CLINICAL COMPLEXITY AND ITS ROLE IN TRAUMA CARE: VALIDATION OF AO PRINCIPLES OF CARE.

Sunny Deo's research was recognised as the best research presentation at this year's British Trauma Society Meeting, held in Sheffield in early November 2017.His award winning presentation is based on clinical data collection from the Orthopaedic department prior to the start of national hip fracture data, which suggests a pragmatic "real-world" system of measuring clinical complexity fits with previously taught principles which have not been so easy validate using traditional big data series. It highlights the importance of careful clinical data collection and suggests certain factors not commonly captured in standard datasets can and do influence the outcomes for a given condition, in this case patients with hip fractures.

Introduction:

Complexity theory is based around the interaction of agents and factors to predict and quantify predictable and unpredictable events. Other features of complexity include non-linearity, feedback and scalability. This is contra-distinct to deterministic models focussing on 1 factor, reliance on average values and normal distributions. Interestingly, Orthopaedic Trauma practice has historically centred around the consideration of multiple factors, but this has been under-represented in peer-reviewed literature.

A key component of complexity involves the role of fractals, which have transformed the understanding of a range of natural science subjects, including cardiac, neural-network and cancer studies.

Method and patients:

Over the past 8 years we have undertaken a number of clinical projects centred on clinical complexity and the interaction between 2 principle factors namely local and systemic, generating a 4 part classification of clinical complexity.

This equates to "injury factors and patient factors" of traditional AO/ ASIF (Association for the Study of Internal Fixation) teaching. We further refined these by setting criteria for these factors being straightforward or complex, thereby creating a 2x2 matrix of clinical complexity, with C0 as the most straightforward type of case and C3 the most complex.

For any presenting problem eg hip fracture

Specific fracture eg hip ▶ General patient status ▼	Simple: straightforward pattern, normal bony anatomy and soft tissues	Complex: complex fracture pattern, pathologic / deformed bone, abnormal soft tissues
Simple Generally well ASA 1-2	C0	C1
Complex 3+ major Charlson comorbidities and or ASA 3+	C2	C3

Results:

Our orthopaedic trauma research has thus far focussed on hip fracture patients and we have validated results over 2 centres, involving analysis of 717 patients with AO/OTA A31 and B31 fractures. We found statistically significant differences between the most complex groups and straightforward patients in a variety of parameters such as mortality rates at 30 days and 1 year ($p < 0.001$).

Conclusions:

Stratification into the 4 clinical complexity groups seems to have almost universal applicability. It tends to validate the AO principles of injury, that injury and patient factors are key to patient outcomes.

We should look more closely at the principles of complexity science, as this may provide an alternative methodology, with greater efficacy at modelling healthcare delivery and outcomes and would demonstrate which additional data would need to be collected.