

## Feedback from Anesthesia clinicians

### 2.1 Intubate Patient Workflow

The following section describes the workflow as derived from the Intubate Patient use case analysis.

#### *Intubate Patient (Process)*

This process describes the clinical workflow described by [the use case: Intubate Patient](#).

**For Confirmation:** There will be more than one response team member, and they share duties. There are typical duty assignments among nurse, physician, and respiratory therapist: these are not illustrated here, as the participants may perform atypical tasks in an emergent situation.

The following diagram describes the steps required to intubate a patient who needs respiratory support.

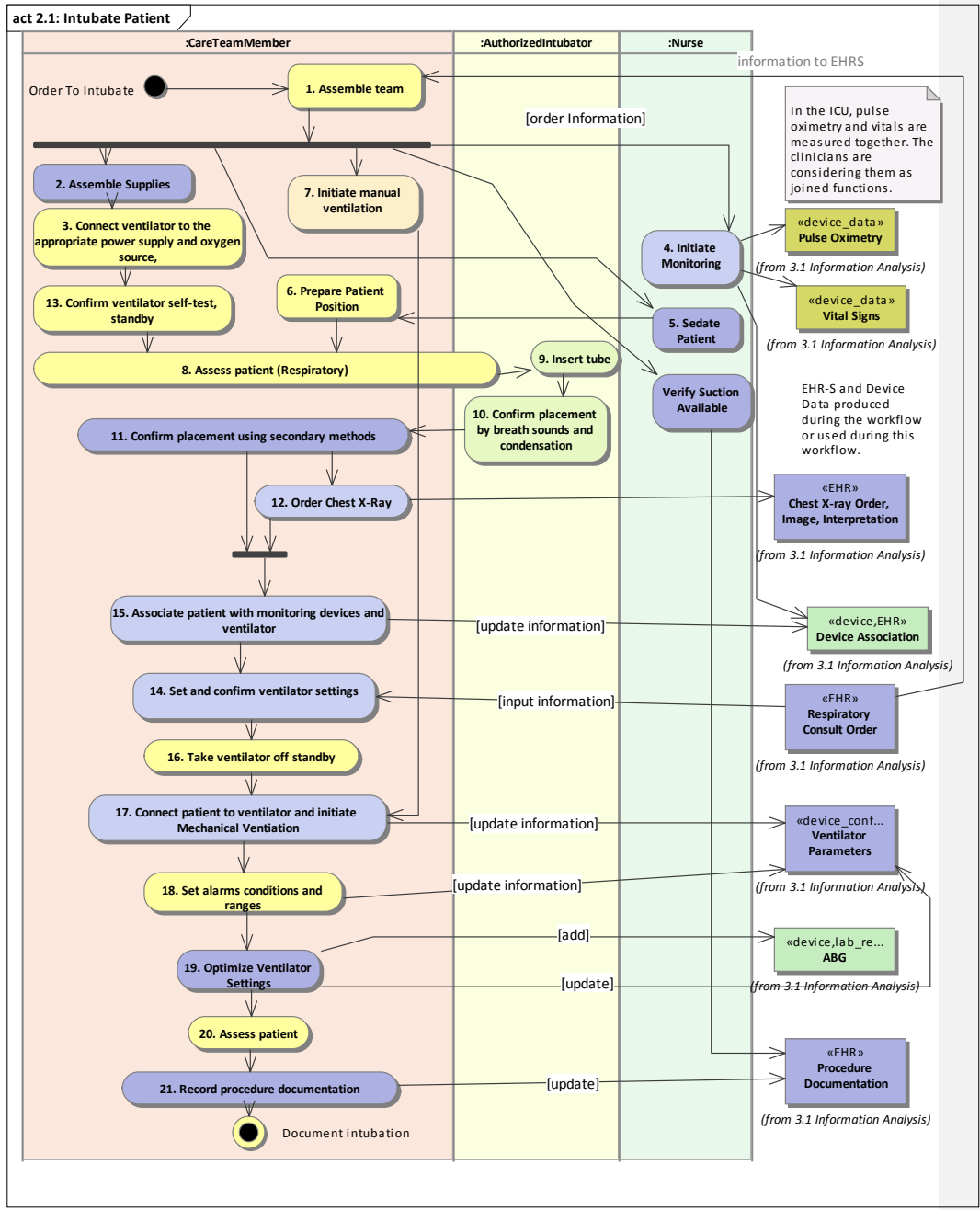


Figure 2.1: Intubate Patient

	The steps in this partition are performed by the person who play the role of "Privileged Intubator" as described in the previous section .
Order To Intubate	In response to a deterioration in patient condition, a physician orders intubation (verbally or in a document) and assembles a team. The physician specifies the ventilator setting in the respiratory consult. An arterial blood gas laboratory test may also be order in advance of the Endotracheal Intubation procedure order. <a href="#">Consider difficult airway (DA) assessment – history of DA or after examination, consider DA devices or anesthesiology consult</a>
2. Assemble Supplies	Is there a checklist for supplies? Are the supplies matching the order and the preferences of the individual Privileged Intubator? Is the Endotracheal Tube the correct size based on order and patient's previous history with intubation? <a href="#">Suction should be checked before giving sedation; sedation may not be need in a code situation</a>
3. Connect ventilator to the appropriate power supply and oxygen source,	Connect to appropriate power supply (pneumatic, electric) and to the oxygen source and set up generic settings.
4. Initiate Monitoring	The patient is associated with pulse oximetry monitor and the monitor sends its readings to the information system. In Intensive Care settings, the vital signs are monitored together.
5. Sedate Patient	A verbal or written order from the physician would be required before sedating a patient. <a href="#">Need emergency drugs available in the case of code or problem during the whole intubation sequence.</a>
<a href="#">6 Position patient</a>	<a href="#">Bed flattened, consider head / neck support, shoulder roll, discuss "uncleared neck", traction etc.</a>
7. Initiate manual ventilation	This step is also referred as "pre-oxygenation". The nurse or therapist ( <a href="#">maybe others in this role</a> ) will use a mask and <a href="#">an manual-bag/mask ventilation (standard phraseology)</a> to pre-oxygenate the patient. This activity continues until the mechanical ventilation is initiated.
8. Assess patient (Respiratory)	This assessment is a respiratory assessment. <a href="#">Need intubation(insert tube) step. Do you mean resp assessment before or after intubation? I assume you mean after.</a>
<a href="#">10 Primary assessment of tube placement</a>	<a href="#">Listen to chest to confirm bilateral chest movement, over stomach to exclude esophageal intubation, observe chest rise (condensation is very unreliable)</a>
11. Confirm placement using secondary methods	Methods of confirmation may include one or more of he following: - CO <sub>2</sub> reading confirming expiration <a href="#">and correct tube placement– required item now in all settings: data to be recorded manually or automatically in ICU into the EHR</a> - EDD ( <a href="#">meaning of acronym?</a> ) device confirming the presence of carbon dioxide in the breath.  Note: We do not assume these devices will report their readings automatically to information <a href="#">system</a> but they are used by clinicians to validate tube placement.
12. Order Chest X-Ray	A chest X-ray is order to confirm the correct placement of the tube. Initially and, in some care settings, repeated on a daily basis. Note that the X-ray may be performed after the procedure ends. The attending physician will evaluate the X-Ray and request a change, if needed .The physician's findings are recorded in the electronic record.
15. Associate patient with monitoring devices and ventilator	pulse oximeter, vital <a href="#">signs</a> , <a href="#">end</a> -tidal CO2, ventilator <a href="#">settings</a> <a href="#">This step ensures that the ventilator is reporting results directly to the EHR-S.</a>
19. Connect ventilator to medical record	This step ensures that the ventilator is reporting results directly to the EHR-S. <a href="#">Don't think that just 'connecting' ensures reporting.</a>
19. Optimize Ventilator Settings	This set up goes beyond the starting point setting specified in the order including <a href="#">an ABG to confirm adequacy of ventilator settings.</a>
20. Assess patient	Assess the patient status for discomfort and improvement. This may include a respiratory assessment and evaluate vital signs.
21. Record procedure documentation	-- includes difficulty <a href="#">of intubation</a> (e.g. <a href="#">levelGrades 1-4</a> , number of failed attempts, <a href="#">any adjunctive devices used</a> ). The documentation will include the use of disposables during the procedure. The information is automatically transferred to relevant information system. <a href="#">Why does this need to called out? 'Disposables' not documented at all places. The</a>
Document intubation	A clinical note is created to document the Endotracheal Intubation Procedure.

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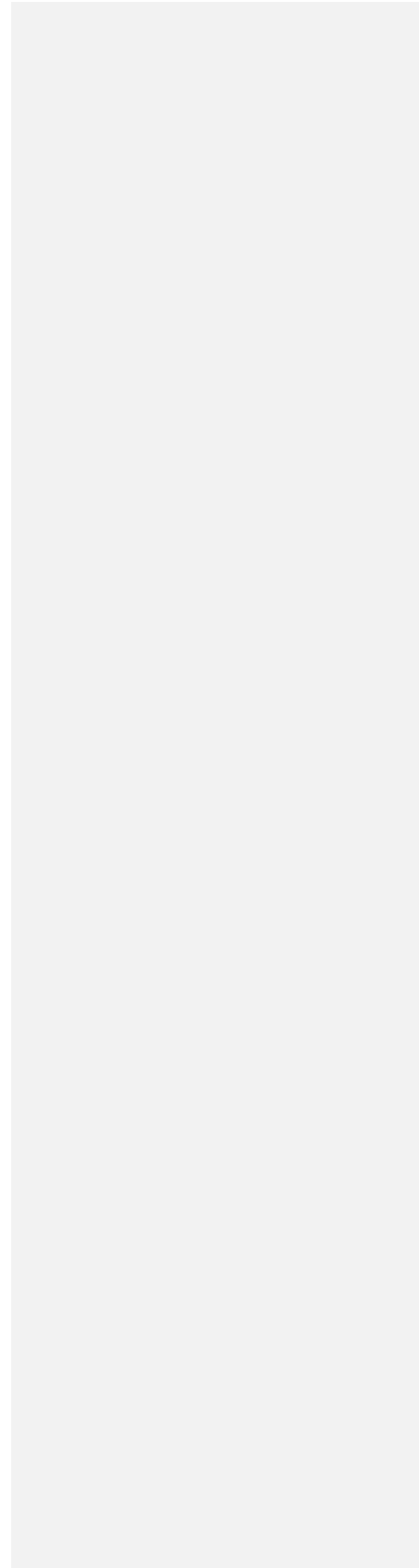
## 2.2 Manage Patient On Ventilator Workflow

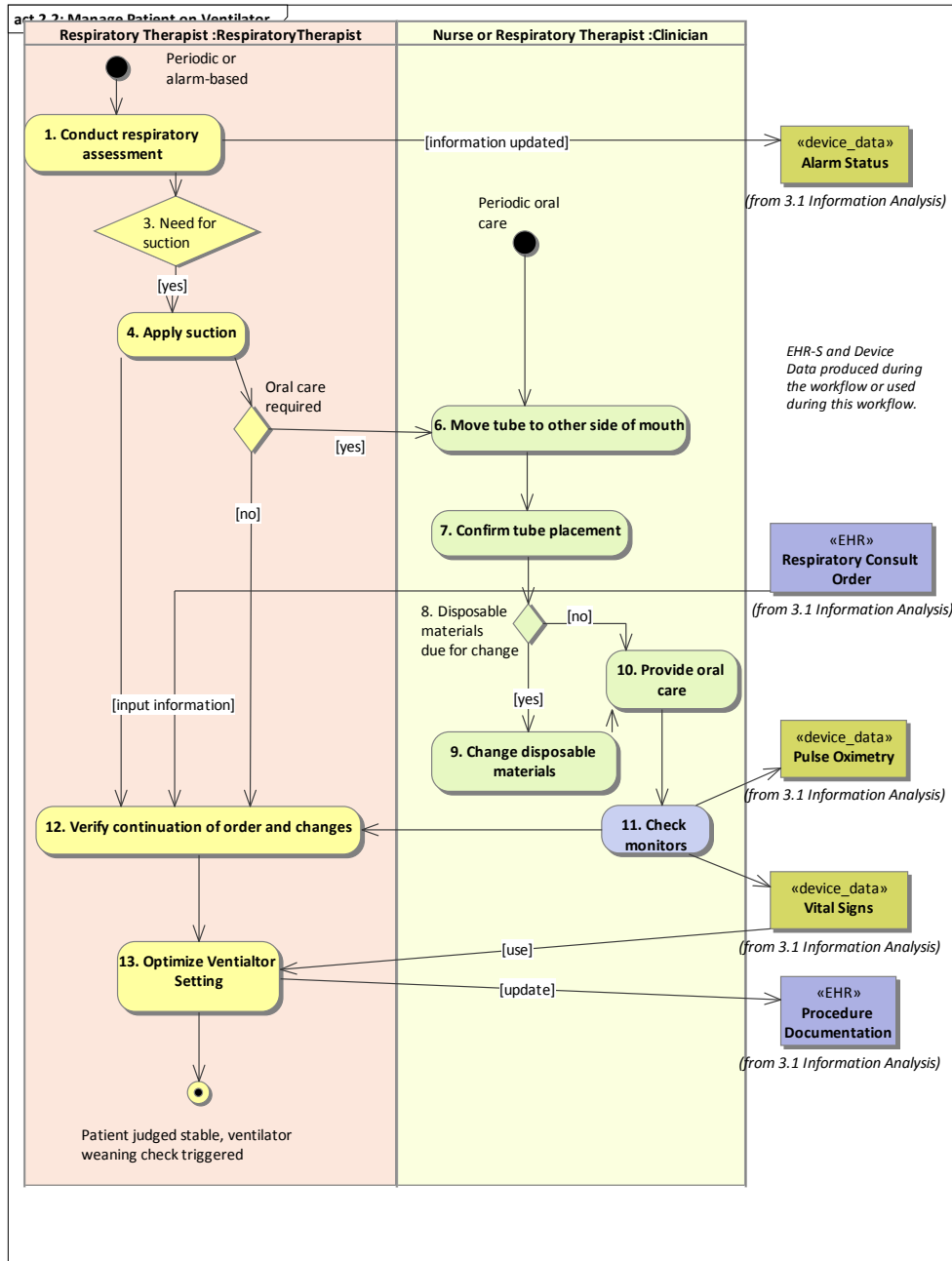
| The following section describes the workflow as derived from the Manage Patient- use case analysis.

### ***Manage Patient on Ventilator (Process)***

This process describes the clinical workflow described by the [Manage Patient Use Case](#).

The following diagram describes the steps required to manage the ventilator settings while a patient is intubated.





**Figure 2.2: Manage Patient on Ventilator**

Respiratory	RespiratoryTherapist	This partition contains the activities performed by respiratory therapist
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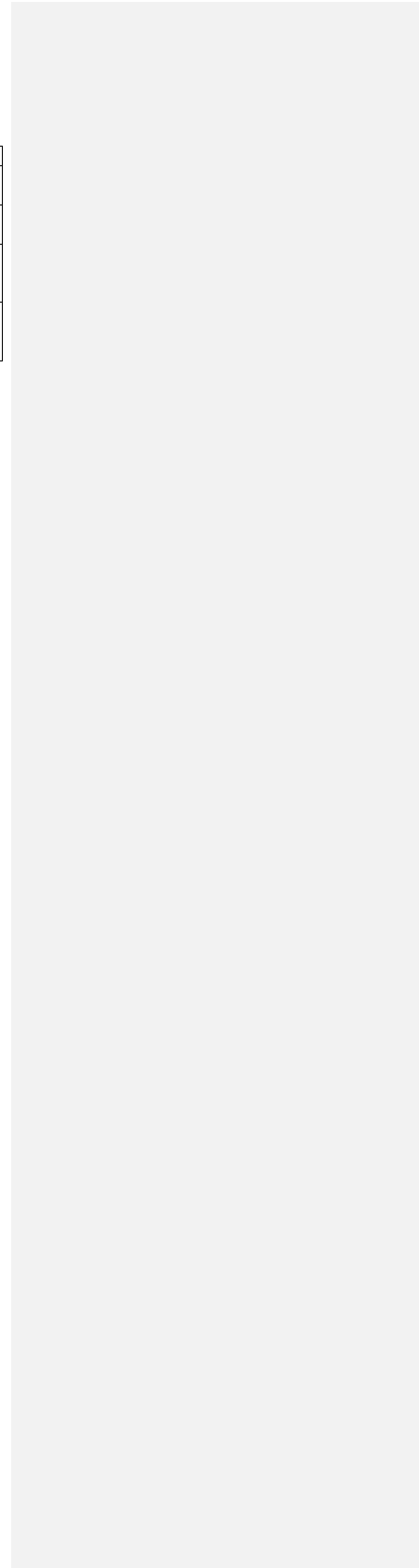
Therapist		who manages the patient who is intubated.
4. Apply suction		Suction and wait for patient to recover from suction, stop coughing, etc.
5. Patient due for oral care		Also referred as "airway care"
12. Verify continuation of order and changes		... This step includes checking for any changes to the order (e.g. vent mode).
13. Optimize Ventilator Setting		This activity describes the set of steps required to optimize the ventilator settings starting with those settings ordered by the ordering physician.

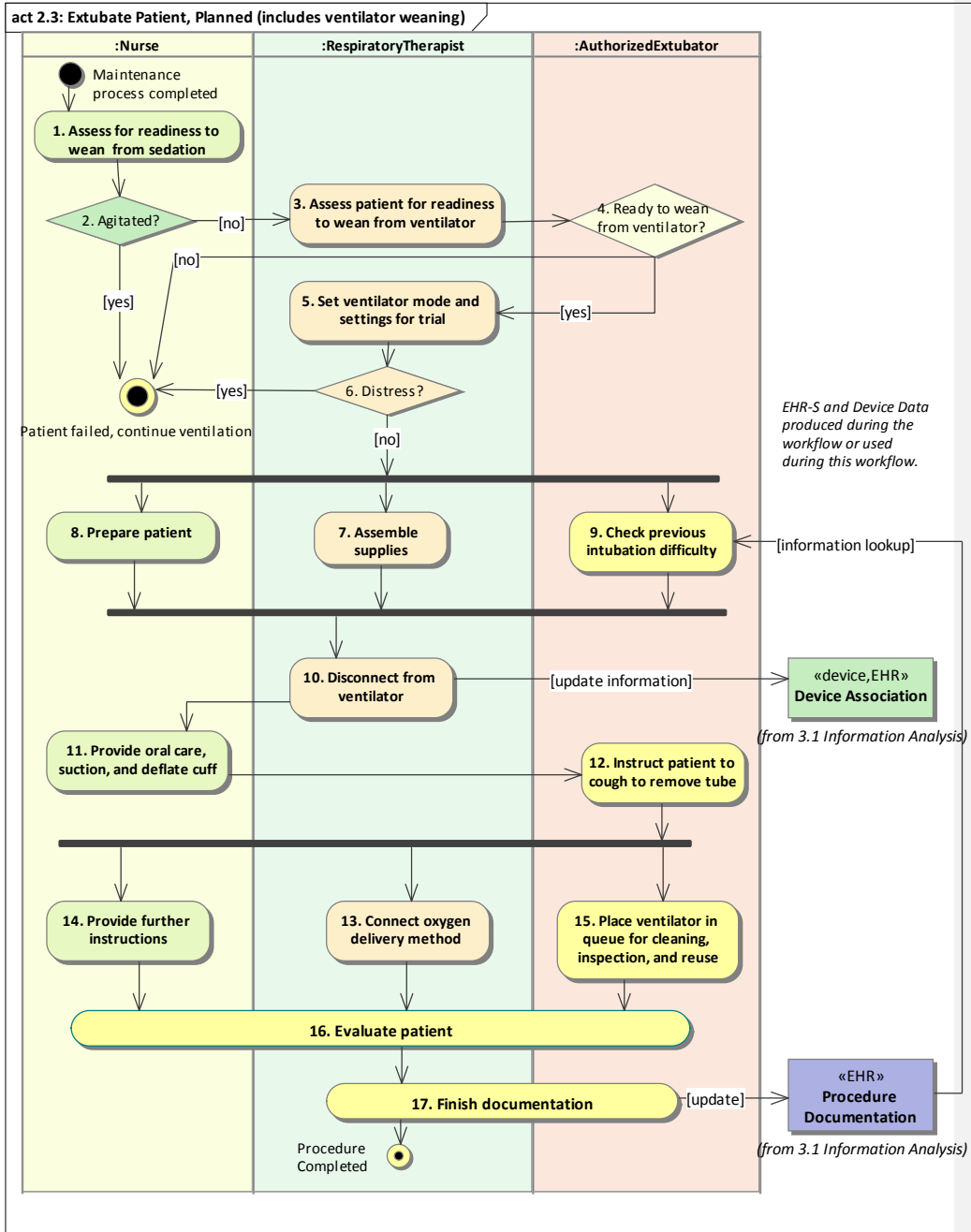
### 2.3 Liberate Patient from Ventilator, Planned Workflow

The following section describes the workflow as derived from the Liberate Patient From Ventilator use case analysis.

#### ***Liberate Patient from Ventilator, Planned (Process)***

This process describes the clinical workflow described by the [use case Liberate Patient](#). The following diagram describes the steps required to terminate a patient, including ventilator weaning.





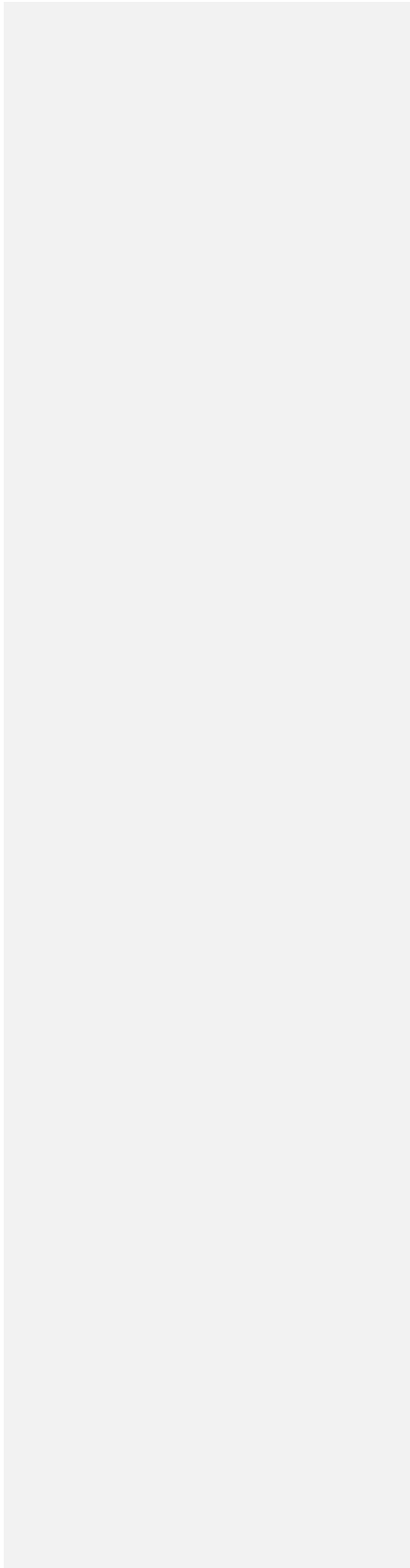
**Figure 2.3: Extubate Patient, Planned (includes ventilator weaning)**

3. Assess patient for readiness to wean from ventilator	It may include RSBI and other assessment methods based on best-practices.
5. Set ventilator mode and settings for trial	This is done after the assessment
8. Prepare patient	Suction, position, explain process
9. Check previous intubation difficulty	Difficult or standard - should be part of initial intubation. In this step we check to see if additional clinicians need to be involved for a difficult intubation.
10. Disconnect from ventilator	The device is disconnected from the patient and device association record is updated automatically.
12. Instruct patient to cough to remove tube	The cough helps remove the tube.
16. Evaluate patient	On-going assessment

## 2.4 Post-Operative Patient Transport

The following section describes the workflow as derived from the Transport use case analysis.

The following diagram details the steps required to transport a patient across the enterprise.



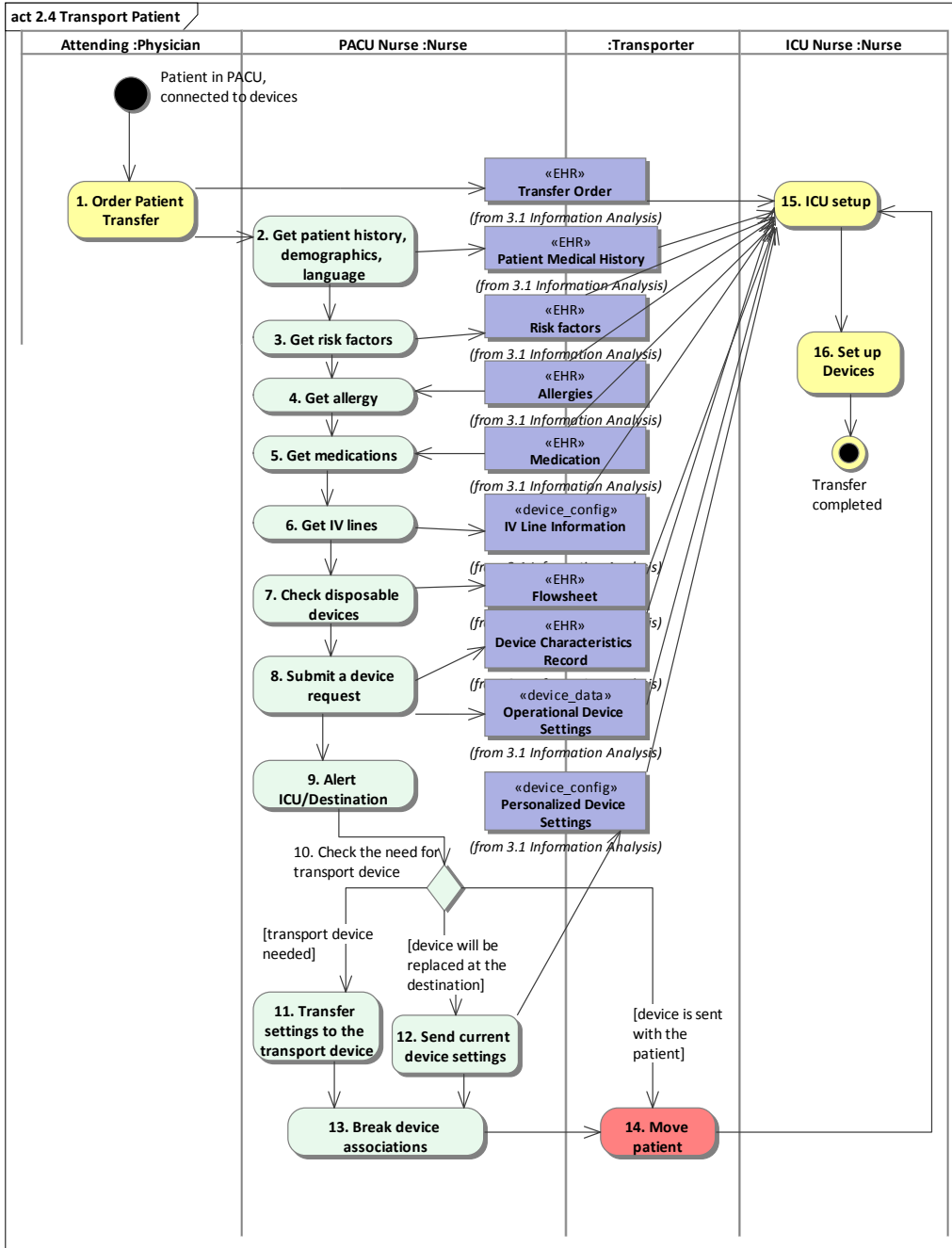


Figure 2.4 Transport Patient

### **1. Order Patient Transfer (Activity)**

A physician orders that the patient is moved from the one location to another (e.g. from PACU to ICU).

### **2. Get patient history, demographics, language (Activity)**

While this activity is primarily completed on paper, the updates to the medical history and consent forms should be recorded in the health information system and in the patient Electronic Health Record.

### **6. Get IV lines (Activity)**

Get Intravenous Line information.

### **7. Check disposable devices (Activity)**

This includes checking where they are connected, when it was placed.

### **8. Submit a device request (Activity)**

This request is sent to the destination unit to have the devices available when the patient arrives

### **10. Check the need for transport device (DecisionNode)**

Depending on the status of the patient, the distance of the transport it may be necessary to provide devices (e.g. ventilator) for transport, use the current device, or use manual ventilation.

## **2.5 Referenced Technical Workflows**

The following section elaborates the technical use cases required to support the overall user requirements regarding intubation and other clinical needs.

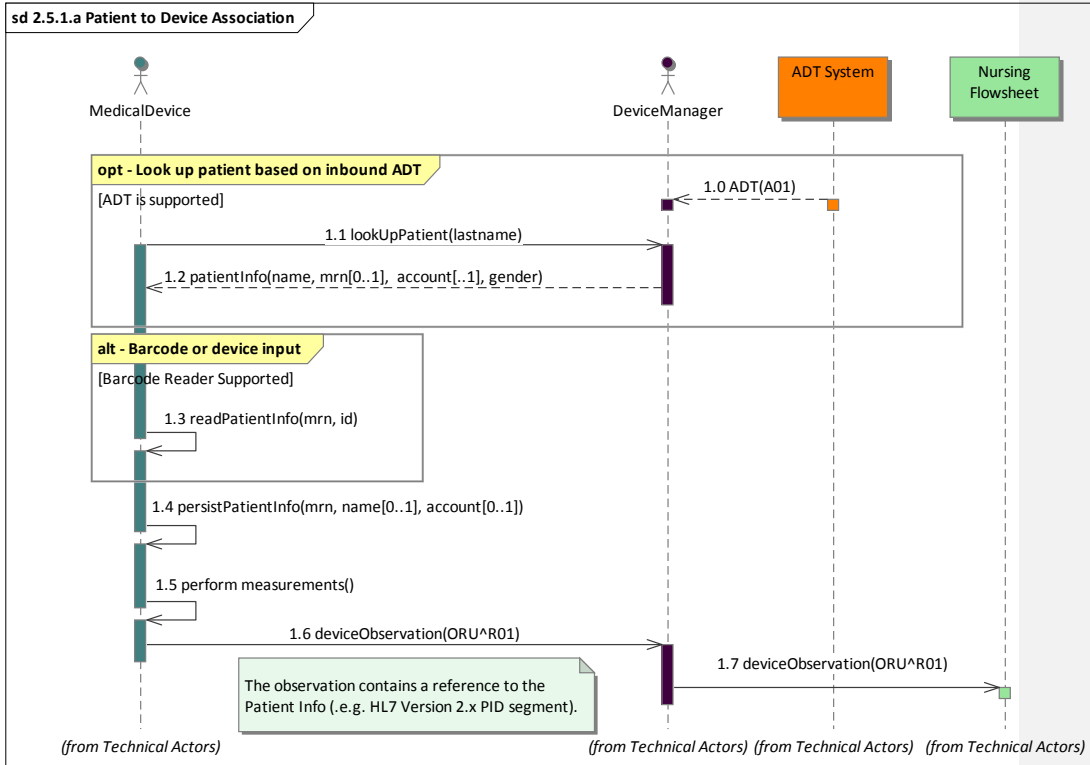
### **System Roles**

The following section details the system roles involved in the technical use cases for this model.

#### **2.5.1 Patient to Device Association**

The Patient-to-device association -workflow specifies the interactions between devices and the information system required to establish that a device is assigned to a specific section and ensure that the alarms and measurements transmitted by the medical device to the EHR-S or Nursing Flowsheet where the results are later validated and reviewed by clinicians before they are added to the patient's medical record.

The following diagram illustrates the systems interacting when a device is assigned to the patient right at the point-of-care using either from a list drawn from known ADT records captured by the Device Manager and made available to its devices or by entering the patient's identifier(s) at the bed side - ideally by reading their wrist band. While other user entry methods are plausible, a barcode reader avoids the entry errors inherent in typing identifiers on the device.



**Figure 2.5.1.a Patient to Device Association**

The interactions are more complex for Legacy Medical Devices as they rely more heavily on Device Manager system and, in extreme cases, on information systems to associate the observations of medical device with a specific patient record.

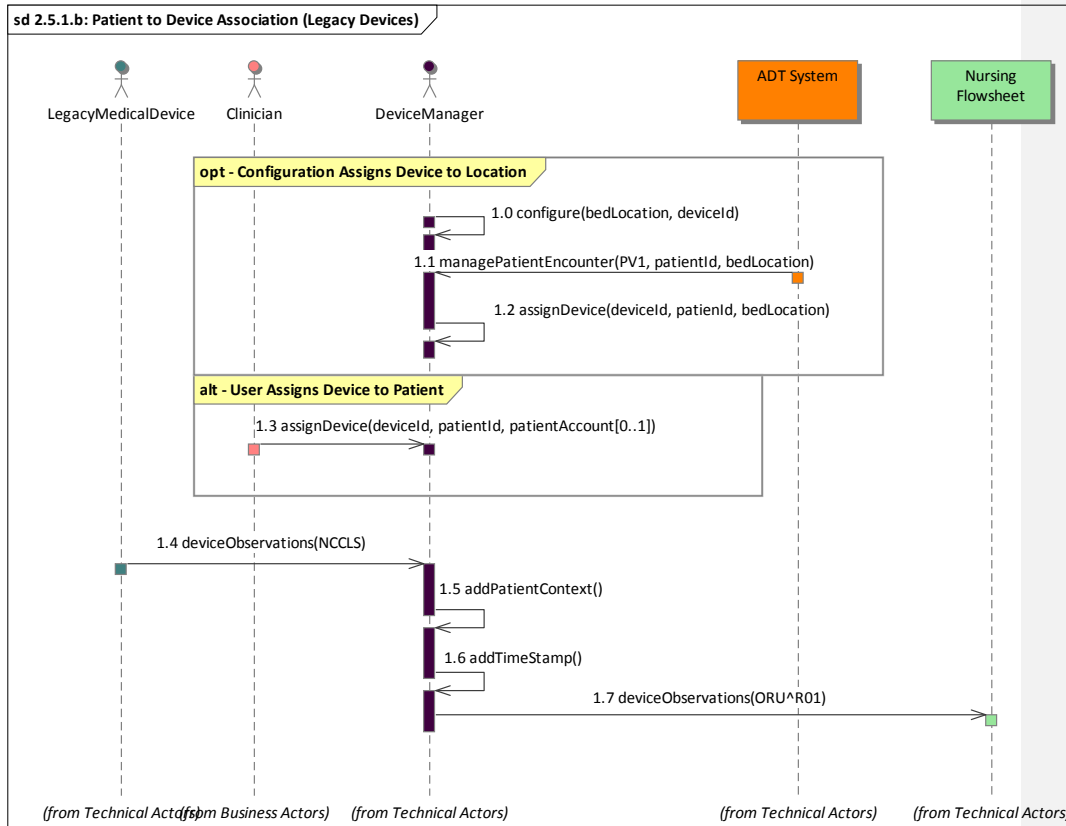


Figure 2.5.1.b: Patient to Device Association (Legacy Devices)

**- Look up patient based on inbound ADT (InteractionFragment)**

This option requires that the Device Manager track the ADT messages flowing in the enterprise.

**- Barcode or device input (InteractionFragment)**

This alternative option is available to those devices that support bar code readers.

**2.5.2 Time Synchronization**

The following section elaborates how time synchronization would operate for legacy and networked devices.

The following interaction summarized the simple network time synchronization for those medical devices able to communicate over the local are network with other systems in the enterprise.

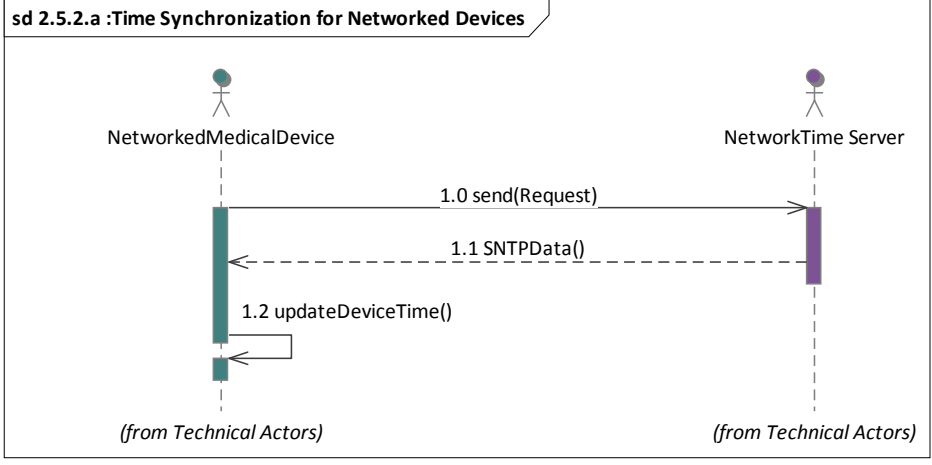


Figure 2.5.2.a : Time Synchronization for Networked Devices

Since legacy devices cannot update their clock using SNTP as seen in Figure 2.5.2.a, the Device Manager may be used to either add an alternative time stamp to the data reported by the device or substitute the device timestamp with its own.

As seen below, the Device manager may transform a legacy (e.g. ASTM/NCCLS) or proprietary message structure to the standard-based specification supported by the enterprise systems (e.g. Nursing Flowsheet).

In the process, the Device Manager may add the patient context based on the location where the device is placed or its identity. If the device is associated with a specific bed, the Device Manager will use the ADT information regarding patient's bed location and upon receiving the information from the medical device.

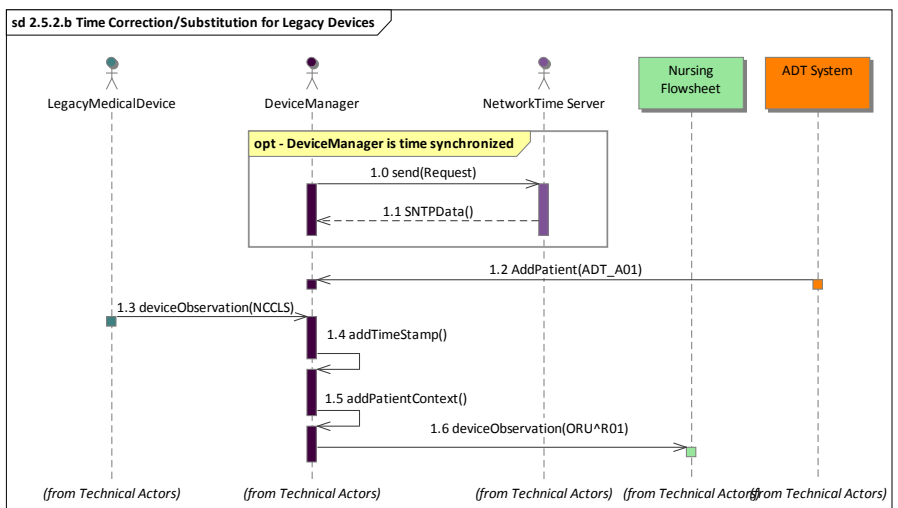


Figure 2.5.2.b Time Correction/Substitution for Legacy Devices