

IMPLICATIONS OF FORENSIC INVESTIGATIONS TO PREVENT WATER SYSTEM FAILURES IN HEALTH CARE CENTERS

ಆರೋಗ್ಯ ಕೇಂದ್ರಗಳಲ್ಲಿ ನೀರಿನ ವ್ಯವಸ್ಥೆ ವಿಫಲತೆಗಳನ್ನು ತಡೆಗಟ್ಟುವ ಸಲುವಾಗಿ ನ್ಯಾಯ ವಿಜ್ಞಾನ ತನಿಖೆಗಳ ಅಳವಡಿಕೆ
صحت کی دیکھ بھال سینٹروں میں پانی کے نظام کی فلاح و بہبودوں کو فروغ دینے کے لئے جینیٹک انوسٹمنٹ کی منظوری

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Introduction

Water supply infrastructure and the network designed for the water supply holds a key importance for its users. From the past, a number of methodologies are in practice to evaluate the performance of water networks. These methodologies are more inclined towards the prevention of harmful error prone processes, rather than focusing on the corrective actions against the causes of system failures. Block (2017) explained forensic based investigation as a tool which determines the root causes of the system failure which can't be observed with the thorough analysis. The forensic methods are being used to evaluate the failures after the mishap has occurred, rather than earlier, thereby helping the health care centers in fabricating corrective measures more than preventive ones. Therefore, it is of utmost importance especially for health care centers where water quality holds a significant value to implement quantitative forensic tools to counter the situations like growth of pathogens and other factors which affect the quality and water supply system performance in the health care centers. Therefore, we are studying the implementation of forensic investigation based methods for the assessment of water supply failures in health care centers.



Visual showing exigence

Failures of Water Supply Systems in Health Care Centers

The water system failures affect the hospitals both in their daily processes as well as in the equipments which require water to function normally. Bigoni et al(2014) mentions about its need for water at the hospitals and the processes dependent upon it namely, drinking and food preparation, patients' bathing and personal hygiene, laundry services, flushing of toilets, fire prevention system, laboratory services, and cleaning, whereas, Rak and Cieslak(2010) talk about the failures from a general perspective by studying the process of how the consumer is at a loss due to a failure at the catchment area. Ashbolt. J et al (2014) illustrated the effect of generation of biofilms with in the pipe system and possible hazardous effects related to it, among which, top of the list is the production of E coli K12 bacteria which can cause several water borne diseases through water supply systems. These biofilms layer not only controls the water supply discharge but also can lead to severe biological changes in the human body, which in turn can result in to DNA isolation problems. Ashbolt. J et al (2014) mentioned the sources for the E coli K12 which are potentially different sources in their kinds and should be considered to not to end up having in any water supply system to the community.

Concept of Forensic Analysis

Forensic based investigation is a technique to observe the failure causes of objects under study. In general spectrum forensic analysis is usually explained in terms of forensic based investigations. Methods and results accuracies depends upon the problem under considerations and the types of solution demands. Forensic analysis works with the system in usually a passive way but nowadays modern development and advanced tools has emerged this field as a strong platform for providing framework for the future failures. It also provides the framework for taking corrective actions for the future.



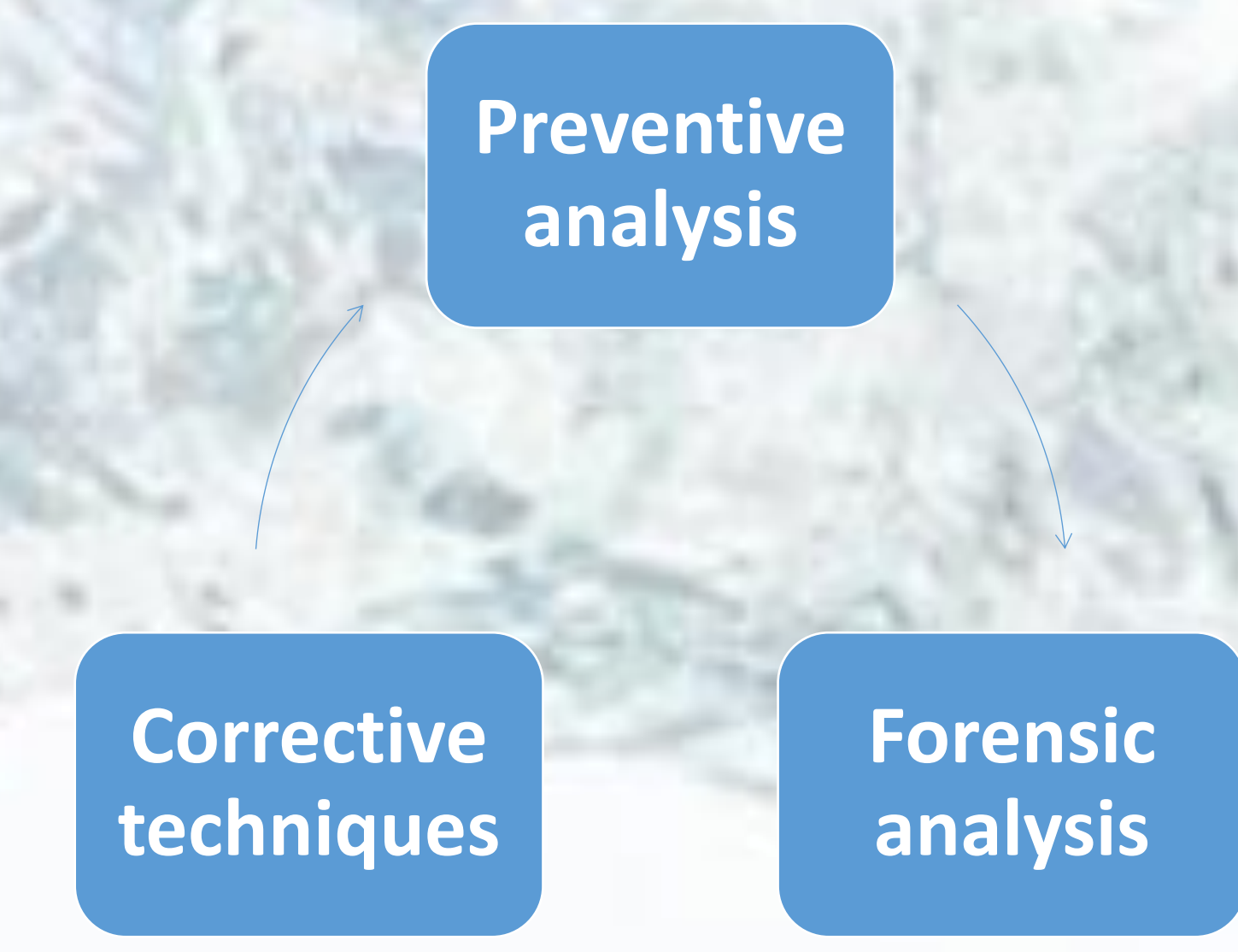
Types of Water System Failures in Healthcare Centers

Limitations of Failure Evaluation Techniques

Methodologies in practice against countering the causes of water supply failures are insufficient to maintain the performance of whole water supply network in health care centers. Hence, techniques based up on qualitative and corrective actions should be implemented to ensure the performance of the water supply systems. Faiella et al (2018) describes the limitation of available methodologies for evaluating the water supply networks by mentioning that current techniques lack the approach of responsive behavior against failures and more focused on the prevention of systems. Moreover, Nemes & Bozikova (2013) in particular focused the implementation of evaluating tools, on the problems like growth of pathogens and diseases caused by it in health care centers. These two resources support the dire need of new forensic tools to assess the performance of water systems in the health care centers. In addition to this Block (2017) illustrated the importance of forensic based investigations towards the assessment of actual causes of failures. These sources highlight the causes of failure of water systems and then identifies the type of techniques to overcome the causes of failure to ensure the efficient water supply system.

Different Failure Evaluation Methods

Currently, the method used to evaluate the failures is the conventional FMEA but there are a few investigation techniques which are specific for the health fraternity. The specific techniques are the healthcare focused approach of FMEA (HFMEA – Healthcare Failure Mode Effects Analysis) with human factor- focused (SHERPA - Systematic Human Error Reduction and Prediction Analysis) and system-focused (STAMP - Systems-Theoretic Accident Model and Processes) approaches. The above mentioned are the ones to be used in the future for better evaluation results. Unlike conventional FMEA, these techniques are conditional which in fact strengthens the domain of these techniques applications.



The continuing cycle of correction and prevention

Viability of Forensic Analysis in the Future

- Forensic Investigations such as STAMP are generally based up on the advanced set up to outline the causes of failure on the basis of which a network can be designed afterwards.
- Factor of safety thus calculated is too reasonable to not to support higher value of design cost of the system.
- Debon (2008) explained that forensic proactive techniques predict the best measures to take for the reason these predictions are based upon actual risk models while, Danon (2001) moved one step forward and explained that the forensic investigations are not only feasible for determining the types of damages that can occur but also the extent of damages under different condition.
- With this project, we mean to create newer corrective options which will in turn create opportunities for prevention.

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