Visit complexity reflects billed level of service and documentation burden

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The electronic medical record (EMR) promised healthcare efficiency, but has increased documentation burden for providers without yielding insight into patient outcomes. It is unclear how the EMR documentation workflow relates to the billed level of service (LOS) for clinic visits. We asked if the complexity of EMR documentation during a clinic visit correlates with the visit LOS. ThreadNet is a novel, R coded, graph-theoretic methodology that converts threads of sequence data into event networks to calculate visit complexity based on actions, roles, and workstations. It does not measure note length or content. We applied ThreadNet to time-stamped EPIC EMR audit data for 55,059 visits from dermatology clinics at University of Rochester. Each clinic visit had a billed LOS as a new patient (NPV) or follow-up patient (FUV) visit. Visit complexity was calculated for in-clinic documentation (i.e., check-in to checkout). Overall, mean visit complexities significantly differed between clinic visit LOS (mean±SD: LOS 1: 3.53±1.87; LOS 2: 3.92±1.59; LOS 3: 4.41±1.88; LOS 4: 5.34±2.28; LOS 5: 6.75±3.40, p<0.0001). FUV had lower overall visit complexity compared to NPV (mean±SD: 4.40±1.96 vs. 4.60±1.87, p<0.0001). The variation patterns of visit complexity may be a useful proxy for LOS, which could permit clinicians to focus on important content and simplify visit documentation. Thorough evaluation of visit audit trails will identify key components that influence complexity and differ between LOS. Further analyses will determine if after clinic documentation influences visit complexity. Overall, visit complexity can be used to indicate visit LOS, simplify visit documentation, and reduce EMR burden. This work is supported by the National Science Foundation (SES-1734237).