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This paper presents a methodology to estimate the intraday liquidity that systemically important entities (SIE) need to fulfill all its obligations in a timely fashion, when a simulated failure-to-pay from its main liquidity supplier by discretionary concepts of payment occurs. Using the Bank of Finland's simulator and the fund transfer data from Colombian large value payment system, we achieve a dynamic estimation measuring three types of effects (direct, second round and feedback). The results validate the existence of a non-linear relationship between the initial failure-to-pay of a specific institution and extended failures-to-pay to the rest of system. An Intraday Liquidity Sufficiency Index is proposed to quantify the average amount of additional liquidity needed to fulfill timely all SIE's obligations without generating second-round effects. Our methodology and recommendations contribute to the international discussion on management intraday liquidity risk, to efficiency and security of the payment system, and ultimately to financial stability.