DID	Type	Vendor	HDO	Update frequency	Connections	Install method
1	Docking stations for syringe pumps	A	1	So far, once	To Nurse call system	Via flash card
2	Patient monitoring system	B	1	Upgrade every 2 years	To PDMS, telephones, nurse call system, HIS	Prepare update on server, install on monitors via UI
3	Medical ventilators	C	1	Every 3 - 4 years	To PDMS via server	Not specified
4	Ultrasound System	D	1	Approx. once per year	Doesn't know	Via USB stick
5	Ultrasound System	D	1	Approx. once per year	Doesn't know	Via USB stick
6	Ultrasound System	D	1	Approx. once per year	Doesn't know	Via USB stick
7	Patient monitoring system	B	2	Check for available updates in random interval	Bedside monitors to central stations to HIS. Within own VLAN. Gateway server allows remote updates to central stations.	Prepare update on server, install on monitors via UI
8	Radiology bucky system	E	4	Every 4 - 6 months	To HIS, RIS, and quality system.	Via USB stick
9	MRI	D	4	Every 3 - 4 months	To PACS, RIS, and HIS.	Via USB stick
10	EEG	F	4	Approx. once per year	Doesn't know	Via device UI
11	Laptop as part of medical device	NA	4	Windows 10 / 11 patch frequency	Laptop connected to ECG and ABM.	Via laptop UI
12	MRI	B	5	Approx. once per year	LAN, not in domain	Via device UI
13	Ophthalmic retinal camera	G	6	NA	To PACS via server	Server and devices in tandem (via Laptop)
14	Patient monitoring system	H	6	"*Not often*".	Bedside monitors to central stations to EPR via gateway servers. Within own VLAN	Server and devices (via USB stick)
15	Bucky X-Ray system	E	4	Approx. once per year	To PACS and HIS / RIS via LAN	Receive file from vendor, install via device UI
16	MRI	D	4	Approx. once per year	To PACS and HIS / RIS via LAN, remote connection to manufacturer.	Via USB stick
17	Database server connected to sleep monitor	NA	4	Once per month	To EEG devices via workstation PCs, to PACS	On server (remotely)
18	Patient monitoring system	B	7	Every 2 months	Bedside monitors to central stations to HIS. Within own VLAN. Gateway server allows remote updates to central stations.	Prepare update on server, install on monitors via UI
19	Infusion Pumps	I	7	Approx. once per year	To smart docking stations to HIS.	Via laptop connection to device
20	Ventilator	J	7	Only in case of patient risk. "*Rarely*"	Standalone (currently not connected)	Via laptop connection to device
21	Vessel-sealing coagulation system	K	6	First time	Standalone (currently not connected)	Via laptop connection to device
22	Automated external defibrillator (AED)	L	6	Every 2 years	To HDO-wide AED alert server via WiFi.	Via USB stick
23	Infusion pumps with docking stations	L	6	First time	Docking stations to HIS. Within own VLAN	Via laptop connection to device

(Continued on next page.)

DID	Type	Vendor	HDO	Update frequency	Connections	Install method
(Continued from previous page.)						
24	Diathermy machine	M	8	Every 2 years	Doesn't know	Via laptop connection to device, VPN connection to manufacturer
25	ECG machine	N	9	Every 2 years	Via WiFi to middle-ware to EMR	Via USB stick

Table 3: List of update cases for different connected medical devices. *DID* = Device ID. Not all cases were (pure) security updates due to common bundling. Nonetheless, the process is the same for security updates. Vendor names were obfuscated. *ABM* = Ambulatory blood pressure monitor. *ECG* = Electrocardiograph. *EEG* = Electroencephalograph. *EMR* = Electronic medical record system. *EPR* = Electronic patient record. *HIS* = Hospital information system. *MRI* = Magnetic resonance imaging device. *PACS* = Picture archiving and communication system. *PDMS* = Patient data management system. *RIS* = Radiology information system.