



IntelliFill® i.v.
Print Stream Interfaces for
IV Compounding Devices



INTRODUCTION

Pharmacy compounding devices are medical devices that perform drug preparation tasks ordinarily done by hand. Of those doses, none are more labor-intensive or potentially hazardous than IV admixtures, which must be both accurate and sterile. Devices such as IntelliFill® i.v. provide value, both in terms of safety and accuracy, and in terms of labor savings, by automating these otherwise manual tasks.

Pharmacy compounding devices provide maximal value when they are directly interfaced to a pharmacy information system and can react by providing medication doses with little or no manual intervention on the part of the pharmacy staff.

SYSTEM INTERFACES

Pharmacy systems' interface technologies (centered largely on HL7 transactions) do not support providing dose-specific interface transactions that instruct a compounding device on specific doses that need to be made. While there is an HL7 message set that supports description of individual doses that need to be administered (RGV), pharmacy information systems have not traditionally supported that message set and often lack the mechanisms to generate the information at the time the order is transmitted.

Rather, these systems are architected to send orders to other devices and systems. The receiving systems must therefore parse the orders and compute a dose schedule to determine what doses need to be administered over any given time frame. This additional order parsing results not only in unnecessary complexity in the automated device but also in potential conflicts around variations in the mechanisms and results of order parsing.

Classical interfaces present additional issues in that they require elaborate error processing and downtime scenarios. Since interface transactions are generally handled as background processes asynchronous to user activity, any errors in the transmission of data, physical or logical, require exceptional activity to identify, troubleshoot and resolve.

Interface transactions are not designed for reading by humans; therefore, any downtime scenario requires that the interface be disabled and any pending transactions redirected to alternative outputs, usually with remarkably different formatting.

Classic interfaces are expensive both in cost and time, because they require coordination and cooperation between two vendors who have little motivation to cooperate if such cooperation requires a change in their application or a modification of their development timeline.

LABEL INTERFACES

Every pharmacy system that supports the production of IV admixtures prints labels. In the manual process, each label represents a work order traveler within the pharmacy IV admixture area that a technician uses to prepare and label that dose. The technician is prompted to

perform an admixture when the label emerges from the printer, and prepares the dose using only the information printed on that label.

Each label therefore contains the data set necessary to prepare that dose, given the knowledge base of the person (or device) preparing the injectable dose. Thus, a potentially preferable interface technology involves developing software that “reads” the already-existent label, parses it and prepares the dose it demands, much as a human would. This type of interface is called a *print-stream interface*. Such an interface is configured on the pharmacy system as a printer and the labels are printed to the IV admixture compounding device.

In earlier years, these connections were largely serial asynchronous connections with relatively high transmission failure rates. In this environment, print stream interfaces often failed to provide the kinds of protocol and traceability to permit them to be properly maintained. Modern connections are network-based, almost exclusively TCP/IP, which provides both highly reliable protocol and traceability. Once a connection is established, data loss is essentially nonexistent.

A print-stream interface provides the following advantages:

- There is one authoritative source of order parsing and dose timing determination (the pharmacy information system).
- No changes are required in the sending system, other than the instantiation of a new printer, so there is no cost from the vendor of the pharmacy system to prepare the interface.
- All work in terms of developing, testing and maintaining the interface is done by the device vendor, who is highly motivated to perform.
- Hospital information technology involvement is limited to providing the connectivity between the pharmacy information system and the device.
- Since all the output is intended for printing when sent, error recovery involves simply sending the erroneous transaction to the printer for which it was originally designed. The user continues to react to the label as they did in the manual environment. Indeed, since most devices have limits to the scope of doses they can create, such a mechanism must remain active at all times to direct the work that the device cannot do to a user for manual preparation.
- Since all output is intended to be printed, downtime processing simply involves redirecting the stream to an appropriate printer. Redirection can occur either at the device itself, or within the pharmacy information system, depending on the situation.

INTELLIFILL i.v. LABEL STREAM

Baxa Corporation has developed a field-configurable parsing engine that provides exceptional flexibility and reliability in “reading” a label stream. The engine handles such esoteric issues as label data that moves around on a label depending on other content, the need to generate more than one printed label for a single dose and the ability to provide lookup tables and other features that permit IntelliFill i.v. to provide features that may be missing on the pharmacy information system (such as the ability to bar code a dose or provide drug-specific warnings on a label).

Using this technology, Baxa can respond quickly to the desire to change label formatting; often formatting changes have little or no effect on the parsing rules. Even when they do, the time to change the parsing rules is measured in minutes or hours and can be done remotely.

When labels are intended to be printed on specialty printers (such as Zebra or Intermec printers), the transmitted data can be embedded in the label output in non-printable form. This allows the printed label and interpreted label to be completely different, enabling the format of the printed label to vary at will without disrupting the label feed interpretation.

Baxa preferentially uses print stream interfaces because they are easy to implement, cost-effective, easy to maintain and provide quick downtime and error recovery.

IntelliFill i.v. is manufactured for Baxa Corporation by FHT, Inc.