Effective Use of FDA's TPLC Database

Dan O'Leary CBA, CQA, CQE, CRE, SSBB
Ombu Enterprises, LLC

Objective

- Participants will learn the location and structure of the TPLC database, how to extract the data, and methods to use the data for device improvement.

Outline

- Location of the TPLC database
- Device information
- Premarket information
- Adverse events
- Recalls
- Reliability
- Risk Management
- Signal Detection

Introduction

- The Total Product Life Cycle (TPLC) database integrates premarket and postmarket information about medical devices.
- TPLC pulls information from CDRH databases including Premarket Approvals (PMA), Premarket Notifications (510(k)), Adverse Events, and Recalls
- TPLC information updates once a month

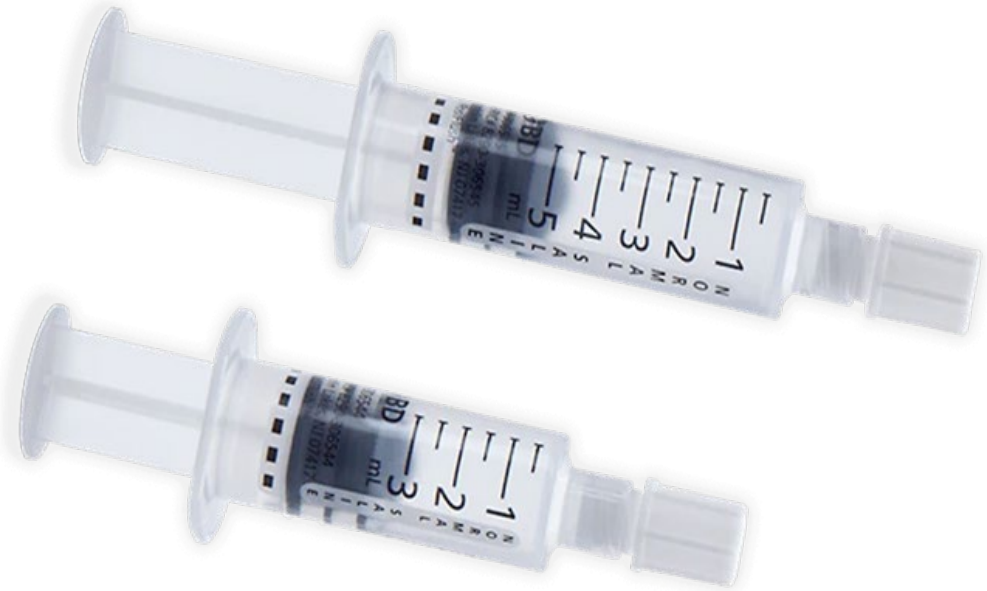
Location of the TPLC Database

- FDA CDRH maintains many databases.
- Each has an entry screen that allows the user to search the database.
- The TPLC entry screen is https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfTPLC/tplc.cfm

A 510(k) Device Premarket Notification

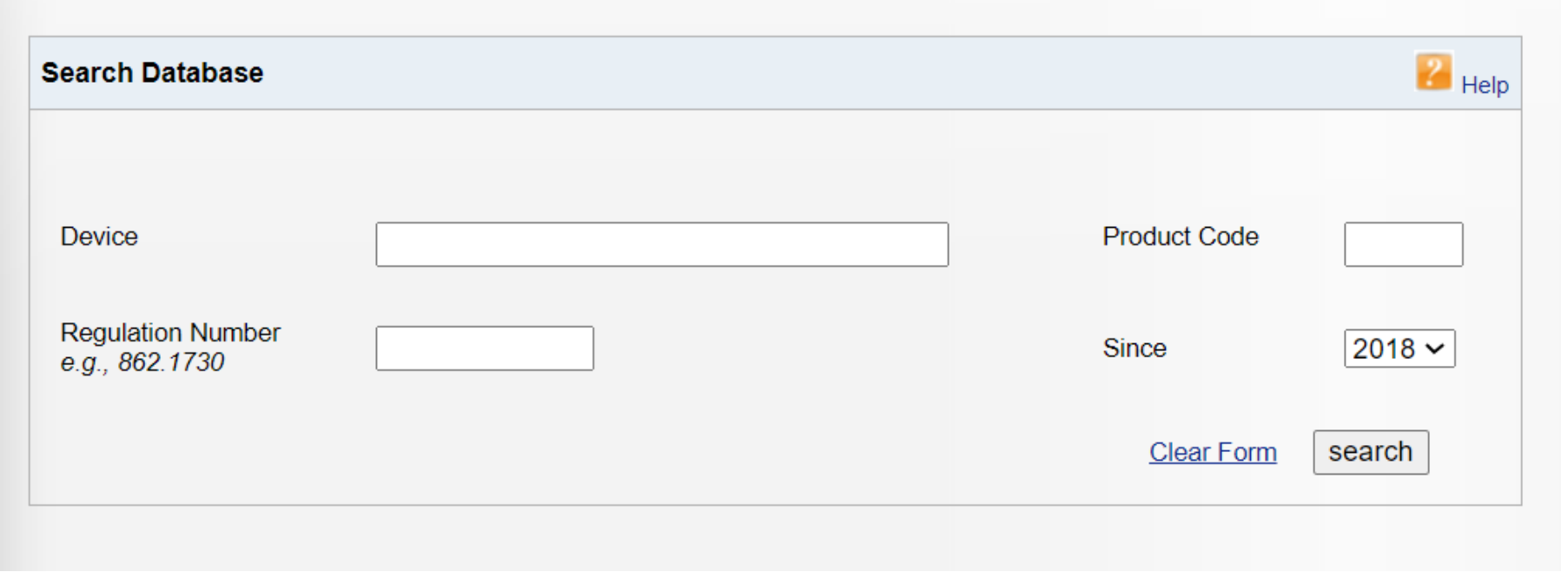
An Example

- Becton Dickson PosiFlush™ is a range of ready-to-use sterile pre-filled flush syringes containing sodium chloride (NaCl) 0.9%



TPLC Search Screen

- For an example, enter Product Code NGT
- The default is “Since 2018”
  - This provides all the data from 2018 to current



First TPLC Screen – Product Code NGT

- The result is four items of information:
  - The Product Code
  - The Device Class
  - The Device Name (FDA's name, not the manufacturer's)
  - The FDA Regulation number of the device

1 result found

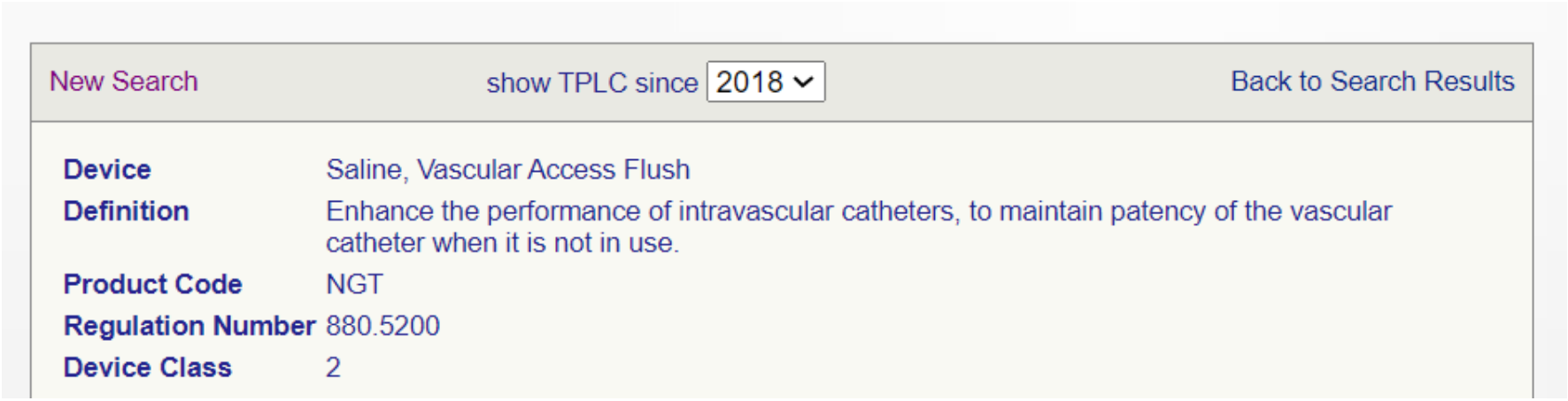
results per page 10

New Search | Help | Safety Communications | More About TPLC

Product Code	Device Class	Device Name	Regulation Number
NGT	2	Saline, Vascular Access Flush	880.5200

TPLC Screen – Device and Date Section

- This view includes the four items of information on the prior screen as well as FDA's definition.



Premarket Notification

- Medical device manufacturers are required to submit a premarket notification or 510(k) if they intend to introduce a device into commercial distribution for the first time or reintroduce a device that will be significantly changed or modified to the extent that its safety or effectiveness could be affected. Some firm names may not be the current 510(k) owner. The Premarket Notification database is not updated when 510(k) ownership transfers from the original sponsor to other firm.

TPLC Screen – Premarket Information

Premarket Reviews		
Manufacturer	**Decision**	
AMSINO INTERNATIONAL, INC.		
	SUBSTANTIALLY EQUIVALENT	2
JIANGSU CAINA MEDICAL CO., LTD.		
	SUBSTANTIALLY EQUIVALENT	1
MEDLINE INDUSTRIES, INC.		
	SUBSTANTIALLY EQUIVALENT	2
MEDXL INC.		
	SUBSTANTIALLY EQUIVALENT	1
NURSE ASSIST, LLC		
	SUBSTANTIALLY EQUIVALENT	1
PENTAFERTE ITALIA S.R.L.		
	SUBSTANTIALLY EQUIVALENT	1

TPLC Screen – Amsino First Screen

- For the first entry, click on SUBSTANTIALLY EQUIVALENT and there are hyperlinks to FDA Clearance, 510(k), information

Premarket Reviews		
Manufacturer	**Decision**	
AMSINO INTERNATIONAL, INC.		
	SUBSTANTIALLY EQUIVALENT	2
1. K183473 AMSafe(R) Pre-Filled Normal Saline Flush Syringe		
2. K213522 AMSafe Pre-Filled Normal Saline Flush Syringe		

Amsino – K183473

New Search | Back To Search Results

Device Classification Name	saline, vascular access flush
510(k) Number	K183473
Device Name	AMSafe(R) Pre-Filled Normal Saline Flush Syringe
Applicant	Amsino International, Inc. 708 Corporate Center Drive Pomona, CA 91768
Applicant Contact	Jim Barley
Correspondent	Amsino International, Inc. 708 Corporate Center Drive Pomona, CA 91768
Correspondent Contact	Jim Barley
Regulation Number	880.5200
Classification Product Code	NGT
Date Received	12/14/2018
Decision Date	07/12/2019
Decision	Substantially Equivalent (SESE)
Regulation Medical Specialty	General Hospital
510k Review Panel	General Hospital
Summary	Summary
Type	Traditional
Reviewed by Third Party	No
Combination Product	No

Amsino – K183473 Summary

AMSINO
Advancing Healthcare Worldwide®

Amsino International. Inc.
708 Corporate Center Dr.
Pomona, CA91768
USA

Tel:909-626-5888 Fax:909-626-3888
Toll Free: 1-800-MD-AMSINO
http://www.amsino.com
email: amsino@amsino.com

Traditional 510(k) Summary (As required by 21 CFR 807.92(a))
For K183473

a) Submitter Information:

Submitter:	Richard Lee, CEO of Amsino Amsino International Inc. 708 Corporate Center Drive Pomona, CA 91768 Phone: +1 (909)626-5888 Fax: +1 (909)626-3888
Contact Person:	Jim Barley, RA/QA Consultant Cell phone: 949-4333058 jimbarley@aol.com
Date of Summary:	July 9, 2019

b) Device Information:

Trade or Proprietary Name: AMSafe® Pre-Filled Normal Saline Flush Syringe

Common or Usual Name:	Pre-Filled Normal Saline Flush Syringe
Regulation Number:	21 CFR 880.5200
Classification:	II
Product Code:	NGT

Predicate Device

c) Identification of Legally Marketed Device(s):

Predicate Device: AM USA 0.9% Sodium Chloride Flush Syringe, 510(k) number K133685, 20 cc Syringe with 20 cc fill volume

Amsino – K213522

New Search | Back To Search Results

Device Classification Name	saline, vascular access flush
510(k) Number	K213522
Device Name	AMSafe Pre-Filled Normal Saline Flush Syringe
Applicant	Amsino International, Inc. 708 Corporate Center Drive Pomona, CA 91768
Applicant Contact	Jane Gao
Correspondent	Amsino International, Inc. 708 Corporate Center Drive Pomona, CA 91768
Correspondent Contact	Jane Gao
Regulation Number	880.5200
Classification Product Code	NGT
Date Received	11/03/2021
Decision Date	03/22/2022
Decision	Substantially Equivalent (SESE)
Regulation Medical Specialty	General Hospital
510k Review Panel	General Hospital
Summary	Summary
Type	Traditional
Reviewed by Third Party	No
Combination Product	No

Amsino – K213522 Summary

K213522 Summary

a) Submitter Information:

Submitter:	Amsino International Inc. 708 Corporate Center Drive Pomona, CA 91768 Phone: +1 (909)626-5888 Fax: +1 (909)626-3888
Contact Person:	Jane Gao VP of R&D of Amsino International Cell phone: +86 139 1614 7664 Jane_gao@amsino.com
Date of Summary:	March 22, 2022

b) **Device Information**:

Trade or Proprietary Name:	*AMSafe*® Pre-Filled Normal Saline Flush Syringe
Common or Usual Name:	Pre-Filled Normal Saline Flush Syringe
Classification Name:	Saline, vascular access flush
Product Code:	NGT
Regulation Number:	880.5200
Device Classification:	II
Review Panel:	General Hospital

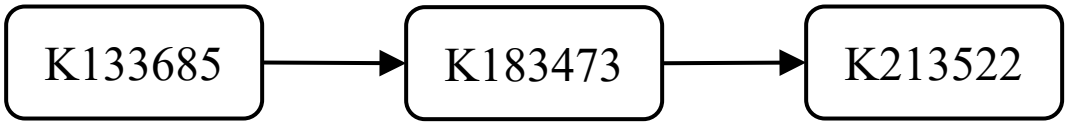
Predicate Device

c) **Identification of Legally Marketed Device(s)**:

AMSafe® Pre-Filled Normal Saline Flush Syringe, 510(k) number K183473.

510(k) Clearance Chain

- From the 510(k) summaries, one can build a chain of predicate devices
- In theory, the chain would go back to the first device of its kind (or a pre-amendment device), but early clearances don't always have the information.



MDRs

- MAUDE (Manufacturer and User Facility Device Experience) data represents reports of adverse events involving medical devices. The data consists of all voluntary reports since June 1993, user facility reports since 1991, distributor reports since 1993, and manufacturer reports since August 1996. MAUDE data is reported by patients, physicians, facilities, and device manufacturers. Preliminary, supplemental, and duplicate reports exist.

MDRs

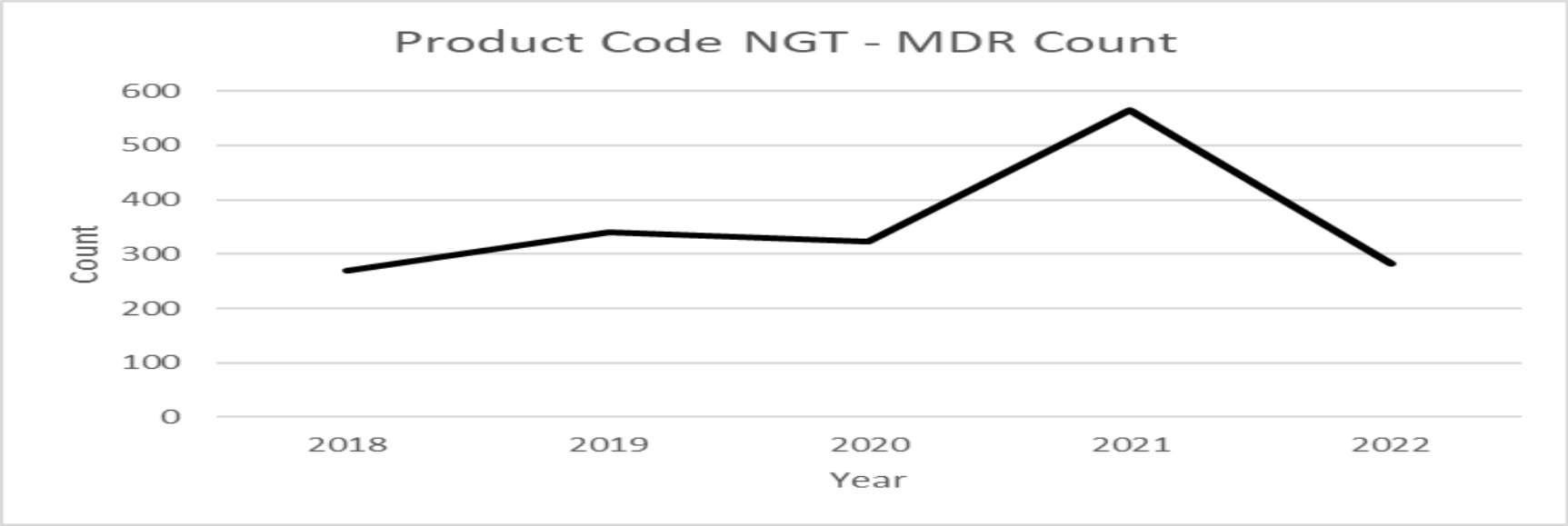
- Manufacturers have an obligation to submit an MDR when the device is involved in a death, serious injury, or certain malfunctions.
- Most manufacturers use FDA's eSubmitter software program.
- Manufacturers provide information, using a set of codes and terms:
  - Health Effect – Clinical Code
  - Health Effect – Impact Code
  - Medical Device Problem Code
  - Component Code
  - Type of Investigation
  - Investigation Findings
  - Investigation Conclusions

TPLC Screen – MDR Information

MDR Year	MDR Reports	MDR Events
2018	269	269
2019	340	340
2020	322	322
2021	566	566
2022	282	282
2023	112	112

TPLC Screen – MDR Information

- A line graph helps understand the frequency.
- Note the spike in 2021. Probably due to higher usage during Covid



MDRs – Device Problems (portion of the list)

Device Problems	MDRs with this Device Problem	Events in those MDRs
Leak/Splash	715	715
Failure to Deliver	380	380
Break	180	180
Device Contamination with Chemical or Other Material	122	122
Physical Resistance/Sticking	97	97
Device Markings/Labelling Problem	86	86
Packaging Problem	85	85
Adverse Event Without Identified Device or Use Problem	56	56
Device Damaged Prior to Use	34	34
Defective Component	32	32
Volume Accuracy Problem	31	31
Fluid/Blood Leak	29	29
Short Fill	26	26

MDRs – Device Problems

- This is a list, in frequency order, of the manufacturer's entries for the Medical Device Problem Code
  - The manufacturer can enter multiple codes from the three code sets (FDA, C, and IMDRF)
- The information is the term for each code entered
- Each term has a hyperlink to the associated MDRs

MDRs – Patient Problems (portion of the list)

Patient Problems	MDRs with this Patient Problem	Events in those MDRs
No Clinical Signs, Symptoms or Conditions	854	854
No Known Impact Or Consequence To Patient	534	534
No Consequences Or Impact To Patient	223	223
No Patient Involvement	102	102
No Information	43	43
Insufficient Information	28	28
Bacterial Infection	20	20
Unspecified Infection	20	20
Hypersensitivity/Allergic reaction	9	9
Pain	9	9
Swelling	8	8
Reaction	8	8
Vomiting	7	7
Death	7	7
Sepsis	5	5

MDRs – Patient Problems

- This is a list, in frequency order, of the manufacturer's entries for the Health Effect Code
  - The manufacturer can enter multiple codes from the three code sets (FDA, C, and IMDRF)
- The information is the term for each code entered
- Each term has a hyperlink to the associated MDRs

Recalls

Recalls			
Manufacturer		**Recall Class**	**Date Posted**
1	Becton Dickinson & Company	II	May-21-2020
2	Becton Dickinson & Company	II	Nov-20-2019
3	Cardinal Health	I	Aug-21-2021
4	Family Dollar Stores, Llc.	II	Aug-17-2022
5	MEDLINE INDUSTRIES, LP - Northfield	II	Apr-08-2022
6	Mckesson Medical-Surgical Inc. Corporate Office	II	Aug-26-2022
7	Medline Industries Inc	II	Aug-29-2018
8	Windstone Medical Packaging, Inc.	I	Oct-29-2021

Recalls

- This is a list of recalls by company name and shows the recall date and the recall class
- Each entry has a hyperlink to the recall report
- FDA has three recall classes:
  - Class I: A situation where there is a reasonable chance that a product will cause serious health problems or death.
  - Class II: A situation where a product may cause a temporary or reversible health problem or where there is a slight chance that it will cause serious health problems or death.
  - Class III: A situation where a product is not likely to cause any health problem or injury.

Recall – Cardinal Health

Product Description	Recall Class	FDA Recall Posting Date	Recalling Firm
Z-2284-2021 - Monoject 0.9% Sodium Chloride Flush Syringe, 10 ML Fill, STERILE, Product Code 8881570121 The Proposed Device Is Indicated For Use In Flushing Compatible Intravenous Tubing Systems And Indwelling ...	1	08/21/2021	Cardinal Health
Z-2286-2021 - Monoject 0.9% Sodium Chloride Flush Syringe, 5mL Fill, STERILE, Product Code 8881570125 The Proposed Device Is Indicated For Use In Flushing Compatible Intravenous Tubing Systems And Indwelling In...	1	08/21/2021	Cardinal Health
Z-2285-2021 - Monoject 0.9% Sodium Chloride Flush Syringe, 3 ML Fill, STERILE, Product Code 8881570123 The Proposed Device Is Indicated For Use In Flushing Compatible Intravenous Tubing Systems And Indwelling I...	1	08/21/2021	Cardinal Health

- This links to three recalls, one for each size (10 ml fill, 5 ml fill, and 3 ml fill)
- Each of these has a hyperlink to the individual report

Recall – Cardinal Health

- Information in the 10 ml recall report includes:
- Product: Monoject 0.9% Sodium Chloride Flush Syringe, 10 mL Fill, STERILE
- Manufacturer Reason for Recall: Potential for the plunger to draw back after the air has been expelled and reintroduce air back into the syringe.
- FDA Determined Cause: Device Design
- Quantity in Commerce: 267,217,860 eaches in total

Premarket Approval (PMA)

Premarket Approvals (PMA)

- Premarket approval by FDA is the required process of scientific review to ensure the safety and effectiveness of all devices classified as Class III devices. An approved Premarket Approval Application (PMA) is, in effect, a private license granted to the applicant for marketing a particular medical device.

Automated External Defibrillators

- Device: Automated External Defibrillators (Non-Wearable)
- Definition: This device is a non-wearable prescription use only AED. These are devices that include automated external defibrillation. Automated external defibrillators use external pad-type electrodes to sense, detect, classify, and treat (with an electrical shock) ventricular fibrillation. These devices are intended to be used on suspected victims of sudden cardiac arrest. A person in cardiac arrest is unresponsive and is not breathing normally. The device can be sold with prescription only.
- Product Code: MKJ
- Submission Type: PMA
- Regulation Number: 870.5310
- Device Class: 3

TPLC Screen – Premarket Information

Premarket Approvals (PMA)					
2018	2019	2020	2021	2022	2023
20	25	52	41	19	11

- The section has a different format from a 510(k) product
- Each of the counts is a hyperlink to a list of PMAs or supplements (changes) for that year
- Each item on the list is a hyperlink to information about the individual PMA or supplement

510(k) Exempt

510(k) Exempt

- There are two cases
- A Class II device required a 510(k), but FDA later made it 510(k) exempt
  - The premarket information section will have information about the 510(k)s, but no information after the status change
- A Class I 510(k) exempt device
  - There won't be a premarket information section

Reliability Considerations

Reliability Considerations

- One source of information for reliability is the list of device problems.
- The lists identifies problems that could result in device failure.
- The list is in rank order from the most common device problems to the least common.
- For your device determine if the device problem applies.
  - Read all the MDRs using the hyperlink from the term

Flushing Problem

- Consider the term “Flushing Problem”
- Following the hyperlink there are three reports.
- They all have only one device problem, “Flushing Problem”.
- They all have only one patient problem, “No Known Impact Or Consequence To Patient”.

Flushing Problem

- Look at the MDRs for common threads. Some excerpts from the event description:
  - BD Posiflush saline syringe does not flush easily. We have had several syringes that do not flush past 8 ml and two that do not flush pass 5ml.
  - It was reported that during use of the 10 ml BD Posiflush normal saline syringe the syringe is not flushing completely “they are meeting resistance after about 5ml”
  - It was reported that BD Posiflush NS filled syringe stopped pushing during a flush. This occurred on 4 separate occasions.

FMECA

- Consider IEC 60812 Ed. 3.0 Failure Modes and Effects Analysis (FMEA and FMECA)
- Figure 1 shows the methodology. Some of the steps are:
  - Identify failure modes
  - Identify failure causes
  - Determine the severity of the failure final effect
  - Estimate the likelihood of the failure mode
  - Estimate other criticality parameters
  - Identify actions
- The MDRs provide information to help identify the failure modes

Risk Management Considerations

Risk Management Considerations

- One source of information for risk management is the list of patient problems.
- The list identifies problems that could result in patient or user harm.
- The list is in rank order from the most common patient problems to the least common.
- For your device determine if the patient problem applies.
  - Read all the MDRs using the hyperlink from the term

Anaphylactic Shock

- Consider the term “Anaphylactic Shock”
- Following the hyperlink there are three reports.
- There are multiple device problems:
  - Adverse Event Without Identified Device or Use Problem
  - Device Contamination with Chemical or Other Material
  - Insufficient Information
- Two have only one patient problem, Anaphylactic Shock
- One has Anaphylactic Shock, Nausea, and Vomiting

Anaphylactic Shock

- Look at the MDRs for common threads. Some excerpts from the event description:
  - It was reported that patients experienced anaphylactic shock after the BD Posiflush normal saline syringes were used to flush the tubing. Additionally, other patients suffered adverse gastrointestinal reactions after the syringes were used on them, as well as nausea and vomiting.
  - It was reported that the syringe 10ml Posiflush experienced foreign matter in the syringe or any fluid path component and was involved with a patient experiencing a systemic allergic reaction.
  - It was reported that after use of a BD Posiflush normal saline syringe, an infant who was currently hospitalized received a clear pipe with flush at 17:00, anaphylactic shock occurred on 17:02 pm … it is also reported this batch had another two complaints of reactions in adults as they vomited after flush was given.

Hazard Analysis

- Consider ISO 14971:2019 Medical Devices – Application of Risk Management to Medical Devices
- Consider the steps in risk management
  - Hazard (A potential source of harm)
  - Sequence of events
  - Hazardous situation
  - Harm
  - Severity
  - Frequency of occurrence
  - Risk estimate
- The MDRs provide information to help identify the harm
- Work backward to arrive at the associated hazard
- Work forward to estimate the risk

Signal Detection

Signal Detection

- The Device Problems and the Patient Problems terms are in descending order.
- It is easy to organize them in a Pareto Chart.
- One signal detection method is to look for changes in rank order.
  - A term that moves up in rank order has more reports
  - To prevent false alarms, consider only terms that move up two or more places, *e.g.,* from 6th place to 3rd place.

Device Problem – Example (Data from a related project)

- Consider the term "Device markings/Labelling problem"
- In 2021 it was in 13th place in the rank order
- In 2022 it had moved to 5th place in the rank order
- Something changed so users were generating more complaints resulting in more MDRs
- By looking at the 2021 and 2022 MDRs, try to identify the change and ensure your device doesn't have the problem.

Patient Problem – Example (Data from a related project)

- Consider the term "Unspecified infection"
- In 2021 it was in 14th place in the rank order
- In 2022 it had moved to 5th place in the rank order
- Something changed so users were generating more complaints resulting in more MDRs
- By looking at the 2021 and 2022 MDRs, try to identify the change and ensure your device doesn't have the problem.

A Case Study

Question

- A colleague asked, “I came across a Class I recall announcement about a wearable thermometer for risk of serious injury, including burns to infants and young children. To my great surprise, this device is classified as a Class I, 510(k) exempt device (Product Code FQZ). The reason I am baffled is that this device is intended to be used on infants and babies under 6 years old. I have been under the impression that the FDA is extra careful when it comes to devices for pediatric use. I am curious about how this type of a device could be considered "low risk" and classified as a Class I device?”

Analysis Using TPLC

- Because we know the product code, FQZ, TPLC is a good place to start.
- Notice that Product Code FQZ is for a color change thermometer. That leads to looking at the regulation, 880.2900

Device	Thermometer, Clinical Color Change
Product Code	FQZ
Regulation Number	880.2900
Device Class	1

Regulation 880.2900

- A clinical color change thermometer is a disposable device used to measure a patient's oral, rectal, or axillary (armpit) body temperature. The device records body temperature by use of heat sensitive chemicals which are sealed at the end of a plastic or metal strip. Body heat causes a stable color change in the heat sensitive chemicals.

Recall

- Since there is only one recall, the choice is simple.

Recalls			
Manufacturer		Recall Class	Date Posted
1	BearCare, Inc.	I	Jun-08-2023

Recall

- The product is described as “Walnut Wearable Smart Thermometer, intended for continuous chest temperature monitoring of children ages 0-6 years in non-emergency medical situations, Model Number WT20”.
  - Notice that this device is wearable and designed for continuous monitoring, It doesn’t seem to match the description in 880.2900.

- The requested action is, “BearCare is asking consumers to immediately discontinue use of all Walnut Thermometers employing a rechargeable battery and return the product to BearCare for a refund”.
  - The use of a battery doesn’t seem to fit with the description in 880.2900.

Patient Problem

- From the question, we know there was a burn involved, so we look at the MDR involving a burn.

Patient Problems	MDRs with this Patient Problem	Events in those MDRs
Erythema	1	1
Caustic/Chemical Burns	1	1
No Known Impact Or Consequence To Patient	1	1
Partial thickness (Second Degree) Burn	1	1
Blister	1	1
Skin Inflammation/ Irritation	1	1

MDR

- Device Problems: Corroded, Material Rupture, and Battery Problem

- Patient Problems: Erythema, Caustic/Chemical Burns, Partial thickness (Second Degree) Burn, Blister, Skin Inflammation/ Irritation

MDR

- Event Description: A 2 year old child was wearing a Walnut Cares wearable bluetooth thermometer to monitor temperature while sleeping for a common cold. Upon removing the thermometer in the morning, corrosion was noticed around the contact sensor and charging contacts, similar to battery acid. We immediately checked the child's skin and discovered a blistered and scabbed chemical burn with significant redness and irritation around the burn site. It appears the battery inside the Walnut device ruptured during wear and caused a chemical burn. We took the child to their PCP, who confirmed a 2nd degree chemical burn caused by the device. We have reached out to Walnut Cares via their customer contact email (info@walnutcares.com) and have not received a response.

Results

- The thermometer's battery leaked and caused chemical burns on a 2 year old child
- It appears the parents filed the MDR. I didn't find an MDR from the manufacturer.
- The manufacturer initiated a recall.
- Response to the initial question:
  - The description of the thermometer does not seem to match the regulation
  - The thermometer appears to have been misclassified as product code FQZ

Conclusions

- TPLC is a powerful tool provided by FDA
- It contains information useful for reliability and for risk management
- It also provides information to generate signals
  - Signal generation provides an opportunity to ensure your device doesn't have problems experienced by other devices
  - Use it to create effective correction action

QUESTIONS