzanian pathology material results in a doubling of cancer samples available to post graduate pathology trainees. Furthermore, sarcomas that constitute a third of the submitted samples provide additional target material to support a specialised paediatric molecular cancer diagnostic service in Dublin. Finally, the interaction with Dar has provided the impetus needed for a cost saving review of immunohistochemistry ordering practices. Although representing only 4% of cases processed in Crumlin, the material from Dar gave rise to 25% of immunohistochemical slides performed, with 53% of Tanzanian referrals requiring immuno stains for diagnosis. The review identified the diagnostic success that could be achieved through the use of the small panel of immunos that will form the basis of the Tanzanian lab and, with costs to the laboratory a sensitive area, this led to the use of more restrictive but no less effective immuno practices that could also be applied to local Irish samples.

The evolution of an appropriately resourced laboratory over time



Conclusions

Rapid remote access to cancer diagnoses in resource poor settings is feasible using modern transport and communications platforms, providing a viable alternative while local capacity is developed.



References

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