login date & time	logout date & time	device	location	userID	position & dept.
2006-09-01, 0:00:00.40	2006-09-01, 0:24:17.29			SKR925	STAFF NURSE I, NURSING
2006-09-01, 0:00:00.43	2006-09-01, 0:00:21.76	M95089	JPP 6750	SLB565	STAFF NURSE II, NURSING
2006-09-01, 0:00:01.23	2006-09-01, 0:03:55.21			HNH286	STAFF NURSE II, NURSING
2006-09-01, 0:00:02.29	2006-09-01, 0:00:14.81	MA1458	RCP 1100	K920	HOUSE STAFF III, NEUROLOGY
2006-09-01, 0:00:02.54	9-1-06, 0:46:37.82	B71118	RCP 1047	M811	HOUSE STAFF I, ETC

Figure 2.1: The first five of approximately 19.8 million EMR login records. The `UserID`s are all de-identified, although each de-identified user has an associated `position & dept` field. The `Device` field provides computer IDs with associated `Location` information. The `Location` field specifies rooms in the UIHC (e.g., `RCP 1100` is room number 1100 in the Roy Carver Pavilion of the hospital). Note that some of the records are missing the `Device` field, rendering them unusable for contact graph construction. needed for contact network construction, still leaving about 11.7 million usable records.

In general, close physical proximity or contact with a common physical surface (e.g., door knob or keyboard) is necessary for the spread of an infection. However, data representing spatial proximity among members of a sizable population are hard to come by. We deal with this problem by using EMR login data. Employees of the UIHC use the EMR system multiple times over the course of a day and each "login event" is recorded (see Figure 2.1). The EMR system uses an automatic logout system, due to HIPPA rules, so login times correspond very closely to the times when a HCW is physically at the login terminal.

Each event is logged by date, time, anonymized user ID, and location, providing a rich context from which to infer contact and movement. The aggregate characteristics of these data given in Figure 2.2 show not only the large number of healthcare workers (15,595) represented in this data, but also their diversity (80 departments, 404 job titles). The 4,379 locations of the computers are well spread out around the hospital. Most computers are located inside out-patient rooms, in clusters just outside groups of in-patient rooms, at nurses' stations, at the desks of unit