SCREENING FOR CONGENITAL HYPOTHYROIDISM IN THE UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL NIGERIA: THE TIME TO ACT?

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INTRODUCTION

Congenital hypothyroidism (CH) is not uncommon, with an incidence rate varying from 1 in 420 to 1 in 3000 in various regions in the world[1,2,3,4]. When untreated, it adds a huge social and financial burden to the society. It accounts for the majority of mental retardation from preventable causes. Most developed countries have instituted routine screening of all new borns for congenital hypothyroidism and other diseases of risk. (America, United Kingdom and Canada led the way, many other developing countries have followed suit)[1,5,6,7,8]. Despite this as many as seventy per cent of new-borns in the world are born in areas without established screening programs. [9, 10] Sri Lanka, and other parts of Asia quite recently in the 21st century have taken the first steps to institute screening for congenital hypothyroidism. [5, 11] Most of the countries in the Middle East and North Africa (MENA) group are involved in newborn screening. [5] Data on established screening programs in West Africa is sparse or nonexistent.

Different criteria have been established to qualify for neonatal screening and congenital hypothyroidism meets most of the requirement.[12] At birth most babies with congenital hypothyroidism have no clinical features making it difficult to distinguish between affected and non affected babies. Swift intervention changes the outcome and there is an established form of treatment for CH. Other requirements include screening tests that are acceptable to the public, affordable and available as well as the presence of a substantial latent phase.

With congenital hypothyroidism, the only way to change the outcome is early intervention which should be instituted as early as possible after birth usually within the first three weeks of delivery. This prevents the gravest complication which is mental retardation. In some countries like the United Kingdom, occurrences of untreated congenital hypothyroidism have been reduced to almost nil. [2,8]

SCOPE OF THE PROBLEM

The true incidence of congenital hypothyroidism in the nation as an entity is not known, because there has been no nationwide screening. One study in Nigeria found a prevalence of transient CH to be 1.4%. Other studies established a reference range for thyroid hormones. [4, 13, 14] These researches required informed consent of the parents and by virtue of the choice involved did not capture all the children born at that time in that locality.

Children with congenital hypothyroidism are being seen in paediatric clinics [15, 16] but due to the poor health seeking behaviour of low and middle income class people, many would have been lost to follow up.

PROTOCOL

Many countries screen between day 3 to 5 after birth, using dried blood spot obtained from a heel prick, placed on a filter paper and sent to the laboratory for analysis. In our environment, women with spontaneous vaginal delivery are discharged less than 24 hours after delivery. (as in other developing countries). [16] This implies that the practise of screening between day 3-5 would not be realistic. Screening would have to be done at birth or immediately after to prevent losing the population at risk. Most laboratories in Nigeria use enzyme linked immunosorbent assay which requires serum making it more convenient to use cord blood. Cord or heel prick blood can be used for screening but confirming a suspected case requires use of serum from venous blood and should be

done between the first 2 to 4 weeks of life. While the confirmatory test is being carried out however, the child is placed on levo-thyroxin at 15ug/kg per day to prevent any retardation in brain development at this stage.

Different screening methods use either thyroid stimulating hormone (TSH) or thyroxin (T4) to screen.[3, 6, 18] Some use both. Use of TSH is more common. TSH is more sensitive for CH and newer more specific techniques have been developed over the years. It is proposed for adoption in our environment. Most researchers would agree.[1,3,4,6,8,19]

Use of cord blood has certain advantages. First of all, the newborn is untouched and as such there is no adverse effect. Secondly estimating TSH at birth precedes the TSH surge and is comparable to screening a few days after birth.[4, 14] The only obstacle to this would be misinformation as some Nigerians culturally attach some mythical importance to the placenta and may perceive use of cord blood as having some power over the future outcome of their child. Also in rural areas or primary health centers with satellite laboratories, transportation to larger laboratories would add a slight increase to the cost. A study done in a hospital in India which spanned over two and a half years screened all term deliveries using cord blood obtained 5 minutes after birth.[20] The only exclusions were ill babies and preterms. Another program in Malaysia has had a five year success screening story using cord blood.[16] Some hospitals in Saudi Arabia and India have used cord blood to screen for up to 17 years.[21,22,23]

Most developed countries and some areas in developing countries use dried blood spot for screening.[19, 22, 23, 24] This has many advantages, firstly phenylketonuria, sickle cell anaemia, glucose 6-phosphate deficiency and other inborn errors of metabolism can be added to the screening panel at minimal extra cost.[24] Secondly, it would make transportation from rural areas to central laboratories less cumbersome and storage, when necessary easier. At the initial phase however it will increase the cost. Newer and filter paper adaptable equipment would need to be purchased.

The authors have carried out two independent studies in total spanning over two years, in various centers in Nigeria with a sum of 2448 specimen obtained over time. The researchers, volunteer nurses and midwives as well as junior doctors all participated in the specimen collection at various times.[4,13] With more co-operation many more specimen would have been obtained. Many challenges were faced during the specimen collection in the above studies. Several babies were missed, especially from those delivered at night. Some staff work in shifts and therefore required a higher number of personnel for effectiveness. Some babies were delivered through caesarean section and the dedicated staff were unable to cover both the labour ward and its theatre. A similar issue occurred when there were multiple deliveries. The labour ward is a sensitive area and only qualified personnel have access.

FINANCIAL IMPLICATIONS

Adding the cost of screening to the already existing cost of antenatal care on a non-profit level would be minimal when using cord blood. This might mean the charge would be the equivalent of the cost price of the reagents and consumables (specimen bottle) plus a minute percentage for maintenance of equipment. With proper consideration this cost should not exceed #NGN1500 (one thousand five hundred naira) and with a discount from the management or health insurance, can be as low as #NGN500. (five hundred naira). This would be the equivalent of 4.2 and 1.5 USD respectively and is comparable to what obtains in other countries around the world.[22] (this price excludes necessary complimentary equipment that are present in any standard laboratory such as centrifuge, separations pipettes, microplate ELISA readers and more). This cost is applicable only for screening with serum obtained from cord blood. Most screening programs in developed countries use dried blood spot and this is the eventual goal protocol, however it is a long term plan. Use of cord blood for screening can start immediately, once the policy is in place.

The proposed protocol would require pre labelling a specimen bottle when a client is in labour or booked for an elective or emergency CS. After delivery of the placenta, 3-5 milliters of blood would be allowed to flow into the specimen bottle from the placental side of the cord by a medical

personnel. For proper organization a laboratory scientist would have to be assigned specifically to the assaying of all specimens sent in from the labour ward and other delivery suites. Another specific staff would also be dedicated to convey the specimen from the labour ward to the laboratory. Ideally this would be done at three to four specific times within 24 hours. Suggested times are 9am, 2:30pm, 6pm and 10pm. Due to the logistics and costing, these specimens would have to be analysed in batches with results released within three to five days. Mothers of positive babies would be alerted. An airtight recovery system has to be put in place. This means being more deliberate with contact details and records, especially for those in rural areas. Phone numbers have to be confirmed, that of the patient, next of kin and maybe the traditional ruler, so the index patient can be traceable.

OTHER ISSUES

The most important challenges are information and policy settings. Screening for any disease should not be a one off thing. [12] It has to be a continuous process and involve all the newborns, omitting none. This can only be done when a policy is put in place by the federal or state government, the hospital management or the affected departments. Secondly education is vital. Parents have to know that an average of 3mls of cord blood would be obtained for the sole purpose of screening. This would help improve the quality of life of the child found positive. Members of the public would also be advised to enrol in the National health insurance scheme which is in its initial phases in different parts of the nation. Some researchers have written about the pros and cons and the necessity of having an established new born screening program in Nigeria. [3, 4] Most researchers agree that some form of support would be needed from the government, NGO's and more. Screening programs have been known to succeed with full funding from the requesting parents. Long term sustainability is a different ball game entirely. [5] The question now is, has the time to act come? It has been said that those who wait for perfect timing would not get anything done. Can we adapt screening programs to suit our environment? Would it be possible for one state in the nation or one hospital to take the lead and show the way? There are many other health policies that are hospital specific. The initial screening process may not be nationwide. Each hospital or state might have to have its own specific policy. In some countries, private groups and individual hospitals working together have achieved as much as 60% coverage within the country, [23,25] and 90% in specific hospitals. [24]

Feasibility

All these pocket studies carried out in various parts of the nation has shown that it is indeed possible [4,13,14] Sri Lanka has shown the way for other developing countries. In 2010, when the screening started, within 18 weeks, 99% effectiveness was achieved. This is a huge success. In their environment, blood from heel prick was placed on filter paper and assayed.[11]

CONCLUSION

Neonatal screening is possible in Nigeria. Almost five decades after the first screening program was initiated in the world, it is time for Nigeria, any group in Nigeria to start a program. Cord blood can be used in the first instance. It is indeed feasible, possible and cost effective. Eventually we can make use of dried blood spots.

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