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Development of an Improved Model for Out-Patient Flow Processes using Hierarchical Timed Coloured Petrinets

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Patient healthcare service delivery system is pivotal to sustenance of lives of human being. Existing works modelled patient flow processes with emphasis on medical record sections and consultation rooms of hospital, thereby limiting the capability of the existing models in studying and improving the issues of outpatients' long waiting time and queue emanating from medical record section through pharmacy section. This research developed an improved model for outpatient flow processes using Hierarchical Timed Coloured Petri Nets (HTCPN) formalism. The developed HTCPN model was simulated using Coloured Petri Nets (CPN) tools to determine the average patient waiting time, operation time and resources utilization rate subject to available medical resources to experiment scenarios. The model was validated by carrying out a statistical analysis t-Test between the simulated and the measured Time of Stay (TOS) of outpatients at 5% significance level. An improved HTCPN model was developed for outpatient flow processes. This model can be adopted in hospital environment to study and improve excessive queues and delays associated with the considered hospital or other related ones.

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