

# Direct to OR Resuscitation: A Reevaluation 20 Years After Implementation at Lehigh Valley Health Network

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# Direct to OR Resuscitation: A Reevaluation 20 Years After Implementation at Lehigh Valley Health Network

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## Introduction

Lehigh Valley Health Network (LVHN) utilizes a complex, and somewhat unique, triage system to care for trauma patients that is designed to direct the most severely injured immediately into the Trauma Operating Room (TOR) upon hospital arrival for resuscitation and surgery. The personal experience of some physicians involved in trauma care at LVHN is that the current system produces an excessive number of overtriages to Operating Room Resuscitation (ORR) (or "Code Red") that result in unnecessary allocation of significant resources and personnel time. Additionally, the realities and logistics of trauma care at this institution would suggest that the initial triage of severely injured patients to the Trauma Bay (or "Trauma Alerts") with upgrade to the TOR as deemed necessary should not adversely impact patient care. Despite this perception, LVHN's Trauma Triage system has been firmly institutionalized over several decades and changes to current protocols would most certainly be met with significant ethical objections and cultural resistance. Substantial changes to this system would need to be justified by well designed internal clinical studies with the consent of multiple community stakeholders. However, the ethical constraints of even conducting such a study demand that the subjective opinions of LVHN trauma providers be first correlated with actual evidence-based justifications for doing so.

## Problem Statement

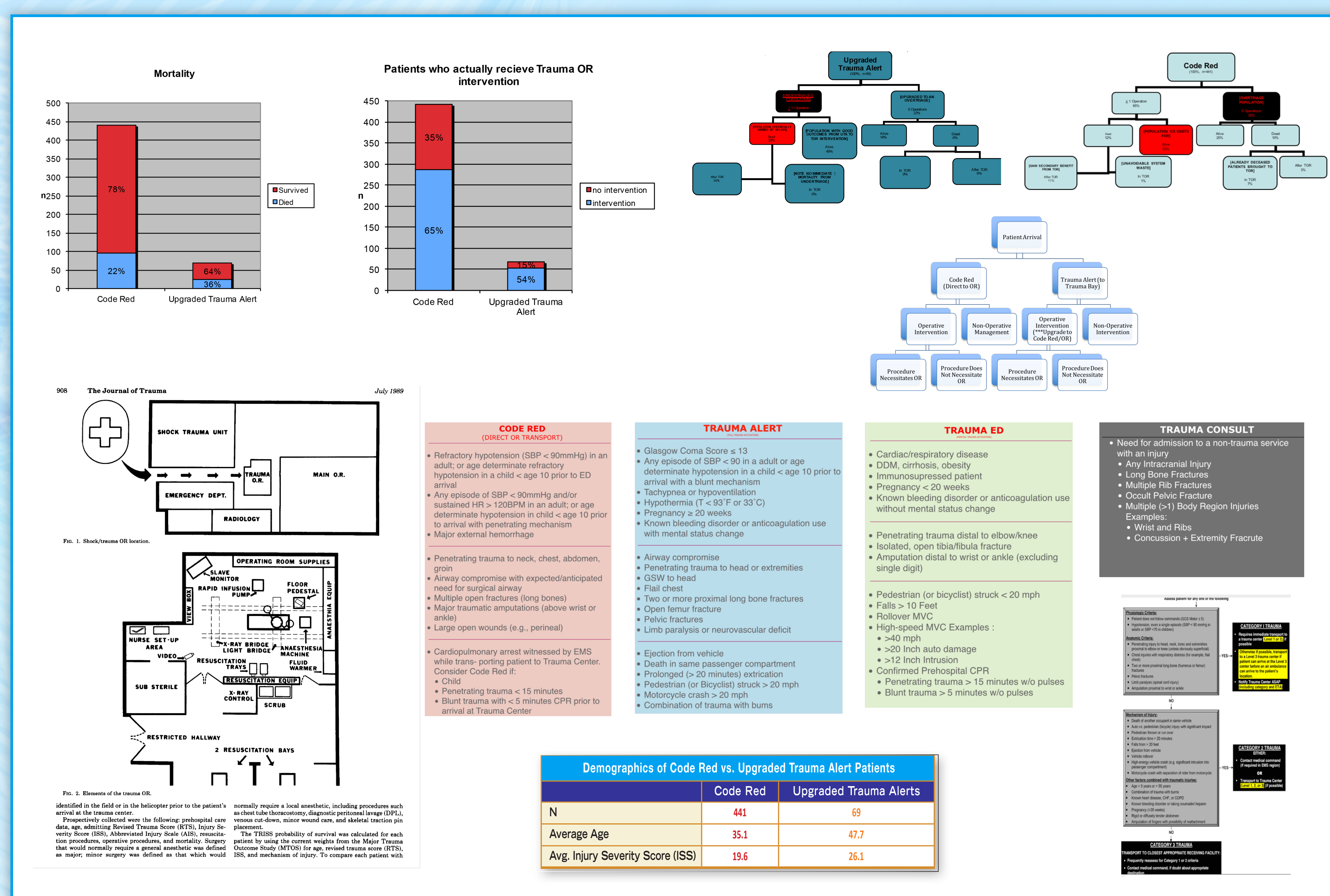
Although the practice of direct to operating room resuscitation (ORR) at LVHN subjectively does not appear to improve patient outcomes despite a significant associated cost, there is a paucity of external and internal evidence to ethically justify investigations aimed at restructuring the current trauma triage system.

## Methodology

A literature review was performed to determine the presence of and variations within the practice of ORR at other institutions and to evaluate the experiences of other Trauma Centers with such a triage protocol. Additionally, five years of general population-based data was gathered from the LVHN trauma registry to generate descriptive statistics and qualitatively examine if and how a formal study on Code Red versus Trauma Alert triages could be conducted. These data were synthesized to generate a viable research protocol for investigating this issue at LVHN.

## Results

42 relevant investigations were identified in the literature discussing secondary (in-hospital) triage systems and only 10 of these specifically discussed the practice of ORR. ORR is an uncommon practice outside of LVHN with conflicting conclusions regarding its utility, the majority of which were last investigated several decades ago. Overtriage of trauma patients can be associated with increased costs and patient morbidity. ORR was originally promulgated several decades ago and there have since been significant changes to the nature of care for trauma patients. Five years of recent trauma registry data demonstrate that during this period there were 441 Code Reds (CR) and 69 Upgraded Trauma Alerts (UTA). Code Red and Upgraded Trauma Alert patients had an average Age and ISS of 35.1 and 19.6, and 47.7 and 26.1 respectively. 65% of patients in the Code Red group and 78% of patients in the Trauma Alert group received TOR interventions. 25% of CR patients and 36% of UTA patients ultimately died from their injuries. Ideal surrogate endpoints for morbidity in the trauma registry for future analysis include LOS, #ICU Days, #Ventilator Days, arrival time to incision, discharge location and #operations performed and care level of admitting unit.



## Conclusions and Future Implications

ORR does not appear to be a widely adopted or studied practice outside of LVHN. The most frequently cited studies of ORR were in fact performed at LVHN by a past Chair of Surgery decades ago. Extrapolation of existing studies on Trauma Triage suggest that simplified and even delayed personnel responses to surgical trauma have a minimal adverse influence on outcomes and centers that implement such conservative protocols have realized significant cost savings. The advent of CT scanning, DPL and Damage Control Resuscitation have changed the nature of trauma care and made much of it nonoperative. Inherent differences in CR and UTA populations at LVHN make direct outcomes comparisons difficult in absence of ethically prohibitive randomized clinical studies. A significant number of CR patients have non-survivable injuries and do not benefit from ORR or, conversely, can be managed non-operatively and similarly do not benefit from ORR. Although the event rate is low, there is a population of UTA patients with comparable traumatic injuries to those of CR patients that could be retrospectively compared for mortality. Several surrogate markers of morbidity are also available from the trauma registry. A retrospective comparison of CR versus UTA to provide the impetus for reevaluation of the current LVHN trauma system is both ethical, feasible and justified. A research protocol has been produced to this effect and is in the final stages of internal regulatory review.

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