

# Hub and Spoke Model : An Integrated sample transport and diagnosis system in Ernakulam District in Kerala

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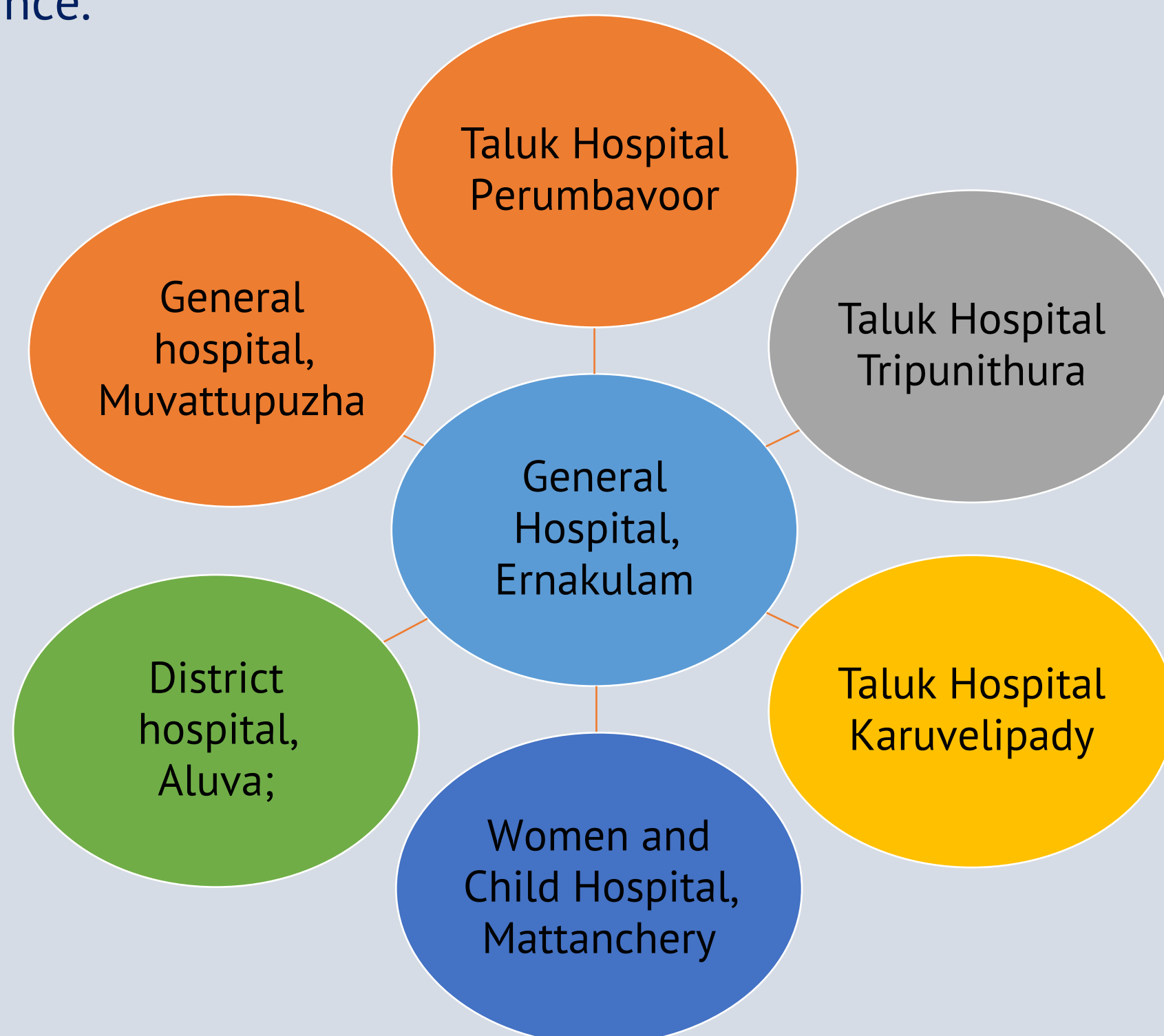
## Introduction

- As part of widening of diagnostic facilities through government and private hospitals, we introduced the Hub and spoke model of diagnostic facility in Ernakulam district.
- Five vehicles are allotted at present for the collection and running of samples from peripheral hospital (spoke) to a central hub every day from 8 am to 8 pm.
- This model was initially piloted for sepsis management project, but now has been extended to Histopathology( Biopsy - under Comprehensive cancer control programme), Metabolic screening , Cartridge Based Nucleic Acid Amplification test (CBNAAT) under RNTCP, COVID- 19 tests samples - and other specimens including Leptospirosis ,Dengue and Hepatitis.
- The collection points of the spokes are the designated laboratories.
- Proper documentation is ensured in all the spokes ,hubs and each vehicle.
- The boxes are color coded for easy identification of samples
- We present the brief outcome of each of the projects.



## Projects under the model and results

**1) Sepsis Management Project: Nov 2019 to April 2020:** This project, which initially started in General Hospital Ernakulam expanded to nearby 6 hospitals in Ernakulam district as Hub & Spoke Model for better result in infection control, rational antibiotic therapy and AMR surveillance.



### 2) Metabolic screening

- Metabolic screening is done for all the new-born babies from the delivery point hospitals .
- Samples are collected from those hospitals as part of this Integrated sample transport system.
- Tests include 17 hydroxyprogesterone, Glucose 6-phosphate dehydrogenase, Thyroid Stimulating Hormone and Galactosemia test.

### 3) COVID-19 tests samples -RTPCR, CBNAAT, Truenat SARS CoV-2 tests

- The samples are collected from all the government hospitals and camp sites through this programme and transported safely to the hubs namely Medical College Kalamassery, Regional Public Health lab, Ernakulam and National Institute of Virology, Alappuzha.

### 4) Histopathology ( District Comprehensive cancer control programme)

- Biopsy ,FNAC and Pap smear samples are collected from the major hospitals including Taluk Hospitals at Kothamangalam, Angamaly, North Paravoor, Tripunithura, Fortkochi, Karivelipady, Piravom and District Hospital Aluva, and GH Muvattupuzha
- The services were set as per the guideline of District Comprehensive cancer control programme .(DCCP)
- Cochin Cancer Research Center and Medical College Ernakulam are the Hub.
- Biopsy turnaround time ranged from **1 to 17 days** with median period of **6 days**.

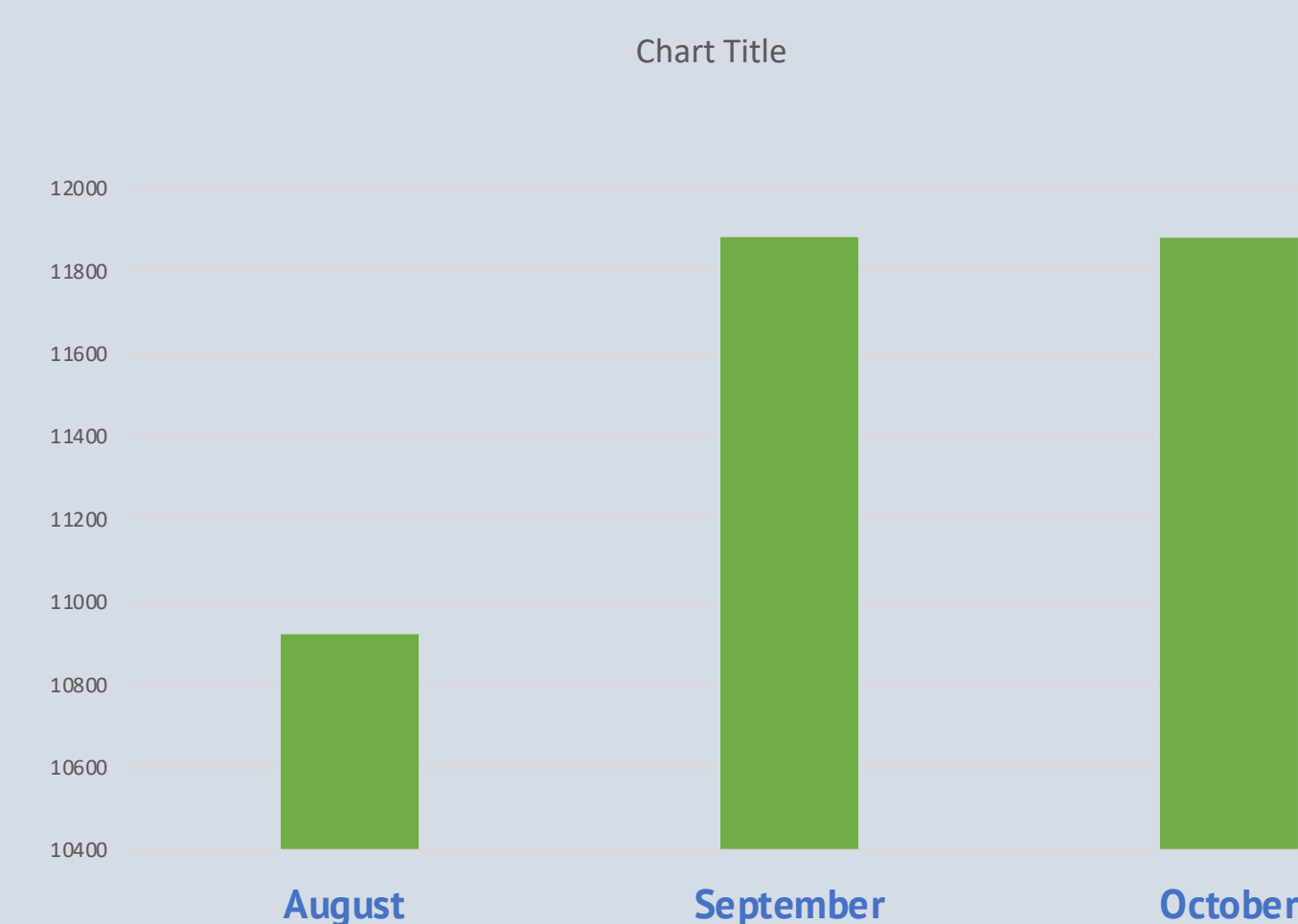
### 5) Cartridge Based Nucleic Acid Amplification test (CBNAAT) under RNTCP

- CB-NAAT testing is useful in making an early and definitive diagnosis of tuberculosis, including MDR-TB.
- Samples are collected from all the major private hospitals and all government hospitals in the district.
- Medical College Ernakulam and GH Ernakulam are functioning as the Hub at present.

### 6) Other Specimens

- Specimens of suspected Leptospirosis ,Dengue ,Hepatitis and all the other Communicable and Non communicable disease tests are also transported through this system.

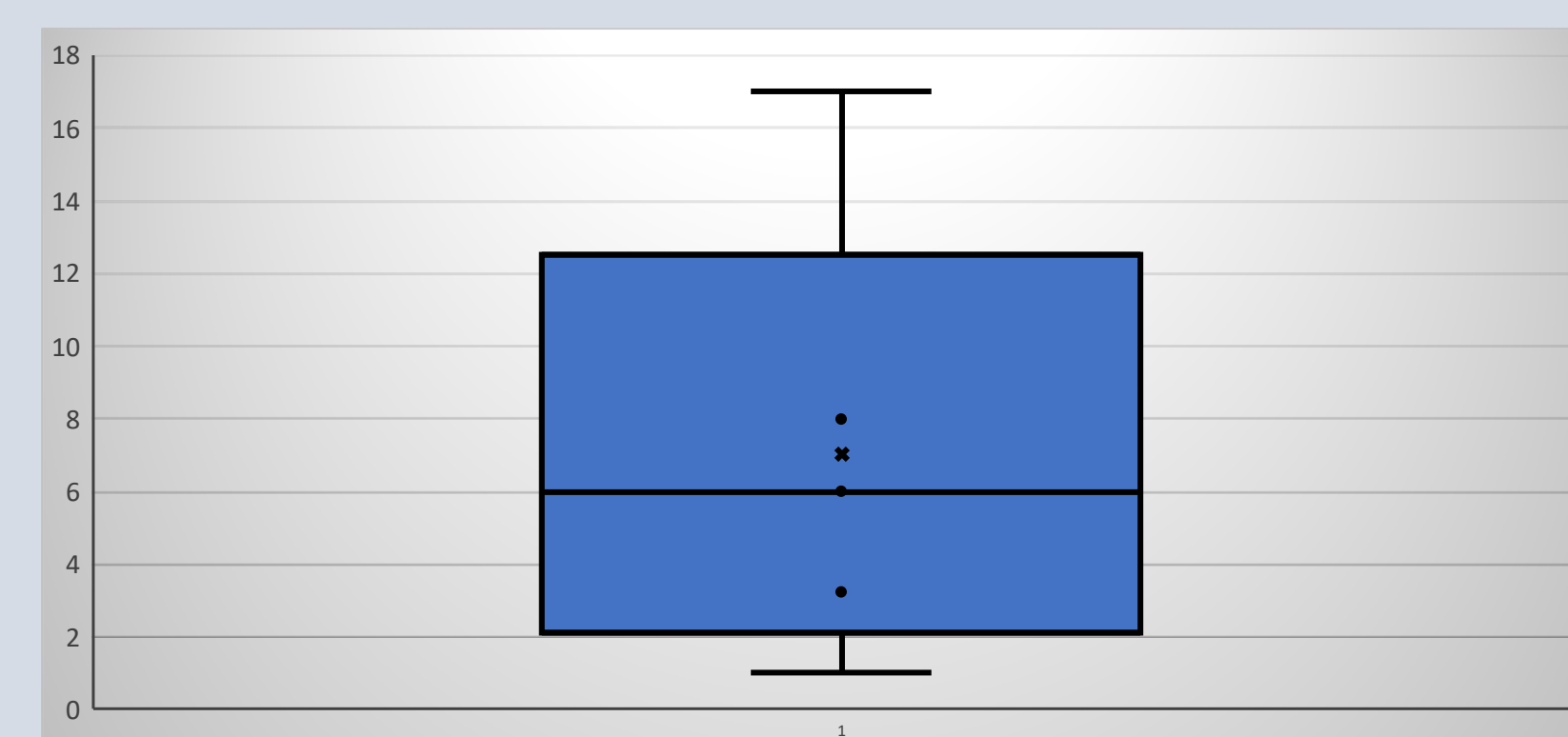
### Total number of samples over a three month period



### Total collection result for the month of September 2020

Specimen	Count
Biopsy	68
CBNAAT	226
Metabolic	778
COVID-19 RTPCR	10364
COVID-19 CBNAAT & Truenat	82
Dengue/Lepto .Hepatitis /HIV	148
AMR	25
Swab	181
To NIV	10
Total	11882

### Biopsy turnaround time of DCCP



### Impact of hub & spoke model

- Increased availability of expensive and latest diagnostic facilities in the peripheral hospitals including primary health centres.
- Optimal utilization of available healthcare resources in the rural and remote areas.
- Maximum utilization of available manpower for logistic management of samples.
- Expansion of diagnostic service using the already available limited resources to serve a larger population.
- Ensuring a better quality of diagnostic services and infection control practices in the laboratories.
- Facilitating the accessibility of specialist services to the peripheral centres.
- Reduction in the total financial burden of the health care system.

## Conclusion

The hub and spoke model has successfully helped in the identification and treatment of sepsis early, implementation of rational treatment ,de-escalation and escalation of antibiotics, a cancer biopsy turn around time of 6 days, better and quicker diagnosis of MDR-TB, COVID-19 and other communicable diseases, help in reduction of neonatal mortality by early identification and management of neonatal sepsis. This is a model which can be successfully implemented in other districts.