

# IMPLEMENTING A DIRECT TO OR RESUSCITATION PROGRAM: NARROWING THE SCOPE

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## BACKGROUND

Methodical review and reduction of unnecessary delays that increase morbidity and mortality due to injury has shaped the trauma systems we know today (Martin et al., 2012). Morbidity and mortality due to life and limb threatening injuries can be mitigated by immediate intervention, including surgical intervention in an operating suite (Johnson et al., 2020; Martin et al., 2012; Puzio et al., 2021; Wieck et al., 2018). The benefits of bypassing the emergency center (EC) for critically injured surgical patients to be transported directly to the operating room (DOR) for initial resuscitation were introduced in the mid-1900s, yet few trauma centers utilize this process and paucity of literature persists in spite of promising results (Fischer et al., 1978; Griswold & Drye, 1954; Johnson et al., 2020; Martin et al., 2012; Noer, 1963).

## THE PROBLEM

Prior to our DOR resuscitation program, astute providers attempted DOR admission for seven cases between August 2019 and September 2020, knowing that slight delays in cases would likely result in increased morbidity and/or mortality. DOR admission was performed for six out of seven requested cases. Of these six cases, two were trauma surgery cases and four were neurosurgery cases. Although these patients received timely appropriate operative intervention, the process varied with each case, increasing the viability of room for error and safety threats.

## CATALYST CASE

One patient taken DOR prior to process implementation was an infant who fell from a bed. Upon arrival to the OSH, the patient was activated at the lowest level of activation and kept in the emergency department for observation during which she developed symptoms. A CT was performed identifying a 3cm EDH with 6mm shift. The highest level activation was paged. The facility's trauma medical director (TMD) was on call that evening and responded. The TMD paged neurosurgery at our facility to facilitate DOR. The patient went directly from the helipad to the OR and was discharged 4 days later at neurological baseline. This patient had a favorable outcome but DOR may not have occurred without TMD presence, reinforcing the need for a formalized process.

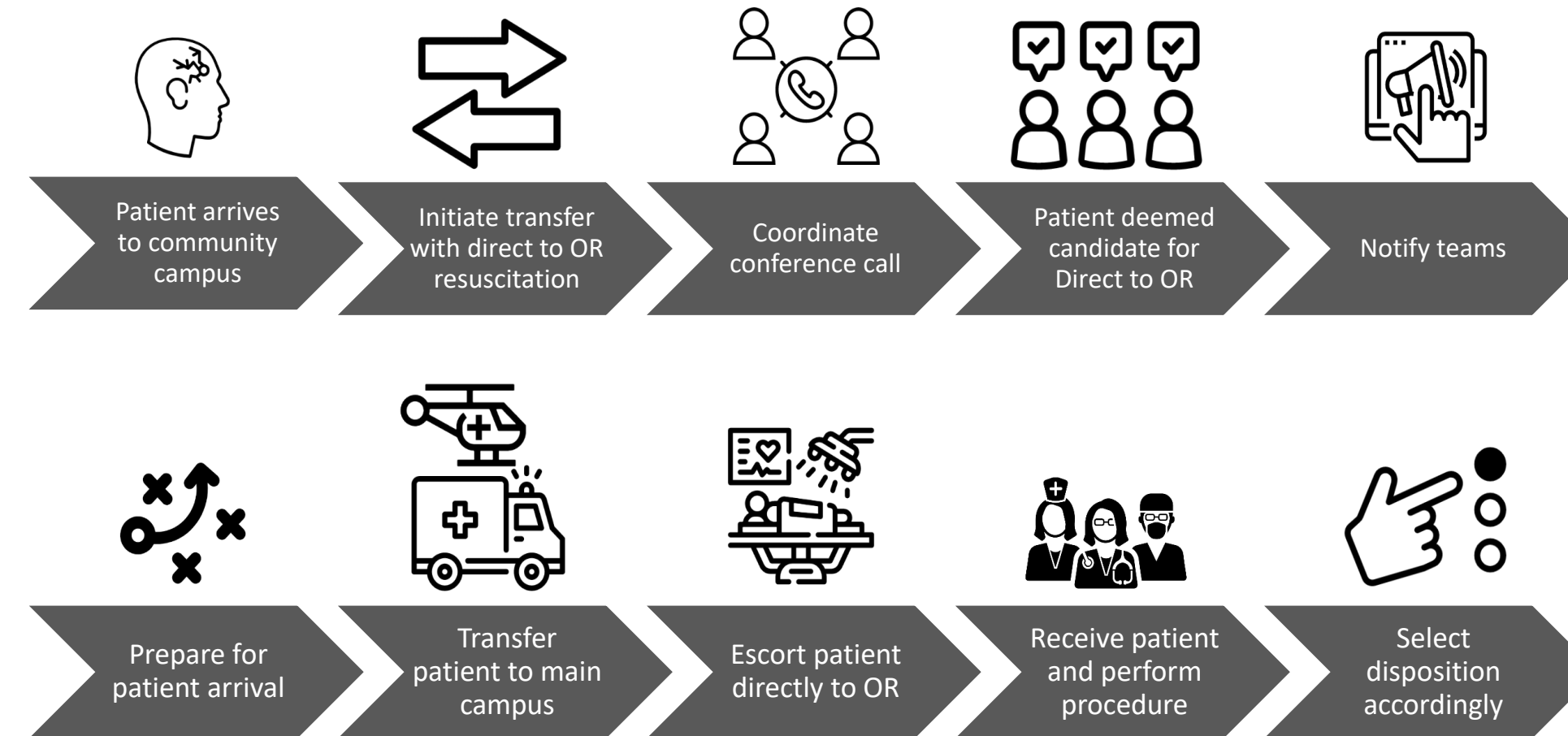


Fig 1: DOR Process Overview

## PROJECT DESIGN

A group of representatives from the OR, trauma, ED, transfer center, neurosurgery and critical care formed a workgroup to define and formalize a process. Although providers in other service lines are accustomed to admitting patients DOR, patients are previously established with the service line or are identified in clinic by the operating physician. Trauma patients present an unfamiliar challenge since they are rarely established patients and most frequently arrive from outside facilities or from scene. For initial implementation, the workgroup narrowed the scope to include only trauma patients with an epidural hematoma causing midline shift arriving from a hospital within our health system. An algorithm was created with inclusion criteria and roles stratified by department. The process was tested using tabletop simulation.

## SYSTEMS TEST

A virtual tabletop simulation was conducted with participants and observers from multiple disciplines and campuses within the health system, uncovering 13 latent safety threats. A failure, modes, and effects analysis (FMEA) report was generated with risk priorities, action items, responsible parties, and deadlines assigned to each threat. For example, the initial project design did not provide clear roles nor communication methods for patients arriving via ground ambulance due to inclement weather. Following the FMEA report, this was addressed and the algorithm was adapted accordingly. After each threat was addressed, a go live date was scheduled and education, customized for each division, was disseminated.

## DISCUSSION

DOR programs decrease morbidity and mortality in trauma patients by providing timely interventions. Although patients were successfully admitted DOR prior to process development, variations in roles and responsibilities emerged exposing the need for a formalized process. A large workgroup was imperative to ensure sufficient representation by all divisions, however, calendar conflicts paired with the pandemic elongated development and refinement, increasing implementation difficulty. Conversely, the narrow scope of inclusion decreased implementation difficulty. Future initiatives will widen the scope to include patients with a broader range of injury from hospitals outside our system and from scene. Previous research identified no significant cost difference nor difference in trauma activation charges between DOR and traditional EC evaluation (Wieck et al., 2018; Johnson et al., 2020). However, DOR reduces the EC staff's workload and occupancy of EC space, which could result in lower left without being seen rates and increased EC revenue (Fischer et al., 1978; Wieck et al., 2018). Future research is needed to further analyze the differences in pediatric and adult patients requiring DOR as current literature often excludes pediatric patients. (Johnson et al, 2020; Puzio et al., 2021; Weick et al., 2018).

## CONCLUSION

DOR programs are cost effective ways to reduce morbidity and mortality in critically injured patients and should be implemented in major trauma centers with appropriate resources. Starting with a narrow scope may decrease barriers when implementing DOR programs.

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