



Sustainability and acquired strategies regarding prompt Turnaround Time (TAT) of chemistry profile for accident and emergency department (AED) in a tertiary care hospital

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Abstract

Swift turnaround time (TAT) is now regard as one of the best assessing tool of any clinical lab performance. For most of the patents reports, it should be reported within prescribed time period so that physicians can take medical decision without delay. Present study described the strategies that were acquired and introduced to provide prompt, urgent reports to Accident and Emergency ward (AED) for the years 2020, 2021, 2022 and 2023 (till Oct). Chemistry profile of Urea, Creatinine, Electrolytes (Cl, Na, K, HCO₃) and liver function (Bilirubin, Alkaline Phosphatase, Aspartate aminotransferase, Alanine aminotransferase, and gamma-glutamyl transpeptidase) tests were taken as reports that needed to be provided as within 30 minutes (TAT) to AED. In all four years, 2020 till 2023 (October), TAT for AED, chemistry profile were finalized and reported under the time limit of 30 minutes. Average parametric data of tests finalized and reported to AED is around 21,600 per month, as of 2023, sum upto around 260,000 per year. Strategies of installing of new instruments, dedicated for AED only and trained staff bench stations solely for the purpose of AED chemistry profile analysis and reporting became the rationale for such swift delivery and sustainability of less than 30 minutes TAT for four years.

Keywords: Turnaround time TAT, Laboratories, accuracy, ISO, JCIA

1. Introduction

Multi-disciplinary, tertiary care hospitals, and its associated clinical laboratories with independent departments such as Clinical Biochemistry, Microbiology, Hematology, Blood banking, Histopathology and cytology tends to provide sustainable, efficient, swift turnaround time (TAT) for most of the patents reports, which provides one of the best assessing tool of any clinical lab performance. Although all external and internal quality control measures (CAP, ISO, JCIA, and CLSI) are implemented and followed by large scale laboratories, it's the TAT that measures their ability to cope with swift analysis, overcoming all inherent errors of pre-intra and post analytical phases and filling all patient related pledges. Nonetheless, sometimes, laboratory professionals superintend the analytical accuracy of test(s) that needed to be reported ASAP, for example, repetition of high potassium, hemolysis samples for bilirubin, Calcium, Enzymes etc. However, physicians and clinicians required urgent time bound reports for prompt medical



decisions, mainly in ICUs and ER set-up, therefore aforementioned aberrations were forgiven, provided that in 95% routine cases, tests were accurate, precise and standardized.

Present article describes the efforts, steps that were introduced to provide prompt, urgent reports to Emergency ward (years 2020, 2021, 2022 and 2023 till Oct), TAT (or STAT) taken into consideration chemistry profile of Urea, Creatinine, Electrolytes (Cl, Na, K, HCO₃) and liver function (Bilirubin, Alkaline Phosphatase, Aspartate aminotransferase, Alanine aminotransferase, gamma-glutamyl transpeptidase) tests. TAT is as a tool of clinical laboratory competence defined as submitting a test request or submitted a sample to the lab to reporting of final results [1-5].

2. Materials and Methods

Our Accident and Emergency department (AED) generally caters 250 patients per 24 hours for which they requires urea, creatinine, electrolytes, and Liver function tests, on urgent basis. For this current study we profiled and studied Turnaround Time (TAT) for generally made requested for above mentioned parameters. A study published earlier [5] was taken as reference article and utilized its methodology for standardization purpose. As we stated earlier, starting from 2014 Dec, we decided to accelerate our analytical efficiency to facilitate AED, by providing urea, creatinine, electrolytes, Troponin I, Liver function tests, calcium, magnesium and phosphorous results within 1 hour (60 minutes) and then gradually go down to within half hour (25 minutes) over a period of 5 years 2015-2019. To sustain our target of within 30 minutes reporting, dedicated staff analysis and reporting of AED requests as per designated TAT continue to be the policy. Moreover additional analyzers, routine chemistry, electrolytes were made available and installed such as pre-analytical units such as p471 and p512, in addition to bar code readers were integrated to carry out urgent analyses. Number (quantity) of analyzers such as Cobas c501 (Roche, Basil) for routine chemistries, Nova 8 CRT (Nova biomedical, USA) for electrolytes and Cobas e411 (Roche, Basil) were doubled to provide AED dedicated analyzers to work on. We has been receiving around 100 to 150 patients' samples 24/7 from AED which sometimes goes upto 200 depending upon season and/or any emergency situation in the city. Our TAT is defined as per international standard version whatever samples received within our lab till results availability either hardcopy or online as per designated TAT. Data was retrieved from integrated Lab reporting system (LRS) analyzed as mean of sample per day, per month and presented as line chart monthly and yearly with TAT minutes of reporting of AED chemistry profile.

3. Results

Results are summarized in Figures 1 to 4. In all four years, 2020 till 2023 (October), TAT for AED, chemistry profile, of Urea, Creatinine, Electrolytes (Cl, Na, K, HCO₃) and liver function (Bilirubin, Alkaline Phosphatase, Aspartate aminotransferase, Alanine aminotransferase, gamma-glutamyl transpeptidase) tests were finalized and reported under the time limit of 30 minutes. Average parametric data of tests finalized and reported to AED is around 21,600 per month, as of 2023, sum upto around 260,000 per year. Installation of new instruments, dedicated for AED only and trained staff bench stations solely for the purpose of AED chemistry profile analysis and reporting became the rationale for such swift delivery and sustainability of TAT for four years. Hiccups, hindrances, staff reluctances, administrative and technical issues, we came across all and rectified it as per policies and procedures prescribed and available. Since we are ISO 9001:2015 certified, working on Joint Commission International Accreditation (JCIA) standards and ISO 15189 extensively with documentations, policies, procedures and trainings, have the competencies, awareness and knowledge about components that needed to be followed, implemented and executed for better patients services and satisfaction.



Fig 1: TAT for Accident and Emergency chemistry Profile (Jan 2020 to Dec 2020)

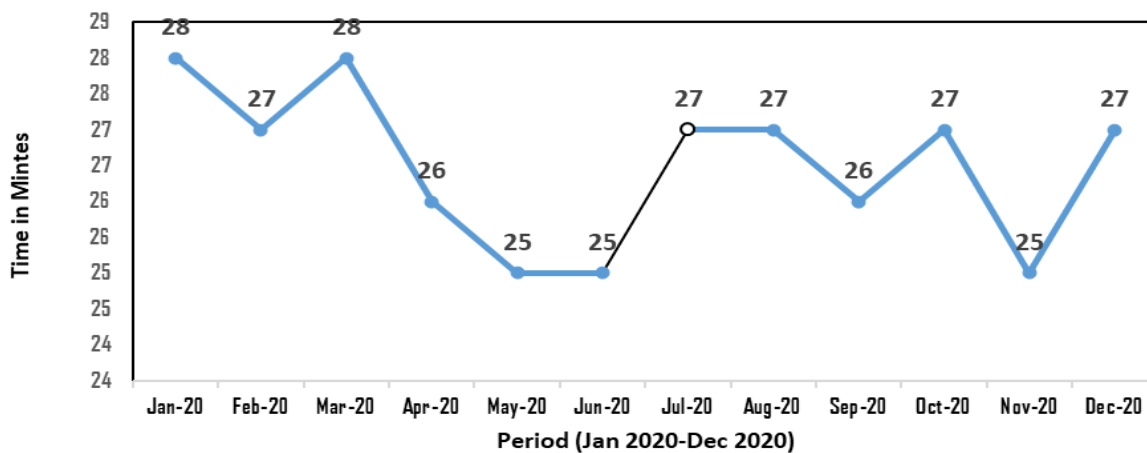


Fig 2: TAT for Accident and Emergency Chemistry Profile (Jan 2021 to Dec 2021)

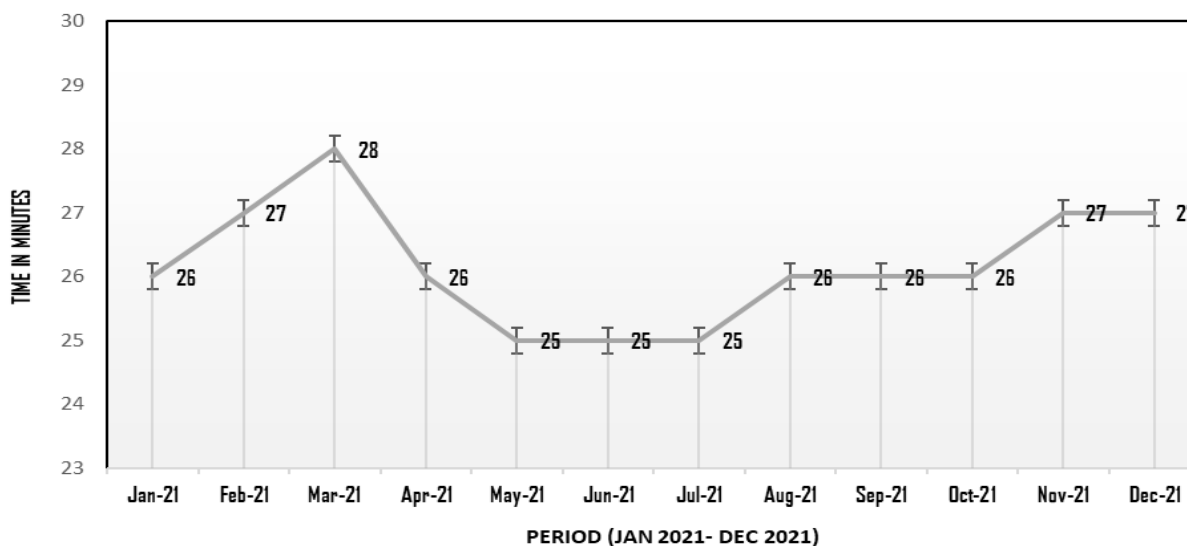
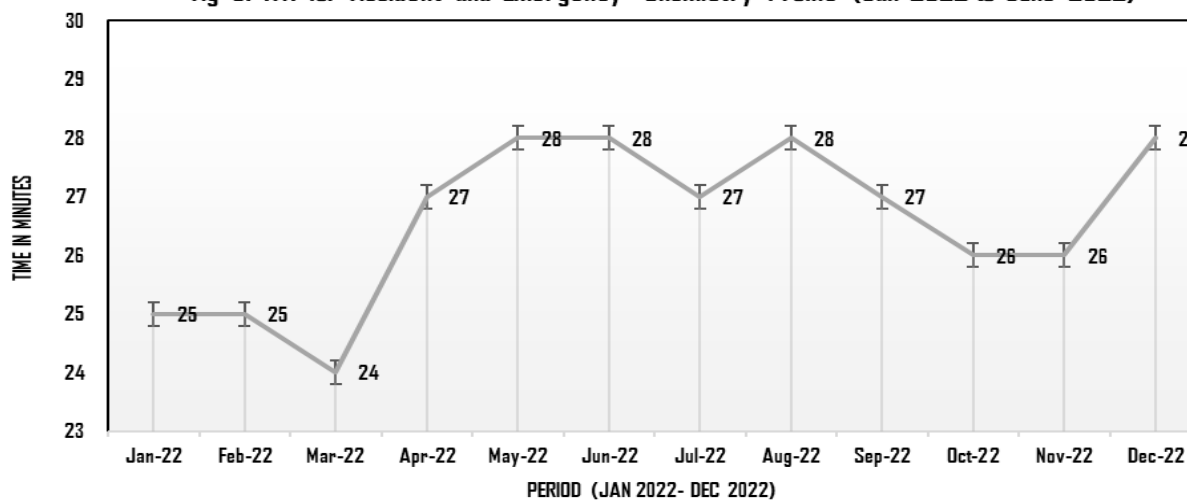
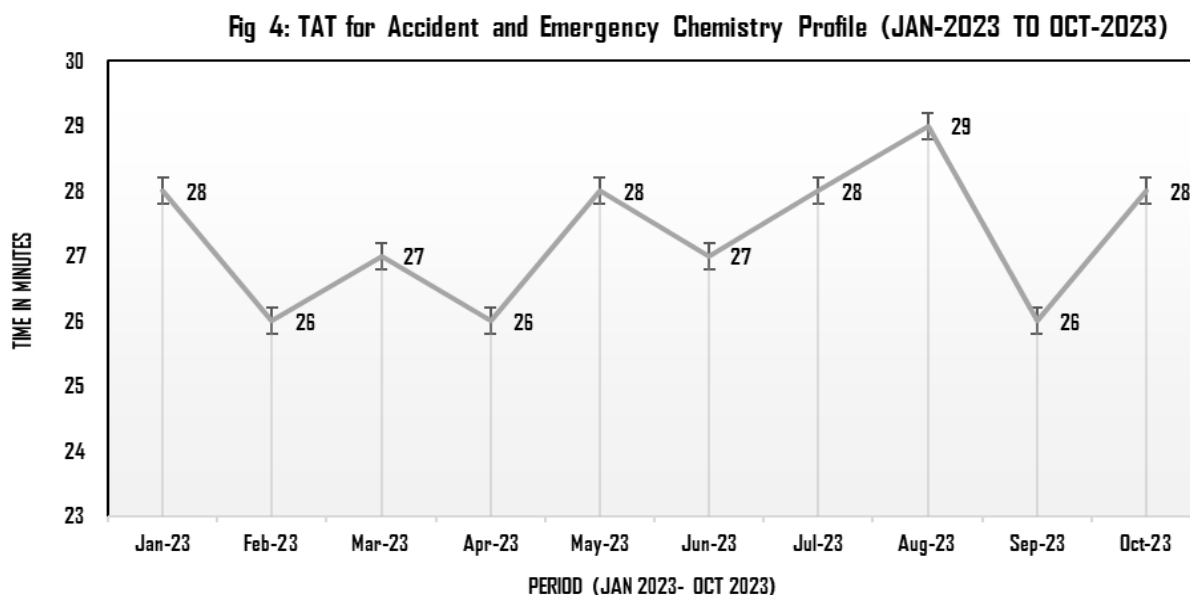


Fig 3: TAT for Accident and Emergency Chemistry Profile (Jan 2022 to June 2022)





4. Discussion

It is well known fact that TAT is directly correlated with patient wellbeing, on time, swift and prompt especially in case of patients in AED. They required their lab profile tests within shortest period of time, mostly within 30 minutes or 60 minutes: the tests which are related to organ functions, metabolic components and/or pathophysiology as indicated in our current study, as Urea Creatinine, electrolytes and LFTs. We were and still, providing AED chemistry profile within 30 minutes time, facilitating AED physicians to take medical decisions swiftly, promptly and without any delays, either admissions, some procedures or discharge. To do the needful such as presented in current study, a lab has to set goals to achieve its target of TAT for all or atleast some of the significant tests of urgent nature. An earlier study focused on same goals and achieved their targets of prompt reporting by following those goals known as "one-stop service (OSS)" for routine chemistry tests [6,7]. They set the goal of providing 90% of the tests reports within 60 minutes from sampling to reporting, which was a major achievement. However as the study group stated, as time passes, more and more tests has been added to that particular profile which sometimes caused prolongation, mostly in pre-analytical phase [7]. Interestingly, the group made some more changes to make that OSS more realistic and achievable by given preferences to OSS samples. As a good outcome, they achieved a target of 91.9% OSS samples reported within 60 minutes. Same was done by our team as well, whenever we observed a deviation or delay, we started preferences sampling, testing and reporting, thus achieving our target of within 30 minutes for AED profile. Although this practice should be followed by all tartaric care hospitals and its associated labs, this not seems to be the routine in many hospitals and reluctance observed either due to lack of awareness, policy, instruments, trained staff etc.

TAT for AED or any other specialty of hospital benefits the patients and facilitates physician in prompt and evidence based data. Any delays in reporting either routine labs or STAT, will cause deleterious effects on medical condition of patients. Therefore, clinical laboratories must provide reports within stipulated time period with accuracy, reliability and quality assurance to guarantee high quality and trustworthy diagnostic services. By doing so, physicians develops a sense of partnership, synergy and in return uses this prompt TAT services as referral and benchmark [6-9]. Prompt TAT for any services are nowadays evaluated as quality indicator of any clinical laboratory whether associated with a hospital or independent lab. Effectiveness and efficiency of a lab is also been evaluated by its testing profile and TAT as better timely reporting is now becoming a need, rather than choice of both patients and physician. As we also faced some hindrances, mostly in pre-analytical phase regarding sustainability of TAT, if happens must be dealt with evidence-based methods and protocols. Due to delays in



reporting on time, it was estimated that around 61% longer stay in AED and 43% delay in treatments of patients happens generally in hospitals [6-9]

5. Conclusion

Present study described the sustainability and methods that were utilized to achieve TAT of less than 30 minutes for chemistry profile of Urea Creatinine, electrolytes and LFTs for AED. Several strategies such as dedicated trained staff, dedicated instruments, and better standardized methods and policies were employed to have a sustainable turnaround time for timely medical decisions and treatments.

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