Supplemental Material: Data dictionary

Variable / Field Name	Field Label *Field Note*	Field Attributes (Field Type, Validation, Choices, Calculations, etc.)
ed_volume	Annual ED patient volume	text (integer, Min: 0)
number_adult_patients	Annual number of adult patients (18 or older)	text (integer, Min: 0)
number_female_patients	Annual number of women patients	text (integer, Min: 0)
median_patient_age	Median patient age	text (number, Min: 0)
hospital_admission_rate	Annual hospital admission rate (%) *Number of ED patients admitted to hospital including observation status and ICU (but excluding ED observation care), divided by total annual ED volume*	text (number, Min: 0, Max: 100.0)
transfer_rate	Annual transfer rate (%) *Number of patients transferred out of ED to other facilities, divided by total annual ED volume*	text (number, Min: 0, Max: 100)
separate_peds_workflow	Does a separate workflow exist for pediatric patients?	yesno 1 Yes 0 No
peds_workflow_description Show the field ONLY if: [separate_peds_workflow] = '1'	Please briefly describe the pediatric patient workflow	notes
ed_setting	ED Setting	radio 1 Urban 2 Suburban 3 Rural
ed_educational_affiliation	ED Educational Affiliation	radio 1 Academic 2 Community 3 Hybrid
trauma_center_designation	Hospital trauma center designation	radio 1 Level 1 2 Level 2 3 Level 3

		4	Other	
		5	No trauma designation	

observation_unit	Does this ED have an observation unit?	yesno 1 Yes 0 No
obs_unit_location Show the field ONLY if: [observation_unit] = '1'	Is the observation unit physically located in the ED?	yesno 1 Yes 0 No
number_observation_beds Show the field ONLY if: [observation_unit] = '1'	How many beds does the observation unit have?	text (integer, Min: 0)
intake_process_exists	Section Header: *Description of Front End Process* Has this ED implemented a new front end process to replace traditional nurse-based triage?	yesno 1 Yes 0 No
prior_process_description	Was your old front end process anything other than nurse-based triage? If yes, please describe.	notes
intake_start_date	On what date was a new front end process implemented in this ED?	text (date_mdy)
intake_hours	Please describe which hours and days of the week that the new front end process is in operation.	notes
front_end_activities	What activities are performed in your new front end process?	checkbox
other_front_end_activity Show the field ONLY if: [front_end_activities(7)] = '1'	Please describe which other activity is performed in your front end process	notes
front_end_exclusions	Which types of patients are EXCLUDED from	checkbox

For the front_end_activities checkbox:

1	front_end_activities___1	Labs
2	front_end_activities___2	Medications
3	front_end_activities___3	Imaging
4	front_end_activities___4	Consults
5	front_end_activities___5	ESI Level Assignment
6	front_end_activities___6	Discharge Disposition
7	front_end_activities___7	Other (Please describe in answer below)

	your front end process, if any?	1	front_end_exclusions___1	EMS arrivals
		2	front_end_exclusions___2	Vital sign instability
		3	front_end_exclusions___3	Non-English speakers
		4	front_end_exclusions___4	Other (please describe in answer below)
		5	front_end_exclusions___5	None of the above

front_end_exclusion_other Show the field ONLY if: [front_end_exclusions(4)] = '1'	Please describe which other criteria are EXCLUDED from the front end process	notes		

front_end_staff	Who staffs your front end process?	checkbox		
		1	front_end_staff___1	Attending
		2	front_end_staff___2	APP
		3	front_end_staff___3	Resident
		4	front_end_staff___4	Scribe
		5	front_end_staff___5	RN
		6	front_end_staff___6	Tech
		7	front_end_staff___7	EKG Tech
		8	front_end_staff___8	Registrar
		9	front_end_staff___9	Security
		10	front_end_staff___10	Other (please describe in answer below)

front_end_staff_other Show the field ONLY if: [front_end_staff(10)] = '1'	Please describe which other staff are involved in the front end process	notes
front_end_treatment_spaces	How many treatment spaces are available in your front end process?	text (integer, Min: 0)
front_end_spaces_description	Please describe the treatment spaces in your front end process.	notes
surge_plan	Do you have a surge plan for the front end process? If so, please describe.	notes
impact_of_intake	Did your visit to the University of Colorado/UCHealth impact your ED's front-end operations? If so, how?	notes
quality_monitoring_process	Do you have a structured quality monitoring program for your front end process? If yes, please describe.	notes

arrival_to_provider_pre	Section Header: *Pre- and Post-Implementation ED Metrics In this section, we seek to understand changes in metrics before and after new front end processes. Please use standardized metrics as defined here by the ED Benchmarking Alliance.* Median arrival-to-provider time (in minutes) PRIOR to new front end process (i.e. "Door to Doc" time) *First documented date and time the patient arrived in the ED until documented date and time of first contact with a physician/APRN/PA in the ED*	text (number, Min: 0) Field Annotation: First documented date and time the patient arrived in the ED until documented date and time of first contact with a physician/APRN/PA in the ED
arrival_to_provider_post	Median arrival-to-provider time (in minutes) AFTER new front end process (i.e. "Door to Doc" time) *First documented date and time the patient arrived in the ED until documented date and time of first contact with a physician/APRN/PA in the ED*	text (number, Min: 0) Field Annotation: First documented date and time the patient arrived in the ED until documented date and time of first contact with a physician/APRN/PA in the ED
median_los_all_pre	Median ED length of stay (in minutes) for all patients PRIOR to new front end process *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED*	text (number, Min: 0) Field Annotation: First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED
median_los_all_post	Median ED length of stay (in minutes) for all patients AFTER new front end process *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED*	text (number, Min: 0) Field Annotation: First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED

median_los_walkin_pre	Median ED length of stay (in minutes) for ONLY front end patients PRIOR to new front end process *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED*	text (number, Min: 0) Field Annotation: First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED
median_los_walkin_post	Median length of stay (in minutes) for ONLY front end patients AFTER new front end process *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED*	text (number, Min: 0) Field Annotation: First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED
median_dc_los_pre	Median length of stay (LOS) for patients discharged from ED PRIOR to new front end process (EXCLUDING patients in observation status) *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED.*	text (number, Min: 0)
median_dc_los_post	Median length of stay (LOS) for patients discharged from ED AFTER new front end process (EXCLUDING patients in observation status) *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED.*	text (number, Min: 0)
median_admit_los_pre	Median length of stay (LOS) for admitted patients PRIOR to new front end process	text (number, Min: 0)

	(EXCLUDING patients in observation status) *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED.*	
median_admit_los_post	Median length of stay (LOS) for admitted patients AFTER new front end process (EXCLUDING patients in observation status) *First documented date and time the patient arrived in the ED until documented date and time of the patient's physical departure from the ED.*	text (number, Min: 0)
lbbs_pre	Overall left before being seen (LBBS) rates (in %) PRIOR to new front end process *Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.*	text (number, Min: 0, Max: 100) Field Annotation: Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.
lbbs_post	Overall left before being seen (LBBS) rates (in %) AFTER new front end process *Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who*	text (number, Min: 0, Max: 100) Field Annotation: Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.

	presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.	
lbbs_during_intake_hours	Overall left before being seen (LBBS) rates (in %) during hours of new front end process operation *Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.*	text (number, Min: 0, Max: 100) Field Annotation: Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.
lbbs_non_intake_hours	Overall left before being seen (LBBS) rates (in %) outside of new front end process hours *Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who*	text (number, Min: 0, Max: 100) Field Annotation: Total number of patients who leave the ED before examination by a physician/APRN/PA, divided by the total number of patients who presented to the same ED during a defined time period. Which provider completes the patient's initial assessment is governed by law and hospital bylaws. It will vary by site. LBBS includes patients who complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.

	complete the triage process. LBBS patients may or may not have received initial treatment and/or diagnostics.	
daily_census_pre	Median ED daily census prior to new front end process *Median number of patients arriving to the ED in a 24-hour period*	text (number, Min: 0)
daily_census_post	Median ED daily census after new front end process *Median number of patients arriving to the ED in a 24-hour period*	text (number, Min: 0)
daily_boarding_pre	Median number of daily boarding hours PRIOR to new front end process *First documented date and time of the disposition to admit the patient from the ED to documented date and time of the patient's physical departure from the ED.*	text (number, Min: 0)
daily_boarding_post	Median number of daily boarding hours AFTER new front end process *First documented date and time of the disposition to admit the patient from the ED to documented date and time of the patient's physical departure from the ED.*	text (number, Min: 0)
diversion_hours_pre	Median number of monthly ED EMS diversion hours prior to new front end process	text (number, Min: 0)
diversion_hours_post	Median number of monthly ED EMS diversion hours after new front end process	text (number, Min: 0)
barriers_to_implementation	What were the biggest barriers or change management struggles in implementing the new front end process?	notes

successful_changes	What were your biggest successes in implementing the new front end process?	notes
comments	Section Header: *Comments and Survey Submission* Please leave any other thoughts or comments below. Thank you for your participation in this survey!	notes
permission_to_acknowledge	May we acknowledge your contribution in any publications arising from this data?	yesno, Required <table><tr><td>1</td><td>Yes</td></tr><tr><td>0</td><td>No</td></tr></table>
acknowledgement_names Show the field ONLY if: [permission_to_acknowledge] = '1'	Please list any contributing team members to be acknowledged	notes, Identifier
intake_survey_complete	Section Header: *Form Status* Complete?	dropdown <table><tr><td>0</td><td>Incomplete</td></tr><tr><td>1</td><td>Unverified</td></tr><tr><td>2</td><td>Complete</td></tr></table>

Table S1. Qualitative descriptions of front-end treatment areas

Upright treatment spaces separated by a wall from the waiting room and dividers between patients
Split flow model moves patients back to a care area so only patients who must wait get workup by protocol
During Front End Process hours, two front rooms are used for physician triage and the back four rooms are used for lower acuity patients for treatment and discharge and processing orders for patients who will be roomed in the main ED
Chairs
Recliner chair
Small rooms with recliners, same space as nursing triage. Additional room with 4 to 5 recliners for initiation of protocols
Table, chair, vital signs monitors, EMR

ED = emergency department, EMR = electronic medical record

Table S2. Qualitative descriptions of front-end surge plans

Our frontend process is the surge plan, otherwise it is direct bedding
Yes, Charge nurse/Clinical coordinator, will send additional RNS to intake if intake wait times are longer than 30 min.
Yes. If surge, CareSTART doctor discusses with charge nurse needs/resources to remove bottlenecks. We sometimes bring back an additional resident/faculty to do physician intake. Hallways are utilized. We try not to open 'triage'
Another provider steps up
Yes, once we get to 5 or more waiting for registration/triage, we call for assistance from registration personnel and additional RN to triage; in addition, rolling out artificial intelligence project that predicts surges 2 hours in advance so that providers, clinical staff, EVS, transportation, house supervisors, central bed management, lab and imaging can help resource to clear out current patients and accelerate patients arriving through the ED process
Our ED Charge nurse will survey the department flow and modify ambulatory patient placement, depending on length of waiting in the Main ED vs SuperTrack.
Yes moving to the waiting room to initiate care.

Table S3. Qualitative descriptions of barriers to implementation

We are remodeling so LOS data are in flux. The physical space not well designed for the new split flow process but helped us know what we needed, currently in construction build for new care model. As with many places, our process was an evolution of various forms of frontend redesign. starting with a provider in triage and evolving to care team in triage and ultimately a split flow model of care in which we found the greatest success.
1) Buy in from nursing to not open triage during surges, 2) Not loosing 'track' of patients in our internal waiting once studies back but still no room in main ED, 3) Help patients understand the process ('feel like they are on conveyor belt')
Boarding
Space, boarding, and nursing staffing
Lack of manpower to perform the orders e.g. ECG and lab tests.   Limited ability of nurses to order tests or medications because of licensing restrictions. At peak hours there can be more than 10 people waiting for triage and the triage times go up to 60 minutes. There are only 4 triage rooms. There is only one ECG room which is a choke point as well.
1. physical space - we only have 2 triage rooms, so we made the front end happen in waiting room 2. funding for additional nurses. Had to get hospital approval
Physical plant layout, sustaining provider presence in intake area