



# Trauma System Implementation Programme

## *Workstream 6: Planned Trauma Care*

Model of Care

1 September 2022

Final Draft

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## Glossary of Terms

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ASA - American Society of Anesthesiologists

Cappagh - National Orthopaedic Hospital, Cappagh

CDP - Clinical Decision Process

CNMs - Clinical Nurse Managers

Croom - Croom Orthopaedic Hospital

CT - Computed Tomography

CUH - Cork University Hospital

ED - Emergency Department

HSE - Health Service Executive

ICT - Information and Communications Technology

OPD - Outpatient Department

PTC - Planned Trauma Care

PTC facility - Any unit/hospital which is involved in the receiving of patients in the PTC pathway

RGN - Registered General Nurse

SIVUH - South Infirmary Victoria University Hospital

SpRs - Specialist Registrars

UHL - University Hospital Limerick

WTE - Whole-Time Equivalent

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# 1. Introduction

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The information outlined within this document details the proposed Model of Care for Planned Trauma Care (PTC), a component of the future Trauma System in Ireland. The aim of PTC is to develop a patient pathway where patients with suitable injuries, who do not need immediate admission, are managed in a scheduled manner that is more appropriate to their care needs. This is inclusive of both day case procedures and potential overnight cases, dependent upon the patient's suitability and the hospital's capacity to manage them.

The Model of Care establishes how this service can be standardised and developed for implementation across both the Central and South Trauma Networks. The Model of Care is not designed to be prescriptive for how each hospital, hospital group and potential PTC facility across the trauma networks will implement PTC, but rather sets out several models as to how PTC can be adopted, as the exact model to which each hospital, hospital group and potential PTC facility adapts PTC will vary and depend on numerous factors. It is the aim of the National Office for Trauma Services and Trauma System Implementation Programme to work with hospitals, hospital groups, and potential PTC facilities to identify the most appropriate model for implementation.

The content for this document has been formulated by engaging with key stakeholders in Orthopaedic care provision across the country, as well as analysing best practice international literature on ambulatory care. To provide guidance on the delivery of PTC in an Irish context, this document is also informed by data and feedback received from University Hospital Limerick (UHL) & Croom Orthopaedic Hospital (Croom), Cork University Hospital (CUH) & South Infirmity Victoria University Hospital (SIVUH), as well as on the emergency provision of a PTC-like system during the COVID-19 environment in both UHL and CUH (see section 1.2).

## 1.1 Specialties suitable for PTC

While Orthopaedics and Plastics are currently the specialties predominantly availing of PTC, the service can also be expanded to other surgical specialties where the care of patients falls into the described model of care. Paediatric trauma care, for example, is eminently suitable for PTC once appropriate capital and staffing resource requirements are in place. The National Office for Trauma Services welcomes interest from, and will engage with, all surgical specialties on their inclusion in PTC.

## 1.2 Trauma System Implementation Programme

The Health Service Executive (HSE) is committed to delivering high quality, patient-centred care and has a responsibility to ensure that essential trauma care is conducted with maximum efficiency for the best possible outcome for patients; to achieve this, implementing the recommendations of the National Trauma Strategy - *A Trauma System for Ireland* - is a priority for the HSE. As part of formulating the strategy, a number of factors currently impacting the effective delivery of trauma care to patients in Ireland were highlighted, including:

- The diluting effect on trauma expertise and system management when many hospitals in the same region provide low-volume trauma care, which is associated with poorer outcomes for patients.

- The strategy thus called for a progression towards a more coordinated approach to the planning and delivery of services within and across the Hospital Groups.
- Simultaneously, the strategy suggested an increased focus on networks of service provision, with hospitals who receive a low volume of trauma patients managing low-complexity urgent or planned care locally, while more complex care is managed by hospitals who receive a high volume of trauma patients.

To that end, central to the ethos of effective trauma care is to refer patients to the appropriate location, in terms of providing the right treatment at the right time and through utilising all facilities across both trauma networks correctly. Consequently, the Trauma System Implementation Programme has set out to establish PTC as a component of the future trauma system.

### 1.3 Prompting transformation: COVID-19

The COVID-19 pandemic prompted a transformation in how the HSE delivers trauma care across the country; these services were severely impacted in terms of timely access to theatre and available bed capacity for patients. Alternative pathways were necessary to refer “COVID-unlikely” patients safely to alternative sites.

Under the threat of the pandemic, protocols and algorithms were established for referral, acceptance and care of appropriate trauma patients from Emergency Departments (ED) to facilities with adequate capacity, resources and pathways. As these facilities were capable of handling increased appropriate trauma patient volume, the burden on the acute hospital system was eased. The process, which has been Consultant-led and Consultant-delivered, has resulted in services with similar objectives to the proposed PTC services being implemented in several locations across the country:

- Dublin: In March 2020, four of the six Dublin hospitals, as well as from UHL, relocated their ambulatory trauma cases to the Cappagh National Orthopaedic Hospital.
- Cork: In May 2020, CUH commenced the relocation of ambulatory trauma cases to SIVUH.
- Limerick: In May 2020, UHL commenced the relocation of ambulatory trauma cases to Croom.

Observations outlined in section 4.3.1 below support that the PTC-like process implemented in UHL and Croom has provided timely and efficient urgent trauma care in as safe a manner as possible for both patients and staff alike, with a high level of patient satisfaction observed. However, an overall national Model of Care which describes the service provision has yet to be developed for PTC, and so the structure and guidance for the provision of this service will be outlined in this document.

## 2. What ‘good’ looks like

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The following are basic principles which underpin this Model of Care:

- Development of a clearly defined pathway that relocates ambulatory trauma cases to facilities which are best suited to care for the patient, pending availability of resources, demand and capacity. The PTC Facility (defined as any facility which receives the patient and where the surgical procedure is performed in the PTC pathway) can be onsite in an existing theatre, offsite in an external facility, an addendum to an existing surgical list either onsite or offsite, or located in a bespoke PTC facility.
- Given adequate capacity, the PTC facility shall receive those ambulatory trauma patients who meet predetermined social, medical and surgical inclusion and exclusion criteria, as outlined below in section 5.3.1.
- Each PTC facility will develop and implement a thorough ‘Clinical Decision Process’ (CDP), as detailed in section 5, to identify and select patients who are suitable for their PTC pathway.
- As a result:
  - Capacity-dependent, suitable trauma patients who do not require acute care will no longer occupy inpatient beds in advance of surgical intervention.
  - PTC patients will receive surgical intervention in a scheduled manner, reducing the likelihood of patients being placed on an acute hospital’s trauma list with no guaranteed timeline to surgery provided.
  - Each facility that will receive patients suitable for the PTC pathway must develop plans to manage any subsequent increase or variance in the volume of trauma care.
  - In the interim, acute hospitals will continue to manage patients with less severe traumatic injuries until PTC has been fully developed and implemented across both trauma networks.

### 3. Overview of ambulatory trauma services

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#### 3.1 Typical ambulatory care patient flowchart

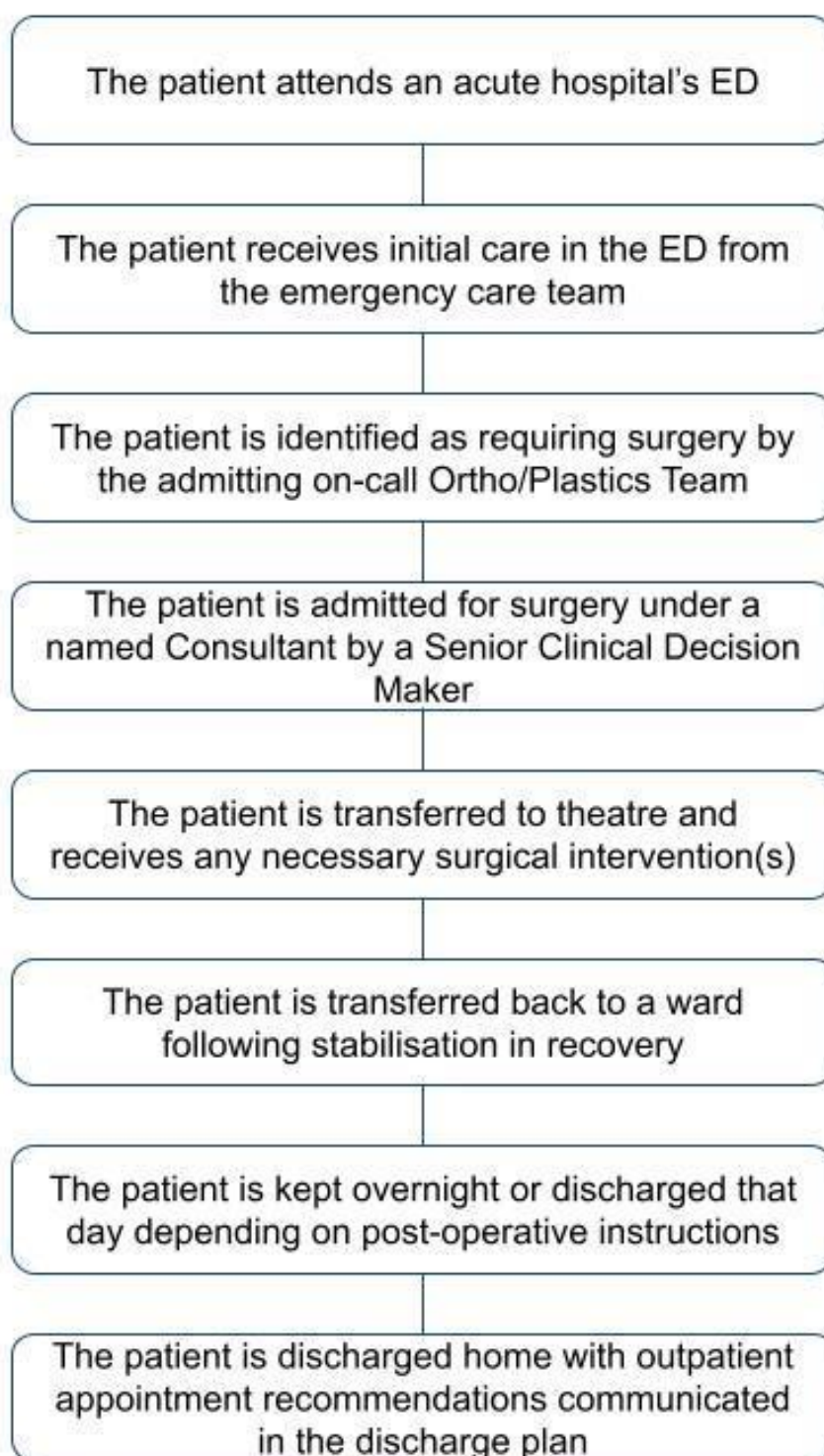


Figure 1 - Current ambulatory patient flowchart

## 3.2 Current service offering

The above chart describes a typical current service offering for trauma care across the country. Below, the variability across this system is highlighted in order to demonstrate the current ways of working and the challenges and inefficiencies in providing care to patients in the traditional inpatient emergency list model.

### 3.2.1 Patient attends hospital ED

The patient arrives at the acute hospital's ED seeking medical attention, and may arrive through the following sources:

- Referral from Injury Unit
- National Ambulance Service
- Self-presentation
- GP referral

Current challenges include patients presenting with traumatic injuries to suboptimal clinical scenarios. Facilities may lack the capacity to appropriately manage the patient's injuries during the time of presentation due to a high volume of trauma presentations. A patient may also present at a facility that does not have the necessary resources to handle their particular injury, potentially resulting in a patient transfer which may be both logistically difficult and/or worsen the patient's outcome.

### 3.2.2 Patient receives initial care in ED

The patient is triaged by the admitting team in the ED, and appropriate initial care is administered to the patient while the next stage of their management is decided upon.

Current challenges include patients receiving non-specialist trauma care in the ED due to the lack of a formalised approach (with a lack of standardised in-built provisions for receiving team expertise as one example) to trauma care within the facility. The quality of initial care may also be compromised by the time of patient presentation, i.e., normal working hours vs out of hours.

### 3.2.3 Admitting on-call team identifies the patient as requiring surgery

The patient with traumatic injuries is identified by the Senior Clinical Decision Maker (SCDM) in the admitting on-call team as requiring surgical intervention to manage their injuries.

Current challenges include the admitting on-call team being able to admit the patient under the appropriate specialty Consultant, and challenges around time to treat due to existing inefficiencies within each facility (including available theatre and bed spaces).

### 3.2.4 Patient is admitted for surgery under a named Consultant

The patient is admitted under the most appropriate Consultant available for emergency surgery either as a day case or an overnight case; this is often dependent on injury severity, theatre space and Consultant surgical list capacity.

Current challenges relate to the unplanned and unpredictable nature of trauma care. Admitting patients for surgery onto a trauma list can often result in increasing the length of stay for patients, and

lead to them taking up limited bed capacity. Cases are often delayed due to more urgent surgeries taking precedence, resulting in surgical interventions taking place at less appropriate times.

### *3.2.5 Patient undergoes surgery on the emergency list*

The patient undergoes surgical intervention on the emergency list under their named Consultant.

Current challenges include matching surgical specialty to the patient, owing to the unplanned, emergency nature of care, and meaning appropriate expertise may be diverted to other more urgent cases.

### *3.2.6 Following monitoring in recovery, patient is returned to the ward +/- overnight stay*

Following surgery, the patient is transferred to the recovery unit where they are monitored until such a point that they are deemed medically stable to return to the ward for ongoing care. This ward may be a Day Unit or may be an overnight inpatient ward.

Current challenges revolve around staffing and bed capacity in terms of progression of unplanned emergency trauma patients from the recovery unit into appropriate wards in a timely fashion, and those same wards being staffed with specific postoperative trauma expertise.

### *3.2.7 Patient is discharged home from the acute hospital +/- outpatient department (OPD) follow-up*

Once the patient is deemed medically stable and at an appropriate functional level, they will be discharged from the acute hospital with a pre-arranged future appointment for follow-up in their named Consultant's outpatient clinic. They will typically receive ongoing rehabilitative input either as an inpatient in a follow-on facility, or as an outpatient if they are returning directly home.

Current challenges here include delays in time to and convenience of location of outpatient review, matching patients to the most appropriate specialty Consultant, discrepancies in information provided to the patient about the short- and medium-term plans of care, and often inefficiencies in onward referral information provided to the patient's next healthcare provider (particularly in the case of onward referral to an external healthcare practitioner or institution).

It is the aim of the PTC pathway to reduce the impact and occurrence of the above challenges and inefficiencies, primarily by guiding standardisation in approach across units nationally - while simultaneously allowing for individual differences from facility to facility. This will make it significantly easier for all stakeholders (including patients, clinicians and hospital administrative staff) to plan treatment optimally.

### 3.3 Patient persona - current ambulatory trauma journey

The below patient journey is included to show the impact on the patient of the wider Trauma System operating on current protocols.

## Minor Trauma Patient: Sarah

### Current Patient Journey

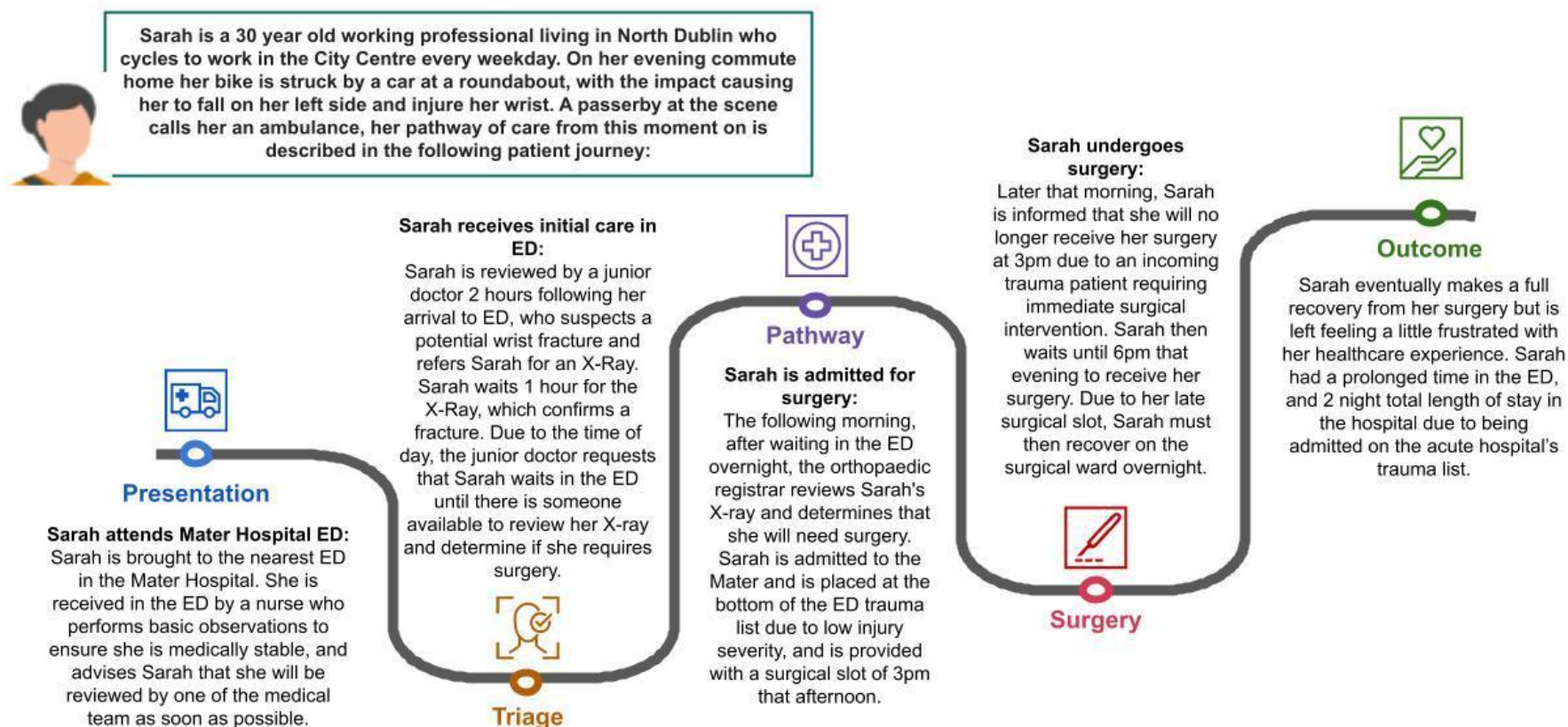


Figure 2 - Patient persona following current ambulatory care management

## 4. Case for change

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### 4.1 Challenges in the provision of care to ambulatory trauma patients

Under the traditional trauma care pathway, detailed above in section 3, there are challenges and inefficiencies which are witnessed throughout the system that highlight the need for change towards a more standardised approach to trauma care. Through discussions with relevant stakeholders in the Irish healthcare setting, several key challenges in providing trauma care in Ireland have been identified. In addition to poor patient experience and unnecessary increased length of stay, the stakeholders identified the following as the two key current challenges:

#### 4.1.1 Unpredictable nature of trauma

Unscheduled trauma care, by its nature, places a burden on hospitals because of its unpredictability in relation to time of patient presentation, type of trauma injuries, and patient volume. The current trauma care pathway struggles to effectively manage this burden, as typical management strategies include admitting patients on trauma lists, a strategy which often has negative consequences for both the patient and the hospital. This can have an impact on scheduled services, bed capacity, and result in a higher number of surgical delays and cancellations. Putting in place the proposed PTC pathway will mitigate such consequences due to its primary focus on reducing the burden of unscheduled trauma care on acute hospitals.

#### 4.1.2 Infectious disease control

Given the current COVID-19 pandemic environment, there is an increased focus within the Irish healthcare setting to monitor and control infectious diseases. As mentioned, the current method of caring for trauma patients often results in increased patient length of stay. Therefore, patients are exposed to a higher risk of contracting and spreading infectious diseases than they would be in a more streamlined model of care for trauma management.

### 4.2 Ambulatory trauma literature review

Planned or ambulatory trauma care has been proven to be safe, efficient and cost effective in multiple healthcare settings, across various international regions.

There is strong evidence within the medical literature that implementation of systems similar to the proposed PTC pathway proves no excess risk to correctly selected patients, while simultaneously reducing operative time, patient length of stay and patient turnaround. This results in an increase in patient satisfaction as well as significant cost savings and increased utilisation of bed capacity for medical facilities when compared to inpatient management.

#### 4.2.1 Patient outcomes

##### 4.2.1.1 Readmission/ED presentation rate

Multiple studies have shown that the implementation of ambulatory trauma procedures, similar to PTC, has resulted in a decrease in patient readmissions and ED presentations across health systems

in the UK, USA and Canada. When analysing outpatient versus inpatient ankle fracture repairs in the USA, Malik et al. (2020) highlights that outpatient ankle fractures had lower rates of:

- 90-day readmissions (9.7% vs 14.1%)
- ED visits (13.8% vs 16.2%).

This is mirrored by a similar study from Pasic et al. (2022) on ankle fracture repair in Canada, where it was found that within 30-days of discharge, outpatients had a 7% presentation rate to the ED compared to 11.2% for inpatients.

#### *4.2.1.2 Postoperative complications*

The introduction of PTC-like systems across the UK, USA and Canada has also had a positive impact on post-operative complications and improving patient outcomes. When analysing all fracture repairs in Canada, Wolfstatd et al. (2020) found that when patients were correctly selected for a PTC-similar pathway, there were no complications during the time period between patients being sent home from the original hospital visit and their readmission for surgical intervention.

When studying hand surgery in ambulatory care in the USA, Thompson et al. (2018) identified that outpatient surgery had a significantly lower risk of complications than inpatient surgery (1.4% vs 8.7%).

#### *4.2.1.3 Patient satisfaction*

The impact of ambulatory care on patient satisfaction levels has proven to be positive, with evidence coming from both the Canadian and Spanish healthcare systems. Wolfstatd et al. (2020) found that patients were overwhelmingly satisfied with their care and with the preparedness for the outpatient surgical procedure, while Martin-Ferrero et al. (2014) identified in a 5-year study of general orthopaedic surgery in Spain that there was no decrease in patient satisfaction when choosing ambulatory management. An additional benefit of following a PTC pathway is that similar trauma injuries can be treated in cohort, meaning patients will have their delivery of care overseen by bespoke teams. These teams become more efficient at those same specific procedures through specific surgical repetition, resulting in improved long-term functional outcomes and higher patient satisfaction rates.

#### *4.2.1.3 Time to intervention*

Within the current system for managing ambulatory trauma, patients with less severe injuries who require surgical intervention often wait in the ED for a free bed space to be admitted into a hospital and are then placed on to the trauma list. These patients could wait several days for their surgery if patients present with more severe injuries and take precedence on the trauma list. Under the suggested PTC procedures, these patients are relocated to an appropriate facility (either internally or externally) that has the capacity to manage the patient. Therefore, these patients can receive more rapid access to surgery and earlier post-operative rehabilitation, improving patient outcomes and quality of care, without taking up bed capacity in the receiving hospital.

#### 4.2.1.4 Improved surgical efficiencies

Anticipated improved efficiencies in surgical intervention in the PTC pathway include permitted and expanded use of imaging (including image intensifiers) by suitably trained medical professionals, to guide and improve surgical interventions to the point that tangible improvements are seen in long-term patient outcomes.

#### 4.2.2 Hospital outcomes

##### 4.2.2.1 Cost

Planned/ambulatory management of medically stable trauma patients has been analysed within the Canadian and USA healthcare systems with regards to financial cost. When analysing ankle fracture repair in the USA:

- Pasic et al. (2022) identified that isolated ankle fracture repair cost is 77% higher for inpatient cohorts than for outpatient cohorts.
- Similarly, Bettin et al. (2019) put forward that outpatient care was associated with 31.6% lower costs compared with inpatient care

These reductions in cost for outpatient management can be attributed to a number of factors, detailed below, including a decrease in patient length of stay and an increase in surgical efficiency, thus improving patient flow.

##### 4.2.2.2 Length of stay

The management of patients through a planned/ambulatory pathway has also been proven to decrease patient length of stay. Pasic et al. (2022) found inpatients had a significantly longer mean length of stay when compared to outpatients (54.3 hours for inpatients vs 7.5 hours for outpatients). This is especially relevant in a COVID-19 environment, where there is an increased focus on reducing patient exposure to infectious diseases.

Patients receiving ambulatory care will also be less likely to occupy beds out-of-hours (i.e., overnight) due to patients returning home while awaiting surgical intervention. This has a positive effect on the number of patients that each nurse is responsible for, which is of particular benefit to those facilities experiencing nurse staffing issues.

##### 4.2.2.3 Patient flow

Several studies have demonstrated the positive effects of planned/ambulatory trauma care on patient flow. Gillis et al. (2017) found that over an eight-hour time period, five surgeries were completed in the traditional operating room setting, versus eight surgeries in an ambulatory setting. Similarly, Munnich et al. (2014) highlight that procedures performed in ambulatory surgical settings took on average 31.8 fewer minutes than those performed in hospitals - a 25% difference. These surgical time savings are realised within the ambulatory care settings due to:

- The scheduled nature of the procedures allowing for improved planning of resources and equipment, in comparison to the variable nature of the inpatient trauma list
- As theatres/units perform similar procedures repeatedly, they become more efficient in carrying out the surgical intervention.

This improvement in patient flow not only allows more surgeries to be performed in a given time period, but it also reduces the length of time for which the facility is responsible for a given patient, particularly during ‘premium’ hospital hours, thus easing the pressure on staffing resources. Additionally, when patients follow the PTC pathway, they no longer impact emergency surgeries as they are not placed on the acute hospital’s trauma list, nor do they impact the scheduled elective care of the hospital.

#### *4.2.2.4 Capacity improvements*

An analysis of the trauma cases that were performed in CUH in 2019 provides us with insight into the volume of patients who could follow the PTC pathway from an acute hospital to a PTC facility, on or off-site. It was found that approximately 50% of total trauma admissions to CUH in 2019 would have qualified as ambulatory/day cases. This would lead to significant implied savings of hospital beds in those facilities with larger volumes of trauma patient admissions. A decrease in trauma admissions would not only improve bed capacity but would result in increased capacity in the main trauma theatres as well as easing the burden on staffing resources by reducing the patient to consultant/nurse ratios. There is also an improvement of capacity utilisation in facilities that receive a lower volume of trauma patients and have capacity to manage more patients, given appropriate funding.

In 2018, NQAIS performed an analysis of all trauma cases in Ireland to identify the potential orthopaedic procedures which could be considered for PTC. This analysis identified a possible 123 orthopaedic procedures that could be considered suitable for PTC, provided there were no further complications. The total number of bed days in 2018 used for these 123 procedures was 11,104 nationally, highlighting the possible bed savings from the implementation of PTC nationwide. However, as the orthopaedic procedures deemed eligible for the PTC pathway will vary from unit to unit and will be impacted by multiple factors, this figure is used here as an indicator for the potential impact the PTC pathway could have on the Trauma System. The potential variance in bed utilisation will vary from facility to facility, with some witnessing a decrease in trauma admissions and a reduction in their trauma list, while other units will witness an increase in scheduled minor trauma surgical intervention with an improved utilisation of theatre capacity.

### **4.3 Opportunity to do things better**

To reduce pressure on acute general hospitals during the COVID-19 pandemic; a decision was made to transfer Hospitals’ ambulatory patients to local elective hospitals. Examples include:

- UHL to the National Orthopaedic Hospital, Cappagh (Cappagh) and then subsequently to Croom
- CUH to SIVUH
- Four of the six Dublin Hospitals to Cappagh.

Similar arrangements were made in other hospitals and Hospital Groups across the country. These previously mentioned hospitals therefore developed new ambulatory trauma care processes and procedures which are positively impacting patient pathways across their trauma services. These procedures have been largely successful in ensuring patients receive timely appropriate care and will inform the proposed Case for Change to the current provision of ambulatory trauma care.

#### 4.3.1 Case study: Provision of PTC from UHL to Cappagh and Croom\*

*\* The following case study on the provision of a PTC-like system in UHL is included to highlight the potential benefits and ways of working of the PTC pathway in the future Trauma System. Not all facilities are expected to adopt a model of PTC identical to this.*

COVID-19 severely impacted UHL in terms of timely access to theatre and created a necessity for alternative pathways to stream “COVID-unlikely” patients safely to alternative sites. The process to relocate ambulatory trauma cases from UHL to Cappagh, and then to Croom, for appropriate patients was Consultant-led and Consultant-delivered, with all patients undergoing rigorous COVID-19 risk screening prior to admission to Cappagh & Croom.

The initial phase of this process involved UHL referring ambulatory trauma patients to Cappagh. This process began out of the necessity to stream COVID-19 unlikely patients to an alternative site to reduce the spread of the infectious disease, while simultaneously creating extra capacity in UHL as they witnessed the surge of incoming patients during early COVID-19 peaks.

The successful implementation of this PTC-like ambulatory process was then used as a business case by UHL clinical staff in pushing for the use of Croom as a local option for UHL’s ambulatory trauma care pathway.

This initial phase of locating patients from UHL to Cappagh demonstrates the potential for effective networked trauma care - i.e., patients receiving the necessary surgical intervention, in a scheduled manner, at a facility that has the capacity to manage their care. This is especially relevant for facilities that witness a lower volume of trauma patients, as it highlights that these facilities can receive patients from different regions of the country in a safe and efficient manner.

The secondary phase of this process progressed to relocating a cohort of ambulatory trauma cases to Croom, with most of these cases being day cases or overnight admissions. This phase of the process can be summarised as follows:

- When a patient was identified by the orthopaedic team on-call in UHL as needing surgical intervention, the process was initiated. If the patient was deemed medically fit for surgery in Croom they were informed as to the process and allowed home if they had an appropriate level of care. If they were deemed medically unfit for surgery in Croom, or could not safely be allowed home, they were not eligible for this pathway.
- The patient details were then uploaded to a secure Information and Communications Technology (ICT) resource by UHL staff, so that relevant stakeholders in Croom could confirm if they had capacity to receive the patient.
- Upon acceptance, the patient information provided through the ICT resource allowed the Croom orthopaedic team to plan the date of surgery, specific surgical procedure requirements, and arrange relevant post-operative care.
- Prior to leaving UHL, the patient being referred to Croom was given an information pack to inform them of precautions to be taken and to provide guidance on bringing relevant medical imaging and medications on the day of proposed surgery.
- During the evening prior to surgery, the patient was contacted by nursing staff from Croom and their clinical screening process repeated, with a particular emphasis on COVID-19 screening measures.

Theatre phase procedures were conducted as per normal operative practice, with additional COVID-19 safety procedures implemented. In comparison to the traditional trauma pathway and due to the scheduled nature of these surgeries, Croom received advanced notice of patient information. This allowed for more efficient planning of resources, including the ability to reduce the likelihood of ‘early

finishes' as the entirety of the trauma list could be planned for, through better coordination of staffing, necessary facilities and equipment. There was an additional benefit of an increased ability to match patients to surgical specialty, depending on their injuries.

Postoperatively, once the patient had been closely monitored in recovery, they returned to the ward. If it was deemed medically appropriate and safe to do so, patients were discharged that evening. If not, or if physiotherapy prior to discharge was necessary, patients may have required an overnight admission. Once discharged, the patients were followed up in the Acute Fracture Unit as per normal UHL practice, depending on the post-operative instructions.

The overriding aim of the process was to provide timely and efficient urgent surgical care in as safe a manner as possible to both patients and staff alike in a COVID-19 environment. The process was implemented as a temporary measure, and normal trauma surgery pathways were to resume when COVID-19 de-escalation occurred. However, due to the success of the service delivery, the PTC-like system is still in operation today.

Key outcomes from the implementation of a PTC-like ambulatory process at UHL & Croom are as follows:

- **Preserved capacity in acute hospital:**
  - Diverting trauma cases from UHL to Croom reduced the trauma list in UHL and created capacity in the main trauma theatre. During the time period of May 2020 - May 2022, Croom performed 817 surgical cases of ambulatory trauma care, with 70% being day cases and 30% overnight admissions.
- **Improved patient flow at Croom:**
  - In such a dedicated ambulatory trauma theatre, patient flow was optimised as these patients were healthier and had lower American Society of Anaesthesiologists (ASA) scores, therefore anaesthesia time was often more efficient and the overall number of cases per day was increased in a safe manner.
  - PTC procedures also allow for improved predictability in trauma care that would not be associated with traditional trauma lists. This facilitated improvements in efficiency throughout the trauma care pathway in resource allocation, particularly in bed capacity management, suggesting that lean processes are applicable in the PTC pathway.
- **Improved outcome for trauma patients:**
  - From a biopsychosocial perspective, PTC procedures provided the patient with more time to make alternative social and work arrangements that might have been adversely affected. This would significantly contribute to improved patient satisfaction outcomes.
  - By design, this patient cohort could also receive more specialised care (for example PTC procedures could dictate all ankle fractures to be treated by a dedicated foot & ankle Consultant), resulting in optimised care pathways and outcome measures for these patients.
  - Improvements in surgical outcomes and efficiency with more Day Of Surgery Admission Unit and day case trauma surgery of a similar nature have been preliminarily observed.
  - An additional benefit in this case example is the improvement in time to treatment of more severely injured patients. This was brought about by the trauma lists in the

primary acute hospital being less busy due to the diversion of patients to Croom, allowing those more severely injured patients on the UHL trauma list to have their treatments expedited through improved capacity. Specifically, UHL saw weekly trauma lists increase from 6 to 11 lists.

## 5. A new way of working - the Planned Trauma Care pathway

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In the new way of working, the implementation of a PTC pathway will be essential to ensure efficient and effective care of ambulatory trauma patients. However, each facility will develop and implement PTC to variable degrees, depending on numerous factors such as trauma patient volume, unit capacity, resource capability and injury presentations. To enable facilities to implement a PTC pathway that benefits both the Trauma System and patients' wellbeing, the process must continue to be Consultant-led and Consultant-delivered.

Therefore, any facility that wishes to become a PTC facility will develop and implement a '**Clinical Decision Process**' (CDP), to identify and select patients who are suitable for this pathway.

The CDP addresses two key areas of the PTC pathway:

1. How a patient is identified and selected to follow the PTC pathway
2. Where the clinical governance lies throughout the PTC pathway

The CDP, which will vary from facility to facility, is followed to allow for individual facilities to select and identify which patients are eligible to follow the PTC pathway upon consideration of their own capacity and resources and determining best clinical practice.

While not every CDP will be identical, it can be comprised of:

- A SCDM determining suitability for a patient's referral into the PTC pathway
- Use of a protocol based on clear inclusion and exclusion criteria (see section 5.3.1 for further detail on examples of appropriate inclusion and exclusion criteria)
- Or it can be a combination of both.

This will ultimately allow the PTC pathway to facilitate allocation of patients to the relevant orthopaedic/plastics Consultant (who retains surgical plan autonomy) and allows the PTC pathway to expand to less common trauma presentations. The CDP will therefore allow for flexibility in the implementation of the PTC pathway across individual units, ensuring each unit maintains control over this new service offering.

### 5.1 Clinical Governance

The clinical governance of each patient on the PTC pathway will remain under the Consultant at the initial admitting facility, until such a point that the patient is received for treatment under a named Consultant at the receiving PTC facility, who will assume clinical governance until patient discharge.

The clinical governance model will be determined on a facility-by-facility basis in association with the CDP being used. For example, the clinical governance may be under a Consultant in emergency medicine or a Consultant orthopaedic/plastics surgeon depending on how and who referred the patient to the PTC pathway in a particular facility.

## 5.2 PTC pathway diagram

Please see below the proposed patient pathway diagram for PTC:

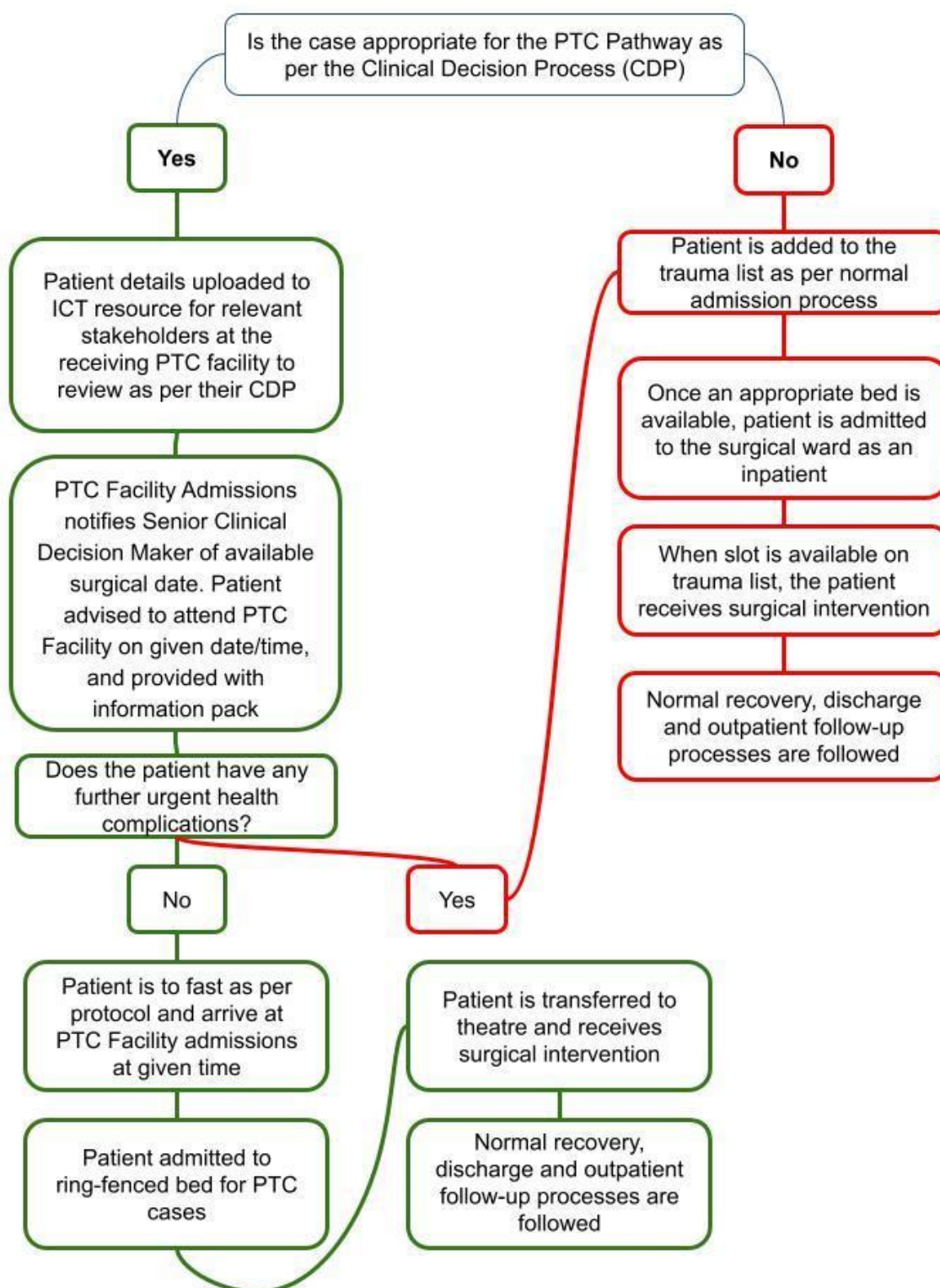


Figure 3 - Proposed patient pathway for the PTC

### 5.3 Description of what the PTC pathway may look like

#### 5.3.1 Patient identified as requiring surgery and is deemed suitable for PTC pathway

Patients with appropriate injuries who meet the broad inclusion criteria detailed below, allowing for variances between facilities for specific inclusion and exclusion criteria, and are medically fit to be transferred to another facility, or could potentially return home, are deemed eligible for the PTC pathway. The decision to follow the PTC pathway will be decided by the Clinical Decision Process (CDP) as described in section 5 above.

Most of these cases are likely to be day cases, however some facilities may have capacity for overnight admissions with PTC patients. It is likely that many overnight PTC cases will have planned early morning discharge; thereby building a process for early identification of potential discharges into a system of care in order to improve patient flow. Patient suitability is the responsibility of each individual facility's CDP.

When assessing patient suitability for inclusion to follow the new PTC pathway, it is imperative that each facility's CDP accounts for the following criteria:

- Social - for example, patient ability to attend a secondary facility
- Medical - for example, low surgical risk
- Surgical - for example, appropriate location and type of fracture

These criteria must be reflective of an overall appropriateness for this patient to be sent home to await surgical intervention at a defined future date, with the overall safety of the patient being always paramount (please see Appendix B for further description of these inclusion and exclusion criteria).

### 5.4 The PTC referral process

#### 5.4.1 Patient is referred and accepted for PTC

The initial phase of this process will be referring a cohort of ambulatory trauma cases to facilities who have the capacity to handle the variance in patient volume. These patients will have entered the hospital system through many sources including:

- The ED of acute hospitals
- Local injury units

It is anticipated that the referral will be made by the initial facility's CDP, and the patient will be accepted by the Consultant on-call or other designated Consultants at the receiving PTC facility with visibility and responsibility for the referral process as appropriate. For example, an eligible patient's details might be uploaded by a Clinical Nurse Specialist at the initial facility utilising a secure ICT resource. These details then become available to the Consultant on-call at the PTC facility and a decision is made to accept them as part of the PTC pathway. Further details on this stage of the PTC pathway are provided below in section 5.4.2.

#### 5.4.2 Patient details are sent to the PTC facility

Upon meeting the selection & inclusion criteria, with the patient following the PTC pathway, their details are then uploaded using an approved, suitable ICT resource. This allows relevant stakeholders to virtually review the patient's injury, plan surgical requirements, arrange instrumentation and a date for surgery, etc. Initially, it is envisaged that this will be in use by the orthopaedic community of residents and consultants, as well as plastic surgeons. ICT support was deemed imperative to facilitate distribution of the referrals and evolving trauma lists to the following relevant stakeholders:

surgical day admissions, bed management, nursing administration, anaesthetists, and theatre resource managers. The aim of utilising the approved, suitable ICT resource in this way is to allow for the development of coordinated & networked care across the system and allow all stakeholders to engage in planning patient care in parallel, rather than in sequence.

#### *5.4.3 Patient is discharged and provided with information regarding PTC pathway*

Assuming the patient maintains their eligibility to be considered for surgery at the PTC facility, having passed the preoperative screening procedures as per the receiving facility's CDP, they will be informed of the process being undertaken for their new care pathway. Information packs for referred patients, to inform them of precautions to be taken and advice to bring pertinent medical imaging (if appropriate) and medications on the day of proposed surgery is given on discharge from the referring emergency department and disseminated electronically. If the patient's status changes during the waiting period, then the pathway may need to be changed. The patient should be always made aware that any changes to their clinical presentation should necessitate a review in the initial trauma facility they were assessed in, or their local ED, whichever is most convenient and expeditious. For any urgent non-clinical status changes, it is suggested that each individual facility provide patients with a dedicated contact point. For example, a unit may provide a secure email address or phone number by which patients can access support or have concerns addressed. It is imperative that this contact point is continuously monitored to ensure patient safety throughout the PTC pathway. Any non-urgent status changes should be addressed by the information packs provided to all PTC-eligible patients.

### **5.5 Day of surgery**

#### *5.5.1 Patient goes directly to the PTC facility or returns home as advised*

Depending on surgical list availability and bed capacity, patients who are suitable for the PTC pathway can return home (if deemed safe and medically appropriate to do so) with clear instructions as to the PTC pathway process, and a proposed date for future surgical intervention at the PTC facility. As mentioned previously, the PTC facility can be internal and/or adjacent to the admitted trauma facility, or a secondary external facility.

#### *5.5.2 Patient is admitted to the PTC facility for surgical intervention*

Patient consent will be obtained on the day of the planned surgical intervention. Patients will have received information regarding their scheduled procedure at the time of initial presentation and admission to the PTC pathway, and this will assist in decision making and consent. Patient consent for surgical procedures, and patient assent for going home to await surgical intervention are central to the PTC pathway, and all due regard to HSE and national guidelines on this topic must be observed. Each individual facility must consider both patient consent and patient assent in developing their PTC pathway.

#### *5.5.3 Upon monitoring in recovery, patient is returned to the ward +/- overnight stay*

Post-surgery, once the patient has been deemed medically stable, they will return to the recovery room/discharge lounge and if safe to do so, may be discharged later that day. Before discharge, the Registered General Nurse (RGN) will carry out a holistic assessment of the patient (*referring to the Day of Discharge Checklist of Integrated Care Pathway for Day Surgery*) to ensure suitability for discharge. If the RGN is concerned that the patient does not achieve the parameters set out in this

checklist, they must escalate this to the Clinical Nurse Manager on duty and/or contact the patient's Consultant or a member of their team.

If it is not safe for the patient to be discharged, or they require physiotherapy prior to discharge, they may need an overnight admission. For those units with an increased capacity for overnight admissions, a broader spectrum of cases can be managed, and overnight stay may be planned with early morning discharge.

## **5.6 Post surgery**

### *5.6.1 Patient is discharged from the PTC facility +/- OPD follow-up*

Once discharged, the patients are followed up in an OPD orthopaedic/plastics setting as per normal practice, depending on the post-operative instructions.

## 5.7 Patient persona - PTC pathway journey

The below patient journey is included, using the same scenario outlined in section 3.1, to show the impact of the PTC pathway:

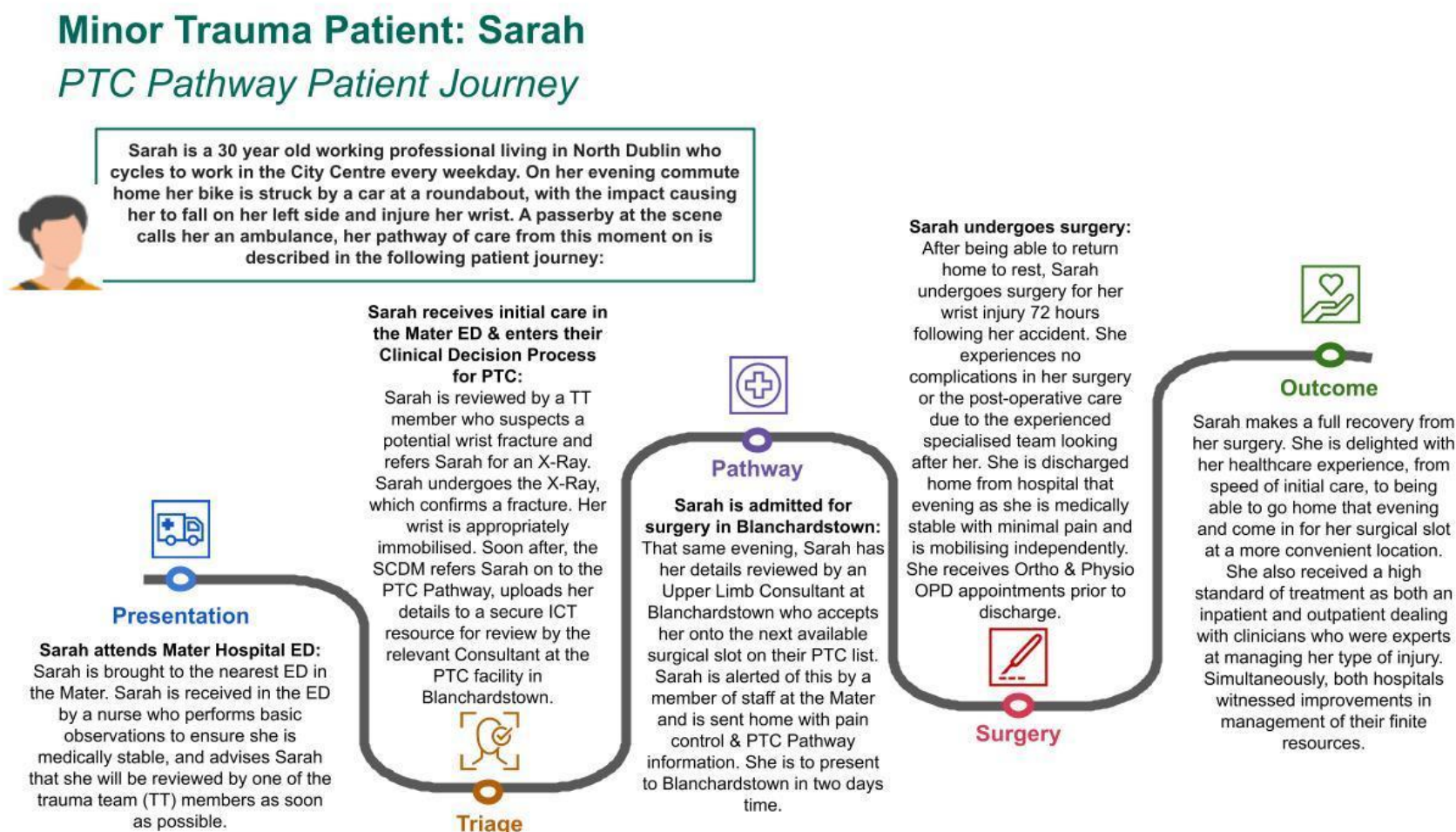


Figure 4 - Patient persona following the PTC pathway

## 6. Relevant stakeholders

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The development and implementation of the PTC pathway will include involvement from certain stakeholder groups - the below list is not exhaustive nor prescriptive. The inclusion of these stakeholders in the development of PTC in each individual facility will vary, however ensuring these stakeholders are aware that the new PTC pathway should be considered by units for successful implementation of this new service offering.

### Referring hospital:

- Known responsible clinicians from the ED or PTC admitting facility are initially responsible for the care of the patients
- The orthopaedic/plastic surgeons in the referring hospital
- Administrative staff from the referring hospital
- Infectious diseases (ID) team in the referring hospital.

### Accepting hospital:

- Predetermined clinician at the accepting PTC facility as per that facility's predetermined CDP
- Consultant surgeon and anaesthetist rota for communication and acceptance of the patients
- Clinical specialists involved in the receiving hospital (orthopaedics/plastics/medical/anaesthetists)
- Administrative staff
- Nursing administration
- Theatre staff
- Company representatives for equipment
- Trauma coordinator(s)
- Staff involved in recording of cases for audit purposes
- Hospital security and reception
- Infection control coordinator
- Isolation protocols for suspected infected and confirmed positive patients and theatre protocols for same
- IT team
- Radiology management and radiographers
- Laboratory
- Pharmacy
- Phlebotomy.

### Patients and the patient journey:

- Information about what to expect on arrival
- Patient information regarding preparation for surgery

- Risk assessment information for patient
- Clear contact point(s) for the patient in the event of any change in their clinical or non-clinical circumstances
- Self-filled pre-assessment form to ease same day admission administrative duties.

## 7. Service specification for PTC

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### 7.1 Introduction

The aim of PTC is to develop a pathway where patients with suitable injuries, who do not need immediate admission, are managed in a scheduled manner that is more appropriate to their care needs. Therefore, the effective delivery of PTC requires the appropriate resources to be available within each hospital, hospital group and potential PTC facility that are looking to adopt or further develop this service provision across the trauma networks.

As there is expected to be variance to the degree and nature in which each unit adopts PTC to suit their specific needs, the service specification for this pathway must maintain scope for flexibility. However, units are still required to be capable and fully equipped to deliver safe and effective ambulatory trauma care within appropriate timeframes. Therefore, the service specification sets out the minimum expected requirements for units to deliver PTC.

#### *7.1.1 Common Requirements in Delivering PTC*

While each individual PTC facility will vary in their existing and anticipated resource availability, the following resources have been identified as being the minimum requirements to deliver ambulatory care, regardless of which model of PTC service will be adopted:

- Access to suitable orthopaedic operating theatres and surgical facilities to cater to the needs of patients suitable for PTC:
  - Appropriate theatre access may be provided by a dedicated ambulatory trauma theatre on or off-site or through using existing sessions.
  - The amount of theatre time made available will be determined by the likely volume of PTC cases.
  - To note, should dedicated theatres be made available for PTC, any latent capacity could be made available for expanding elective activity if appropriate.
- Space, processes and suitably trained personnel to allow for dedicated regional anaesthesia.
- Access to appropriate bed spaces to facilitate day case admissions or day of surgery admissions:
  - Examples of appropriate bed spaces include a dedicated day ward and/or protected beds on a suitable inpatient ward.
  - Bed spaces may facilitate day case procedures and/or overnight cases, depending upon the PTC facility's capacity to manage them.
  - The amount of bed spaces made available will be determined by the likely volume of PTC cases.
- Appropriate X-Ray/imaging access for performing the case mix anticipated at the PTC facility, including access to appropriate equipment (e.g., imaging intensifiers) and operators.
- An approved and suitable ICT support to facilitate cross-network cooperation that will enable better use of the PTC service and facilitate coordination of patient care with relevant stakeholders.

### 7.2 PTC Models

Four distinct PTC models are outlined below which highlight varying specifications for a PTC facility. Each model contains scope for flexibility to ensure that individual hospitals, hospital groups and

potential PTC facilities maintain autonomy over the degree and nature to which they adopt and deliver PTC. The National Office for Trauma Services and the Trauma System Implementation Programme will work with all individual units to identify the most appropriate model for implementation. This collaborative process will identify any potential capital and staffing resource requirements, remaining cognisant of existing engagement and service levels within each facility.

The four PTC models of which most facilities are expected to adopt are:

- Model A - PTC provided in a dedicated elective orthopaedic hospital
- Model B - PTC provided in an Acute Hospital / Trauma Unit
- Model C - PTC provided in a private hospital
- Model D - PTC provided in a dedicated, independent, bespoke PTC facility.

The model adopted by a given facility will be dependent on both patient volume and facility resources. These resources comprise physical resource availability (i.e., bed and theatre capacity), human resource availability (i.e., staffing), and ICT resource availability. Each PTC model will have the capacity to allow for day case procedures, and/or overnight stay for inpatient care; this will again be dependent on patient volume, injury presentations and the resources of the PTC facility. In each model, the length of the PTC surgical list (e.g., a five-day list, a one-day list, a partial day list) will also be determined by patient volume and facility resources. All four models allow for the provision of networked care as a component of their PTC service. An example of this in practice is seen in section 4.3.1 with the transfer of ambulatory trauma patients from UHL to Cappagh.

Some individual hospitals, hospital groups and potential PTC facilities may see a 'hybrid', or combination of models, as being the most appropriate way for them to offer a PTC service. This is reflective of the fact that certain combinations of models will be more appropriate for certain hospitals and hospital groups, as well as for different surgical specialties and time of the year. As above, individual collaborative processes between hospitals, hospital groups and potential PTC facilities and the National Office for Trauma Services will be followed to ensure accurate identification of capital and staffing resource requirements for any potential hybrid PTC model.

## 8. Conclusion

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From assessing the current system of trauma care in Ireland, we can see that two key challenges exist; the unpredictable nature of trauma care, and infectious disease control as Ireland and the world continue to navigate the COVID-19 pandemic. It is the combination of these two challenges that provide the greatest case for change to the current system of trauma care. This change has already been successfully trialled in an Irish healthcare context in the case of a PTC-like system at UHL, CUH and four of six Dublin Hospitals.

A review of international best practice has found planned or ambulatory trauma care to be significantly beneficial for all stakeholders, including the patient, the treating clinician, and the hospital facility. PTC-like systems have been shown to result in the following beneficial outcomes:

- Improved patient experience and overall satisfaction rates
- Improved patient outcomes through increased specialisation of care
- Improved bed utilisation rates
- Reduced waiting times in EDs
- Improved patient flow
- Improved acute hospital capacity for more severe and high complexity trauma care
- Improved facility efficiency through more effective list management
- Reduced patient length of stay and cost per patient
- Reduced negative impact on scheduled care
- Specifically in an Irish healthcare context, PTC also aligns with the directives outlined in the Sláintecare Strategy.

This Model of Care document has outlined the challenges and inefficiencies that exist nationally in the current system of managing ambulatory trauma patients. This Model of Care document also details what ‘good’ looks like through a literature review of international best practice in ambulatory trauma care alongside a case study of a PTC-like system in UHL. PTC is the suggested new way of working to manage ambulatory trauma care in Ireland, and this Model of Care document aims to provide each individual facility that receives trauma patients with a guide on how to develop a model of PTC that best aligns with their individual existing resources and organisational strategies.

The next steps to implement PTC as a new service offering involves each individual facility that receives trauma patients liaising with the National Office for Trauma Services and Trauma System Implementation Programme to identify the most appropriate PTC model for implementation, and subsequently developing their own CDP; with the method of patient entry to the PTC pathway, use of inclusion and exclusion criteria, and clinical governance throughout the pathway (amongst other logistical issues) all to be determined by each facility. Once the model of PTC care and the CDP has been agreed upon, the implementation of the PTC pathway can begin in each facility.

By taking these next steps of agreeing on an appropriate model of PTC care and on an individual CDP to guide their PTC pathway, each individual facility can retain a high degree of autonomy over their trauma care system whilst simultaneously implementing truly networked trauma care in Ireland.

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## Appendix A: Literature Review Tables

### Readmission/ED presentation rate

| Country | Intervention                                     | Result                                                                                                                                                                                                     | Source                                                     |
|---------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Canada  | Ankle Fracture Repair                            | <b>11.2% of the inpatient group (vs 7% for the outpatient group) presented to the emergency department</b> or were readmitted to hospital within 30 days of discharge.                                     | Pasic N et al. <b>2022</b> Apr 8;65(2):E259-E263           |
| USA     | Paediatric (<13yo) Supracondylar Fracture Repair | Relative to inpatient surgical management, <b>outpatient surgical management had lower rates of return ED visits</b> at 1 month (hazard ratio: 0.744, $P=0.048$ ).                                         | Modest, J et al. <b>2022</b> - Volume 42 - Issue 1 - p 4-9 |
| USA     | Ankle Fracture Repair                            | <b>Outpatient ankle fractures also had lower rates of 90-day readmissions (9.7% versus 14.1%)</b> and emergency department visits (13.8% versus 16.2%; $p = .028$ ) when compared to inpatient management. | Malik AT et al. <b>2020</b> May-Jun;59(3):502-506          |
| UK      | Minor Orthopaedic Trauma                         | <b>All patients admitted to day surgery were discharged home. None required admission to a hospital ward</b> , and none developed any postoperative complications that would require return to hospital.   | Charalambous <b>2003</b> Jan;85(1):28-31                   |

### Post-Operative Complications

| Country | Intervention          | Result                                                                                                                                                                                                                                                                                         | Source                                            |
|---------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| USA     | Ankle Fracture Repair | Compared with inpatients, <b>outpatient ankle fractures had statistically lower rates of:</b><br><br>Pneumonia (2.3% versus 4.0%)<br>Myocardial infarction (0.9% vs 1.8%)<br>Acute renal failure (2.2% vs 5.3%)<br>Urinary tract infections (7.4% vs 12.3%)<br>Pressure ulcers (0.9% vs 2.0%). | Malik AT et al. <b>2020</b> May-Jun;59(3):502-506 |

|        |                                 |                                                                                                                                                                                                                                                                        |                                                       |
|--------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Canada | All Fracture Repair             | There were <b>no complications while patients were waiting at home for the surgical procedure.</b>                                                                                                                                                                     | Wolfstadt JI et al. <b>2020</b> Jan 15;102(2):110-118 |
| USA    | Hand surgery in ambulatory care | The use of local anaesthesia and <b>outpatient surgery (1.4% complication rate)</b> was associated with a significantly lower risk of complications than <b>inpatient surgery (8.7% complication rate).</b>                                                            | Thompson NB et al. <b>2018</b> Jan;49(1):69-72        |
| UK     | Minor Orthopaedic Trauma        | <b>No outpatients developed any postoperative complications that would require return to hospital.</b>                                                                                                                                                                 | Charalambous CP et al. <b>2003</b> Jan;85(1):28-31    |
| USA    | Severe Ankle Fracture Repair    | No significant difference in range of motion was evident between the groups. No deep infections or osteomyelitis were present in either group. <b>The differences in wound complications and anatomic reductions between groups was not statistically significant.</b> | Konrath G et al. <b>1995</b> ;9(5):377-80             |

#### Patient Satisfaction

| Country | Intervention                | Result                                                                                                                                                                                                                                                                     | Source                                                 |
|---------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Canada  | All Fracture Repair         | Patients were <b>overwhelmingly satisfied with their care</b> and with the preparedness <b>for the outpatient surgical procedure.</b>                                                                                                                                      | Wolfstadt JI et al. <b>2020</b> Jan 15;102(2):110-118  |
| Spain   | General Orthopaedic Surgery | The results for patient satisfaction with day and inpatient surgery during the last 5 years show <b>no significant differences were recorded overall</b> , so <b>choosing ambulatory management of the procedure did not result in a decrease in patient satisfaction.</b> | Martín-Ferrero MÁ et al. <b>2014</b> Mar;19(2):332-338 |

#### Cost

| Country | Intervention          | Result                                                                                                                                                | Source                         |
|---------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Canada  | Ankle Fracture Repair | The <b>average cost was significantly higher for the inpatient cohort than the outpatient cohort (\$4137 v. \$1834)</b> for isolated ankle fractures. | Pasic N et al. ( <b>2022</b> ) |

|        |                                          |                                                                                                                                                                                                                                              |                                            |
|--------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| USA    | Paediatric Supracondylar Fracture Repair | The median amount billed per claim for <b>inpatient surgeries was significantly higher than for outpatient surgeries (\$16,097 vs. \$9,752)</b>                                                                                              | Modest, J et al. (2022)                    |
| USA    | Ankle Fracture Repair                    | Overall <b>90-day costs for outpatient ankle fractures were nearly \$9000 lower than costs for inpatient ankle fractures (\$12,923 versus \$21,866)</b>                                                                                      | Malik AT et al. (2020)                     |
| USA    | Ankle Fracture Repair                    | <b>Outpatient care was associated with 31.6% lower costs</b> compared with inpatient care                                                                                                                                                    | Bettin C et al. 2019 Feb 1;27(3):e127-e134 |
| Canada | Hand Fracture Repair                     | The cost of performing a Closed Reduction Internal Fixation (CRIF) in the OR under local anaesthetic, is \$461.27 Canadian (CAD) compared to \$115.59 CAD in the ambulatory setting, <b>a 299% increase in cost for inpatient treatment.</b> | Gillis JA et al. 2017, Pages 1044-1050     |
| USA    | Complex Foot Surgery                     | <b>Outpatient management reduced perioperative and intraoperative costs by 54%</b> for patients who underwent hindfoot osteotomy, arthrodesis, or multiple ligament repair.                                                                  | Oh J et al. 2016;35:20                     |

## Length of Stay

| Country | Intervention                 | Result                                                                                                                                                                      | Source                                         |
|---------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Canada  | Ankle Fracture Repair        | <b>Inpatients had a significantly longer mean length of stay than outpatients (54.3 h v. 7.5 h)</b> with no significant difference in readmission or reoperation rates.     | Pasic N et al. 2022 Apr 8;65(2):E259-E263      |
| Canada  | All Fracture Repair          | In the post-intervention period (July 2017 to December 2018), the <b>average length of stay was 0.2 day, a decrease of 94.0% compared with the pre-intervention period.</b> | Wolfstadt JI et al. 2020 Jan 15;102(2):110-118 |
| USA     | Severe Ankle Fracture Repair | There was <b>a significantly longer median hospital stay in the early (3 days) versus delayed groups (2 days)</b>                                                           | Konrath G et al. 1995;9(5):377-80              |

## Patient Flow

| Country | Intervention         | Result                                                                                                                                                                                                                                                                                                        | Source                                          |
|---------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Canada  | Hand Fracture Repair | In an <b>eight-hour surgical block, five surgeries in the OR were able to be performed versus eight in an ambulatory setting.</b>                                                                                                                                                                             | Gillis JA et al. <b>2017</b> , Pages 1044-1050  |
| USA     | Hand Surgery         | The ASC was found to have <b>shorter turnover times than the Orthopaedic Specialty Hospital OSH (27.9 minutes vs 36.4 minutes).</b>                                                                                                                                                                           | Gottschalk MB et al. <b>2016</b> ;11(4):489-494 |
| USA     | All Surgery          | On average, <b>procedures performed in Ambulatory Surgical Centres (ASCs) take 31.8 fewer minutes than those performed in hospitals—a 25 percent difference relative to the mean procedure time</b>                                                                                                           | Munnich EL et al. <b>2014</b> ;35(5):764–9      |
| USA     | All Surgery          | The mean total perioperative <b>time for all procedures examined was 39% shorter in freestanding ASCs than in hospital-based ASCs (83 vs 135 min); surgery time was 37% shorter (19 vs 30 min), operating room time was 37% shorter (34 vs 54 min), and postoperative time was 35% shorter (48 vs 74 min)</b> | Hair B et al. <b>2012</b> Jul;204(1):23-7       |

## Appendix B: Potential Selection Criteria for PTC Pathway

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### A) Sample social selection criteria:

- Patients live within close travelling proximity to the secondary theatre/unit/hospital and have a suitable mode of transport to reach their destination.
- Patients who are suitable for network-wide PTC, i.e., those patients who are medically fit and electively choose to travel - for convenience, reduced time to treatment or other acceptable reason - to a PTC facility with capacity to admit them for care.
- Patients have a responsible adult both to take the patient home and to provide help and assistance during the time period between the discharge from the initial unit/hospital and admission to the secondary theatre/unit/hospital
- The patient has capacity to understand the proposed surgery process and can consent for the surgical procedure

### B) Sample physical selection criteria:

- Assessed to determine medical suitability using a CDP that clearly defines the individual(s) suitably qualified to determine those patients who are medically suitable, typically ASA grade 1 or 2.
- COVID-19 Risk Assessment performed.
- A predetermined and approved list of fractures and soft tissue injuries suitable for selection to the PTC pathway. Such a list will largely comprise fractures and soft tissue injuries extending from elbow to fingertip and from knee to toe, including but not limited to:
  - Wrist
  - Metacarpals/metatarsals
  - Radius & ulnar shaft
  - Humerus and surgical neck of humerus
  - Patella
  - Ankle
  - Other complex foot & ankle injury if deemed suitable by the operating consultant
- Presence of additional surgical risk factors, for example risk of compartment syndrome
- Patient analgesia requirements: if a patient is awaiting PTC and if they need an escalation in pain control (up to and including prescription of opiates), this becomes a trigger to re-attend.
- Plastics: plastics involvement in the PTC pathway will vary from facility to facility.
- Basic outline of comorbidities and abnormal surgical bloods for anaesthesiologist vetting

### C) Sample surgical selection criteria - The normal postoperative course for patients following these surgeries:

- Should not carry a significant risk of serious complications requiring immediate medical attention e.g., haemorrhage or cardiovascular instability.
- Should not prohibit the patient from resuming oral intake within a few hours.