The Swisslog Chain-of-Custody Solution for Hospitals

Swisslog is no stranger to hospital pneumatic tube system (PTS) solutions. It has been 60 years since our first hospital tube system was installed. Today, more than 3,000 hospitals worldwide enjoy the benefits of our pneumatic tube systems. Many of the most advanced and forward-thinking facilities have implemented our chain-of-custody solutions as well.

Addressing Hospital-Wide Challenges

When it comes to managing chain of custody, each stakeholder within the hospital has slightly different challenges. The following diagram outlines the primary concerns of each audience, as well as the specific hurdles they must overcome in their role from regulatory and operational concerns within the C-suite to accountability and workflow at the director level. Each departmental position also comes with its own set of challenges from individual responsibility in pharmacy, nursing, laboratory, operating and emergency rooms to operations and efficiency in the facilities and engineering departments.

1 See pneumatic tube system video on the Swisslog YouTube Channel: www.youtube.com/SwisslogHCS
Incorporating chain-of-custody solutions is becoming more prevalent throughout healthcare as the industry experiences dramatic changes. There are two main reasons for the widespread adoption of Swisslog pneumatic tube system solutions for chain of custody.

First, the development and implementation of effective technologies delivers significant value to hospitals. Our engineers are skilled and highly innovative as evidenced by the dozens of issued, pending and proposed patents from the United States, Canada and the World Intellectual Property Organization. These patents not only validate our unique approaches to addressing PTS challenges, they also demonstrate innovation that only Swisslog offers.

The second reason our PTS chain-of-custody solutions have gained favor is that they transparently combine our technologies with hospital processes to make users’ lives easier (see Figure 1 below).

In the figure below, the gray process steps (60 percent in this example,) are transparent to users because Swisslog technologies perform them automatically.

<table>
<thead>
<tr>
<th>Patent</th>
<th>Synopsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 7243002 B1</td>
<td>A method of dynamic carrier station inventory based on carrier ID</td>
</tr>
<tr>
<td>US 7363106 B1</td>
<td>A method of recording the travel path of a carrier through a PTS and utilizing that data for system maintenance</td>
</tr>
<tr>
<td>US 7328084 B1</td>
<td>A method of PTS system recovery after shut down; if the PTS shuts down, stranded carriers are identified by their carrier ID and automatically rerouted to their destination</td>
</tr>
<tr>
<td>US 7953515 B2</td>
<td>A method of confirming the delivery of a carrier at a station</td>
</tr>
<tr>
<td>US 8447427 B2</td>
<td>A method for the dynamic rerouting of a carrier based upon a reading of its carrier ID</td>
</tr>
</tbody>
</table>

A Summary of Major Swisslog PTS Patents

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Figure 1: The Swisslog PTS Chain-of-Custody transaction process
Swisslog
Chain-of-Custody Products

A best-of-breed chain-of-custody solution may look something like the following flow chart. However, because every hospital is different, Swisslog developed a segmented approach to its chain-of-custody solution for our pneumatic tube system, which allows each hospital the ability to customize a solution that suits its needs.
Carrier Tracking, Monitoring and Inventory Management

Materials sent through a pneumatic tube system—whether it is medication, specimens or other precious cargo—should always be monitored to ensure end-to-end transport. However, it is no secret that carriers do get lost from time to time, which results in delays throughout hospitals, ultimately leading to unsatisfied patients.

Radio Frequency Identification (RFID) Technology

Radio frequency identification (RFID) technology in a pneumatic tube system allows for carrier tracking, monitoring and inventory management. With RFID, users receive real-time verification that patient-critical pneumatic tube transactions have arrived at the right station at the right time.

Swisslog established its leadership in hospital chain-of-custody solutions with its patented “system and method for carrier identification in a pneumatic tube system.” Swisslog carriers are available with a uniquely identified RFID chip. These are read by antennas placed throughout the tube system (at PTS stations and at interchange). As a result, carriers can be tracked both at rest (upon placement into, or arrival to a station or Secure Storage Module), as well as at the multi-linear transfer unit (MTU) and traffic control unit (TCU) within the tube system.

Nexus Pneumatic Tube System Control Panel

The Swisslog Nexus Control Panel is as easy to use as an ATM. Upon placing a carrier containing an RFID chip into a station, the sender enters data into the Nexus Control Panel. The station’s features include:

- Large and easy-to-read displays
- Intuitive menus that follow a logical sequence
- Clearly indicated data entry prompts

After the station sensor reads the carrier RFID number, it associates it with the user-specified destination. This data is used to monitor and confirm the identity of the carrier along its travel path, as well as to validate its arrival at its intended destination. The result is a logged and verified, end-to-end, chain-of-custody audit trail for your secure pneumatic tube system transactions.

Automated Carrier Inventory and Redistribution

The ability to track the location of our carriers, at rest and in the tube system, in real time, means that you can create accurate inventory reports automatically. Personnel formerly devoted to this task may be reassigned to other important duties. Moreover, when carrier inventories get “out of balance” compared to each station’s assigned allotment, the Swisslog pneumatic tube system can automatically redeploy carriers accordingly, as well as reconcile counts based on expected versus active carrier location (based on RFID tag when introduced into system).

Carrier Segregation

Real-time carrier identification and tracking allows you to segregate carriers by groups, subgroups or individuals. This means that you can configure the allowable usage of your PTS solution to mirror your specific operational processes, restrictions and practices. Consequently, you can lower the incidence of cross-contamination of specimens/consumables as well as the potential of narcotics theft/diversion. NOTE: For the purposes of this product overview, “consumables” are defined as materials used in the course of patient care, such as IVs and other medications, blood and blood products.

Ultimately, Swisslog patented and patent-pending technologies for identifying and tracking carriers and their payloads ensure that you establish an impeccable chain of custody for your secure pneumatic tube system transactions. This chain of custody:

- Is automated to ensure data is collected
- Allows you to create standard and ad hoc audit reports
- Increases your control over narcotics to thwart theft/diversion

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2 See Nexus Control Panel video on the Swisslog YouTube Channel: www.youtube.com/SwisslogHCS
Pneumatic Tube System Personnel ID/Authorization

In practice, there are four common ways that hospitals secure access to PTS stations, with increasing levels of protection for each. These are:

1. Control Panel – Security features built-in to a station limit access to authorized users with PIN codes
2. Station Access Door – Provides controlled access to recessed station bins
3. Vault – Provides controlled access to carriers being held securely near station bin
4. Security Badge Access System – Valid access card swipe unlocks the station control panel; secure transaction ensures that both sender/receiver data is logged

While access is restricted in scenarios one, two and three above, the most secure, user-friendly chain-of-custody transaction method is to utilize existing employee ID badges.

Personnel ID Badge Swipe Technology

WhoTube™ card swipe technology provides additional security for pneumatic tube system station access and transactions. To receive a secure transaction, a valid access card must be swiped to release the carrier into the station bin. WhoTube also works to unlock station access doors.

By attaching the Swisslog WhoTube™ Card Access System (in the upper-right corner in the adjacent figure), when your employee swipes their card, the associated data is compared to your authorized user database before granting tube system access.

The Swisslog card access system can receive updates from your facility security database to ensure authorizations are current.

Pneumatic Tube System Software

For your convenience, the Swisslog pneumatic tube system control software (release TL2007 and later) integrates with your existing facility employee ID database. This enables identification of authorized users and releases stations for secure send/receive transactions. Moreover, it associates identified users with transactions and adds this data to transaction logs to significantly strengthen your chain of custody oversight.

The Swisslog system control software is very flexible, allowing you to configure access privileges by groups, sub-groups and/or individuals. Additionally, it improves the security of your PTS system by allowing you to segregate relevant user groups (such as nursing) from ones that have no need to use it (e.g., housekeeping).

The Swisslog Personnel ID/Authorization Solution ensures that your pneumatic tube system transactions are secure. As a result:

- Only authorized personnel can complete secure or stat transactions
- Individual-specific user data promotes accountability
  - Combats narcotics theft/diversion
  - Identifies individuals who improperly pack containers so that you can take remedial action
Secure Storage for Pneumatic Tube System Carriers

The Swisslog chain-of-custody solution allows you to secure "newly-arrived" carriers in three ways. You may configure secure transactions to physically hold carriers at a PTS station, add a locking access door to a station or deploy the Swisslog secure storage vault.

Pneumatic Tube System Station Access Door

The station access door is designed to provide controlled access to recessed stations, offering added safety and security. The Station Access Door is secured by an electromagnetic lock allowing only authorized personnel access to the contents of the station interior after entering a valid code on the keypad or swiping a badge.

Secure Card Access

The WhoTube™-compatible access door features a large clear window, providing visibility of items in the receiving bin. The spring-loaded, self-closing hinges ensure the door remains closed while not in use. It is compatible with 4-inch and 6-inch tube systems and integrates with all generations of TransLogic Pneumatic Tube System control panels.

Pneumatic Tube System Vault

The secure storage vault is located within 50 feet from the user station. Conceptually, think of it as a secure "parking space." Only authorized recipients, having properly identified themselves, may prompt the automated "valet" to retrieve the specified carrier and deliver it to its assigned station.

By physically segregating the secure storage vault away from the station, and away from the ready access of employees, patients and visitors, carriers have the highest level of security. Furthermore, send and receive stations may continue to be used because the carrier is held securely outside of the normal workflow.

The Swisslog Secure Storage module ensures the physical security of your carrier payloads. Physically segregating waiting carriers in a hidden location:

- Protects carrier contents from tampering, mishandling, theft/diversion by unauthorized employees, patients and visitors
- Leaves the PTS station free for continued use
- Demonstrates commitment to security and lowers the risk of potential fines for drug thefts
- Permits automatic carrier return to sender if not retrieved within a pre-determined time frame to avoid expiration and product loss
Alert Messaging

Alert messaging functionality helps to increase user productivity, improve system maintenance and reduce the potential for system down-time. The optional Alert Messaging tool provides both departmental users and engineering staff with a dynamic communication tool to monitor and report PTS transport events. These include alerts for:

- Communications issues
- User-related transactions
- Maintenance issues
- Equipment failures

Additionally, the Alert Messaging module allows you to configure messages and notifications easily. You can adapt them to your own processes and preferences and associate them with transaction-based events, such as:

- Carrier sent
- Carrier received
- Carrier not picked up within predetermined time interval
- Carrier at wrong destination, etc.

All notifications may also be configured to specify the recipient(s), as well as the recipient’s preferred notification method: text, email, phone call, etc.

Notification and messaging features dovetail with your goal to provide efficient patient care. Notifications alert appropriate personnel and prompt them to take action accordingly. Moreover, should carriers be sent to the wrong destination, this fact is quickly identified and reported to allow employees to rectify the situation.

All relevant chain-of-custody transaction data is recorded to the Swisslog database. From this, a detailed daily transaction history report is created (as shown in Figure 2 below.) Figure 2: Swisslog Nexus daily PTS transaction report incorporates chain-of-custody details.

*Note that the “Normal” type listed in the far right column corresponds to non-secure transactions. The “BadgeSecure” entries provide employee-specific identification data. In this Figure, such data is generically referred to by the employee’s job title.*

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<tr>
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<tbody>
<tr>
<td>653</td>
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<td>*TLDRSLI</td>
<td>Pharmacy Tech</td>
<td>Nurse</td>
<td>BadgeSecure</td>
</tr>
</tbody>
</table>
The Swisslog messaging/notification and reporting solutions ensure that stat, routine and error transactions receive prompt attention. By configuring “business rules” to trigger alerts and messages you:

- Improve patient outcomes by consistently and reliably supporting patient through their process of care
- Readily identify misdirected/lost carriers and promptly notify employees to take remedial action
- Provide a complete audit trail through PTS transaction reports

<table>
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<tr>
<th>Feature</th>
<th>Option #1 Alert Messaging Base Option</th>
<th>Option #2 Alert Messaging Enhanced Option</th>
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<tr>
<td>Alarm notification by type</td>
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<tr>
<td>Email notification</td>
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<tr>
<td>Group notification</td>
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<td>Advanced scheduling of notifications</td>
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<tr>
<td>Automatic escalation</td>
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<tr>
<td>Non-email notification (text, page, call, etc.)</td>
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Remote Arrival Indicators

The remote arrival indicator notifies users that a carrier has arrived by flashing a yellow light and/or by sounding a chime. Both the light and chime are turned off by pressing the reset button on the indicator. The arrival indicator can be installed adjacent to a station or in a remote location.

Swisslog chain-of-custody solutions for pneumatic tube systems solution modules are proven, having been deployed in many hospitals worldwide. Swisslog chain-of-custody solutions are innovative, as evidenced by the dozens of patents that have been issued, are pending and have been proposed for our technology over the nearly 100 years the company has been in operation. Swisslog chain-of-custody tools deliver solutions to improve the patient experience.
Summary

Pneumatic tube system chain-of-custody solutions provide control over carriers and their contents. This applies to the varied challenges facing the departments in your process of care. This control helps you improve the quality of the patient experience your hospital delivers. To assure that control, a pneumatic tube system chain of custody must have four essential elements:

**Essential Element #1**
Establish an impeccable paper trail for your secure PTS transactions. This includes the ability to identify individual PTS carriers at rest and in motion as well as to record and report transaction data to improve your operational efficiency.

**Essential Element #2**
Secure your transactions to protect sensitive carrier payloads (narcotics, perishable consumables and specimens) and limits access to them only by authorized employees.

To promote the strongest security of your narcotic and perishable contents, Swisslog uses a dedicated Secure Storage Module. This component serves not only as a secure vault, but also liberates your PTS stations for continued use irrespective of when the carrier is retrieved.

**Essential Element #3**
The timely handling of transactions is essential of a sound PTS chain-of-custody solution. Software provides the means to configure business rules to issue notifications and alerts to promote the prompt delivery of patient care.

**Essential Element #4**
The best PTS chain-of-custody solution in the world does your hospital no good if employees choose not to use it. Essential Element #4 requires that it be easy to use. This means leveraging tools that your employees already have (ID badges, swipe cards etc.) as well as technologies (the reading of carrier RFIDs, for example) that make process steps transparent to them.
Contact Swisslog to Establish Chain of Custody at Your Facility

Contact Swisslog today to learn which chain-of-custody solutions can help your department to
- Improve patient outcomes
- Reduce expenses
- Lower the incidence of stolen/diverted narcotics
- Protect your hospital's reputation