Adapting investigational drug services during a pandemic: Recommendations for future preparedness from the Hematology/Oncology Pharmacy Association Investigational Drug Services Special Interest Group

Am J Health-Syst Pharm. 2022; XX:0-0

Heidi D. Finnes, PharmD, BCOP, FHOPA, Mayo Clinic Comprehensive Cancer Center, Rochester, MN, USA

Berrie Child, PharmD, BCOP, Huntsman Cancer Institute, Salt Lake City, UT, USA

Sean DeFrates, PharmD, BCOP, Northwestern Memorial Hospital, Chicago, IL, USA

Katharine Kinsman, PharmD, BCOP, Seattle Cancer Care Alliance, Seattle, WA, USA

Andrew Thorne, PharmD, MS, UNC Healthcare, Chapel Hill, NC, USA

Sarah Lentz, RPh, BCOP, UW Health, Madison, WI, USA

Robin Lockhorst, PharmD, BCOP, BCPS, Avera Cancer Institute, Sioux Falls, SD, USA

Jennifer Murphy, PharmD, BCOP, BCPS, UC Davis Health, Sacramento, CA, USA

Angela Urmanski, PharmD, BCOP, Froedtert Hospital & The Medical College of Wisconsin, Milwaukee, WI, USA

Sapna Amin, PharmD, BCOP, MD Anderson Cancer Center, Houston, TX, USA

Hallie Barr, PharmD, BCOP, The Ohio State University Wexner Medical Center, Columbus, OH, USA

Sunanda Baviskar, RPh, MBA, Atlantic Health System, Morristown, NJ, USA

Carrie Beckman, PharmD, BCPS, BCOP, UCHealth Memorial, Colorado Springs, CO, USA

Nicholas Chow, PharmD, BCOP, Miami Cancer Institute Baptist Health South Florida, Miami, FL, USA

Megan Derba, PharmD, Northern Light–Cancer Care of Maine, Brewer, ME, USA

Marsha Erickson, PharmD, Essentia Health, Duluth, MN, USA

Emily Hennes, PharmD, BCOP, UW Health, Madison, WI, USA

Heather Heisey, RPh, Penn State Health Milton S. Hershey Medical Center, Hershey, PA, USA

Rebecca Lau, PharmD, BCOP, Kaiser Permanente Washington Health Research Institute, Seattle, WA, USA

Suwicha Limvorasak, PharmD, BCOP, Cedars-Sinai Medical Center, Los Angeles, CA, USA

Todd Luckritz, PharmD, Mayo Clinic, Phoenix, AZ, USA

Theresa Mays, PharmD, BCOP, FASHP, NEXT Oncology, San Antonio, TX, USA

Chukwuemeka N. Nzelibe, PharmD, MBA, BCOP, LifeBridge Health, Baltimore, MD, USA

Tracy Romanowski, PharmD, MS, Miami Cancer Institute Baptist Health South Florida, Coral Gables, FL, USA

Camille Smith, PharmD, DPLA, CCRP, St. Jude Children's Research Hospital, Memphis, TN, USA

Debra Tesoro, RPh, BCOP, Washington University, Siteman Cancer Center, St. Louis, MO, USA

Katelyn Toeniskoetter, PharmD, Dana-Farber Cancer Institute, Boston, MA, USA

Krista Voytilla, PharmD, BCOP, St. Luke's Cancer Institute, Boise, ID, USA

Address correspondence to Dr. Finnes (finnes.heidi@mayo.edu).

Twitter: @HeidiDiann

Keywords: clinical trial, COVID-19, HOPA, investigational drug services, pandemic, virtual

https://doi.org/10.1093/ajhp/zxac267

The Hematology/Oncology Pharmacy Association (HOPA) Investigational Drug Services (IDS) Special Interest Group (Sig) is a community of pharmacists who specialize in the coordination, oversight, and management of investigational drugs for cancer clinical trials. In early 2020, HOPA IDS Sig members collaborated to identify necessary modifications to IDS workflows following the outbreak of the coronavirus disease 2019 (COVID-19) pandemic.[1] The purpose of these recommendations is to describe a best-practice approach to the delivery of pharmacy services to patients receiving investigational medications per clinical trials during this pandemic. These recommendations should be utilized to establish permanent IDS pharmacy virtual workflows and platforms for future preparedness. The scope of these guidelines includes conduct of site qualification visits (SQVs), site initiation visits (SIVs), sponsor monitoring visits during a clinical trial, mailing of oral investigational product (IP) to patients, and virtual sponsor audits. The collaboration of these expert pharmacists during the COVID-19 pandemic prompted a swift response and changes to investigational pharmacy policies and procedures and required increased efficiency through use of technology and changes to investigational pharmacy policies and procedures. We recommend that these proficiencies continue after the pandemic to ensure future health crisis preparedness and to allow for diverse, patient-centered clinical trial focus.

Role of the pharmacist in clinical research. Pharmacists are an integral part of the healthcare team caring for patients receiving investigational therapies per study protocols. Pharmacy services for study operation, called investigational drug services (IDS), require expertise in the study protocol and disease state, inventory management, drug storage, preparation, dispensing, patient returns, and destruction as well as knowledge of regulatory and compliance requirements per institution, state, and federal guidelines. These regulations include Food and Drug Administration (FDA) in the Code of Federal Regulations (21 CFR, Part 312),[2] the International Conference on Harmonisation

of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) Standard E6, also known as "Good Clinical Practice,"[3] and Good Manufacturing Practice (21 CFR, Part 211).[4] Adherence to these regulations regarding investigational new drug products translates to replicable and reliable clinical trial conduct and data. IDS pharmacists and technicians also ensure patient safety and compliance of investigational medications through clinical activities including medication therapy management consultations, drug-drug interaction reviews per clinical trial eligibility criteria, and patient and care team education. These roles have previously been described by the American Society of Health-System Pharmacists and the HOPA.[5-8] In addition, the Institute for Safe Medication Practices has highlighted the importance of pharmacovigilance in accepting IP labels and packaging from drug manufacturers that lack appropriate drug names, strengths, formulations, quantities, abbreviations, lot numbers, and expiration dates to ensure patient safety on non–FDA-approved medications.[9,10]

Investigational pharmacy services before the pandemic. Clinical trials offer lifesaving treatment advancements to patients with cancer; however, fewer than 5% of adult patients with cancer enroll in a clinical trial.[11,12] Approximately 70% of clinical trials are available at large academic institutions. Fewer trial opportunities exist in the community oncology setting despite this being the setting where more than 80% of patients with cancer receive treatment.[13] Barriers to clinical trial accrual are due to many factors, including lack of transportation, travel costs, lack of childcare, socioeconomic disparities and demographics, lack of community oncologist knowledge of available clinical trial opportunities, and patient fears of clinical trial "experimentation."[14] The introduction of COVID-19 worldwide in March 2020 highlighted many of these structural inefficiencies in clinical trial conduct.

Before the COVID-19 pandemic, clinical trials required face-to-face meetings including the patient and research team. These research visits often required traveling long distances to the academic medical center site offering the clinical trial, hotel stays, and added stress due to long days at the healthcare facility. Patients were required to have onsite laboratory assessments and radiological imaging, appointments with their provider, documentation and grading of toxicities, and receipt of oral and parenteral investigational medications from the site IDS pharmacy or infusion center. During this time, the focus of the clinical trial was more on the institution than on the patient.

In the era before COVID-19, regulatory review of the IDS-managed IP by the clinical trial sponsor was also in person.[5-8] For a sponsor to allow site participation in a clinical trial, an IDS pharmacy site visit had to occur to determine appropriate sterile and nonsterile compounding facilities, IP storage requirements, and temperature monitoring as well as in-depth site standard operating procedures (SOPs) and policies. Once a site was activated to enroll patients onto the clinical trial, a study monitor was sent by the contract research organization, pharmaceutical company, or government entity to the IDS pharmacy at regular intervals to review drug inventory, documentation, storage, and patient dispensing, returns, and destruction.

Reimagination of clinical trial patient care. In response to the global COVID-19 pandemic, which has significantly impacted the US and the metropolitan areas of the US where research centers are often located, institutions quickly shifted operations to meet the demands of the research communities and patient care. An American Society of Clinical Oncology survey conducted from March 24 to March 30, 2020, revealed that more than 60% of sites participating in clinical trials had halted screening and new patient enrollment.[15-17] Through advancements in technology, onsite patient visits were minimized. Surgeries were limited to emergent cases. Cancer treatments were modified to oral therapies or parenteral products with longer dosing intervals. A multitude of patients received care via telemedicine visits such as through telephone or video visits.[18,19] The National Cancer Institute (NCI)'s Cancer Therapy Evaluation Program (CTEP) recommended that patients with cancer receive treatment closer to home at participating sites. Additionally, many studies allowed for local laboratory assessment and radiological imaging or for wearable technology.[20-22]

At the center of the pandemic-influenced reinvention of IDS practices was also the commitment to continuity of care and adherence to Good Clinical Practice. A major focus of Good Clinical Practice is to ensure the safety of human research subjects (or patients). Part of doing so in a pandemic is to protect those patients from exposure to infectious disease by research or hospital staff. Healthcare sites across the world have worked hard to ensure proper use of personal protective equipment and to implement new processes of cleaning and infection prevention, movement of people through their buildings, and even broad restrictions of who can visit the healthcare setting with the goal of minimizing exposure.

Travel has been identified as an activity that puts patients and staff at increased risk of exposure that can spread COVID-19. Clinical research associates (CRAs) who travel frequently, patients, IDS staff, and study personnel may be at increased risk of transmission and infection when meeting in person. It should be noted that bringing patients into the healthcare setting can also put them at an increased risk of exposure. To minimize these exposure points during the pandemic, several IDS activities, including audit/monitoring visits and SQVs/SIVs, moved to a virtual format and for the first time ever IP was allowed by sponsors to be mailed to patients on an ongoing basis.

On the basis of the lessons learned during the pandemic, the research community and IDS pharmacies are looking

to continue the modernization of clinical trials through virtual workflows.

Virtual SQVs, SIVs, and monitoring visits. Conducting virtual SQVs, SIVs, and monitoring visits benefits both the IDS staff and the sponsor. The virtual visit eliminates the need for travel on the sponsor's part, saving time for the sponsor representatives, and represents a potential cost savings to the sponsor.

In addition to travel-related savings, virtual visits may decrease meeting length and improve efficiency. Virtual meetings eliminate travel between buildings and meetings and the need for institutional staff to chaperone sponsor representatives during and between sessions.

While some of the information requested by a sponsor at the SQV is unique to the study, much is standard across studies. In a virtual setting, this allows IDS staff to compile standard information such as site SOPs, process documents, equipment, maintenance information, and/or a prerecorded video of the pharmacy space(s). The SQV time can then be used to address unique aspects of a given study or questions that result from the information provided.

Additionally, virtual (centralized) monitoring has been shown to be an effective method of study oversight. Virtual monitoring provides additional benefits beyond onsite visits such as avoiding the need to bring external visitors into restricted IDS spaces, which are often small and not designed to accommodate workspace for external visitors. Individual states may have regulations pertaining to the presence of nonpharmacy staff inside a pharmacy, which should be strictly adhered to. Virtual monitoring visits shift reconciliation of investigational drug accountability into a proactive setting where the monitor reviews the documents in advance and may ask follow-up questions as needed. Historically, much time and labor were spent in person by the study monitor and the IDS staff preparing materials and supporting visits.

Current FDA guidance for industry on oversight for clinical investigations endorses the implementation of virtual (remote) monitoring.[23] In accordance with the recommendations in the FDA guidance, monitoring should assess adherence to the clinical trial protocol and IP accountability.[23] ICH E6 from November 10, 2016, outlines guidance for Good Clinical Practice and monitor responsibilities.[3] As outlined in ICH E6, IP accountability is the responsibility of the investigator or institution.[3] As neither guidance document delegates the responsibility for IP verification or inspection, physically or visually, to the sponsor representative, the best practice is for IDS staff to conduct this task on behalf of the sponsor. This may be completed in the form of IP attestation, defined by the HOPA[7] as 1 or 2 IDS staff members independently verifying, documenting, and attesting to the current inventory. Attestation will facilitate virtual monitoring and verification of IP accountability in line with FDA guidance and ICH guidelines.

Conduct of SQVs and SIVs. To facilitate virtual SQVs, SIVs, or monitor visits, it is recommended that sites create documents or SOPs outlining site-specific practices. At a minimum, these should contain information about the physical location (security, equipment, monitoring, power and backup power, temperature monitoring), IDS staff training procedures, maintenance of accountability records, storage and handling of investigational medications, dispensing and transportation of investigational medications to and from satellite sites, and destruction of used or expired investigational medications, as well as information regarding monitoring visits. It is recommended that sites maintain a contact list that includes the names and email addresses for unblinded IDS staff who will require interactive response technology (IRT) system access that is ready to send upon request to facilitate access.

Sites may consider creating a website that can be referenced by potential sponsors. Elements contained on the IDS webpage may include SOPs, photographs, and/or a prerecorded video tour of the physical location. If a video is created, it should include images of the physical space, storage locations, equipment, monitoring devices, and cleanrooms (if applicable). Additionally, sites should have access to a virtual meeting space such as Zoom, WebEx, or Microsoft Teams. The meeting space should have reliable audio and video capabilities and the ability to screen share for document sharing.

In preparation for the SQV or SIV, an agenda should be sent out by the sponsor with the virtual meeting space and meeting invitation. The SIV should be scheduled by sponsors approximately 2 weeks in advance of study activation. The portion of the SIV relevant to IDS should be clearly delineated on the agenda, and approximately 30 to 60 minutes should be allotted for pharmacy-related topics. Lead IDS staff should be present for this portion of the SQV or SIV. If the information relevant to pharmacy is presented without IDS staff present, another meeting may need to be scheduled to review material separately from the SIV.

Sponsors should make all materials and slides available to IDS staff for remote SQVs or SIVs, preferably at the time of scheduling. All documents should be transmitted electronically and provided in advance so that issues may be resolved before the SIV. These materials may include, but are not limited to, the protocol, pharmacy manual, IRT user manual (if applicable), investigator's brochure, safety data sheet, and SQV or SIV presentation slide deck. Sponsors should facilitate communication with IDS staff before the visit to solicit questions regarding study startup or activation and triage as appropriate, with a goal of being able to provide answers to clinical questions in advance of the SQV or SIV.

During the virtual visit, introductions should be made by all present so that roles are clear. After review of the pharmacy-related information with IDS staff, sufficient time for questions must be made available in real time. If questions are unable to be answered, the presenter should follow up with answers in a timely manner so as to not delay site

activation. A summary of the necessary tools for virtual pharmacy visits is in Table 1.

Conduct of virtual monitoring visits. At the beginning of the COVID-19 pandemic, many sites restricted hospital access to only patients and staff. Sites had to best determine how to maintain study requirements regarding CRAs and monitors sent on behalf of the sponsor. The use of required virtual monitoring visits has led to the recommendation that IDS sites adopt full-time virtual monitoring as appropriate to fulfill the monitoring requirements of the study. The IDS staff, working in concert with the study team, should create a monitoring visit SOP to outline site monitoring practices. This SOP should set clear expectations about how, when, and where external staff or CRAs may visit the IDS pharmacy (physically and/or virtually), review facilities, and review IDS research documents to ensure adherence.

Ideally, the SOP document will contain information about the technological requirements to conduct a visit, the process to schedule a visit, what the visit will entail, and how the visit will be conducted. Special consideration should be given to procedures for blinded trials when working with an unblinded monitor. Additionally, the SOP should describe how documents will be disseminated (email vs upload into the electronic inventory system), how the CRA should communicate with the IDS staff, processes for drug accountability and reconciliation, electronic system access, and the duration of each visit.

Virtual monitoring visits may be conducted entirely through email with a sign-out via telephone call or with a combination of modalities (eg, a secure virtual meeting platform, file hosting services, email, telephone), in accordance with site-specific allowances.

As a best practice for future preparedness, research documentation should be available electronically. This may be accomplished through acquisition of an investigational drug software system that is compliant with the Health Insurance Portability and Accountability Act and 21 CFR Part 11. For IDS sites that must utilize paper drug accountability, we recognize the required personnel, effort, and time to deidentify, scan, and maintain such electronic files to facilitate virtual access and review of documentation by relevant parties. The platform

Table 1. Tools for Virtual Visits

Tools	Key considerations
Standard operating procedures	Relevant sections to include information and procedures for: • IDS pharmacy security • Equipment used for drug preparation and storage • Primary and backup power supplies • Temperature monitoring • Staff training • IP accountability • Storage and handling of IP • Dispensing and labeling procedures • Monitoring visits
Website	Content to include: • SOPs • Site photographs or video tour of spaces utilized for drug storage and compounding of IP
Secure meeting space platforms	Schedule meetings at least 2 weeks in advance (with access to camera and microphone)
Site qualification visits and site initiation visits	Sponsors to provide slides and documents to IDSstaffin advance of meeting: • Agenda • Protocol • Pharmacy manual • IRT user manual (if applicable) • Investigator's brochure • Safety data sheet • SQV or SIV presentation slide deck
Monitoring and audits	Available records for monitor or auditor review should include: • SOPs • Staff training • IP accountability (including packing receipts, returns, destruction) • Temperature monitoring • Expiration memos (if applicable)

Abbreviations: IDS, investigational drug service; IRT, interactive response technology; IP, investigational product; SIV, site initiation visit; SOPs, standard operating procedures; SQV, site qualification visit.

for electronic access must be regulation compliant and secure. If it is not secure, documents or products that include protected health information (eg, photographs or visual display of patient returns if labels include protected health information) should not be provided for virtual viewing to protect subject safety. CRAs should be granted access to the electronic inventory systems in advance of the IDS-CRA meeting time.

IDS teams conducting virtual visits should make a reasonable effort to provide the following to CRAs, sponsor representatives, and study teams for monitoring: IP accountability records, temperature records (site locations, assets, temperature tracking devices), IP destruction records, shipping receipts and packing slips, transportation, and mailing documentation as applicable.

The best practice is to create a site-specific SOP that defines a process for IDS staff to verify and confirm IP accountability on behalf of the sponsor and investigator. Photographs, video, and virtual conference services are not the preferred forms of IP review but may be considered if facility and institutional policies are unable to allow adherence to the previously suggested process.

Mailing of investigational drugs to patients. Traditionally, mailing of IP directly to patients has been prohibited by sponsors, but during the COVID-19 pandemic conducting virtual visits and subsequently mailing IP offered decreased exposure to patients at high risk for infection.

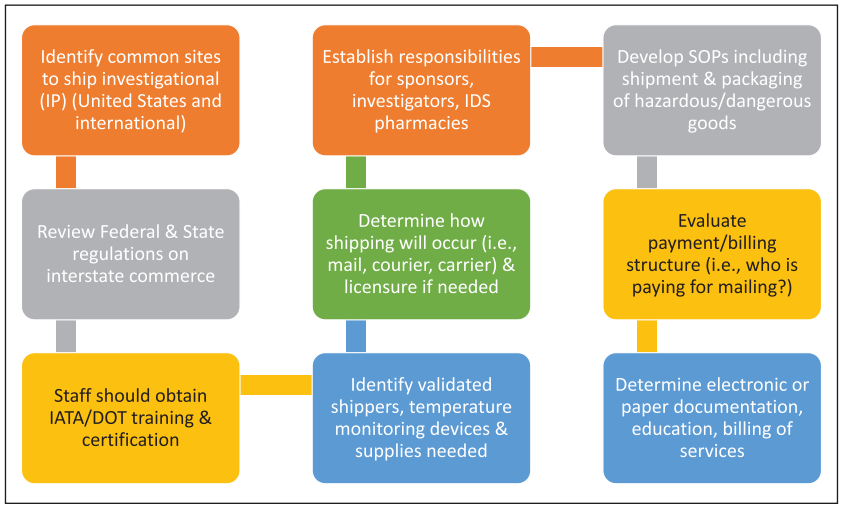
In general, IP under an investigational new drug application (IND) may be shipped across state lines per federal rules.[2] IP that is IND exempt must follow state board of pharmacy rules, particularly in the destination state.[24] When mailing IP, the safety data sheet, particularly section 14, should be referenced to determine whether the agent is considered a dangerous good.[25,26] The hazardous drug assessment of risk, per United States Pharmacopeia general section <800>, is helpful for staff handling of the drug, but is not applicable when determining mailing hazards and dangerous good status. IDS pharmacies should consider training pertinent staff in Department of Transportation and International Air Transport Association programs depending on the extent of the mailing that will be required.[25,26]

Suggestions for pharmacies to consider with mailing of oral IP are listed in Figure 1.

To ensure that the mailing process is safe, timely, and properly documented, IDS staff should develop SOPs defining when mailing will be allowed and what role each member of the research team is responsible for. The study team, defined as the principal investigator (PI), study coordinator, and/or research nurse, must obtain sponsor and PI approval to mail IP, and the associated records must be maintained with the study file and made available to the IDS pharmacy. Site-specific SOPs should delineate who will notify the IDS pharmacy of mailing requests including the timeline required, who will supply shipping materials, whether temperature-validated shippers will be used, who will pack the shipment, and how shipping costs will be invoiced. Further, it is recommended that study teams maintain tracking information for the shipment, confirm receipt, and manage any temperature excursions should they occur during transit.

How the IPs are packed and the method of transport should also be detailed in site-specific procedures. The IDS pharmacy may elect to use a single carrier for mailing and require that sponsors arrange a specific courier service otherwise. The IDS pharmacy and study team should consider the sponsor requirements for packaging and temperature control, as well as the expiration dating, when determining whether a standard mail carrier can be used or if specialized courier services are needed. Additionally, the IDS pharmacy should consider the use of temperature-controlled and validated shippers if necessary. The use of temperature monitoring devices that require the patient to manage the device is discouraged. It is unrealistic to expect a patient unfamiliar with temperature monitoring devices to correctly stop a device and return it to the IDS pharmacy. Once the packaging and transport service is determined, it is recommended that the study team coordinate the pickup of the package. The IDS pharmacy should have a standard process to document shipments that is linked to patients and is traceable. Finally, the IDS pharmacy should receive patient returns, when applicable, at the next onsite visit, unless the study team can perform this task virtually with

Figure 1. Recommendations for evaluation of investigational drug service (IDS) pharmacy mailing of investigational product (IP). DOT indicates Department of Transportation; IATA, International Air Transport Association; SOPs, standard operating procedures.



the patient. These recommended processes are similar to those suggested by the CTEP program of the Division of Cancer Treatment and Diagnosis/NCI in their guidance for shipment of oral IND agents to clinical trial subjects on clinical trials sponsored by NCI/CTEP published on January 1, 2022.[20]

An IDS pharmacy will need resources to accommodate mailing of IP, and available resources may determine the amount of mailing that a specific site can perform. More specifically, space is needed to store shipping supplies and packages ready to ship. Additional staff may be necessary given the added complexity and time required to perform this task. The IDS pharmacy should incorporate mailing of IP into their fee structure and bill sponsors or study teams for supplies, carrier/courier fees, and additional labor time.

The role of the IDS pharmacist in patient education was also impacted by the transition to mailing IP. In-person education was transitioned to telephone or virtual remote education. With this transition, the pharmacist may have faced challenges with scheduling these calls and telehealth visits around patient availability. Documentation templates for education were also revised to account for virtual teaching of drug information and changes in IP return collection.

Conduct of virtual audits. The process for virtual audits is similar to that for a virtual monitoring visit. Sponsors who would like to conduct a virtual audit should send advance notice so that the required documents can be gathered and made available. Optimal timing for requests should be institution specific, ideally with a minimum of 2 weeks before the desired date. Performing an audit requires special training on the part of the auditor, and the IDS staff involved should likewise be trained on what to look for during an audit. Before the audit, the IDS pharmacy should ensure all former and current staff are captured electronically or are on the study-specific training log with the correct training dates as defined within a training and delegation of authority SOP. If training occurred on multiple amendments, ensure that the dates are checked for accuracy. All dispenses, inventory, transactions, and cycle counts must have their dates tracked to ensure the staff training dates are correct.

To prepare the drug accountability records for the audit,[27] IDS staff should review all packing slips and shipping documents to ensure that all dates, lot numbers, kit numbers, and expirations are documented correctly. For sites with paper accountability, the drug accountability record forms (DARFs) will need to be signed by a designated pharmacist or the PI if the site certifies documents. For sites with electronic DARFs, each transaction has a traceable signature, which will negate the need for a wet signature. These DARFs must also be signed according to the instructions from the sponsor.

Documents prepared for the auditors should include any temperature record data and, if applicable, any IRT confirmation reports. Ensure routine patient return cycle counts have been documented for the study and a current cycle count is performed. When presenting the data, confirm the current version of the DARF is being used. If a temperature excursion has occurred for the study being audited, IDS staff must gather and provide all documentation regarding the excursion, including whether the IP was in quarantine and the sponsor documentation indicating the determination of whether the IP was to be used or destroyed.

Each subject enrolled in the study should be origin traced and have one or all of the following documentations: institutional review board–approved version of the signed and dated informed consent, sponsor enrollment form, and registration information. It is important to compare DARFs and patient prescriptions to ensure dates, dispensing information, lot numbers, and IP expirations are correct. There may be other comparable data time points to consider as required by the sponsor. If present, pharmacist notes on the prescriptions must be initialed and dated.

Auditors may ask for related study documents provided to the site during the life of the study, such as the pharmacy manual, protocol, memos, study document amendments, and investigator's brochure. These documents should be stored electronically and be readily accessible.

Audits may be handled virtually with very few additional tools beyond what the IDS staff currently utilizes. The minimum requirements include a computer, internet, email, fax machine, copy machine, and scanner. Additional tools required will include temperature monitoring devices, which preferably have continuous remote monitoring capabilities. Current training logs (if maintained by the IDS site) may be signed manually or electronically if compliant with FDA Title 21 CFR Part 11.[2] All parties participating in the audit should connect through a secure electronic location for videoconferencing. If site policies permit, and the auditors request to see photographs of IP, it is advised that the site use a tablet, iPad, or camera. Of these options, a camera that can upload photographs with a date and time stamp is the ideal method.

Summary. IDS pharmacies transformed SOPs during the outbreak of the COVID-19 pandemic to quickly meet the needs of research teams, study sponsors, and patients. By embracing technology, many of these IDS services such as SQVs, SIVs, monitoring visits, and audits were conducted in an electronic or virtual environment. This resulted in IDS workflow efficiencies as well as potential cost savings to the study sponsor and institution through minimization of the time spent by clinical research organization monitor full-time equivalents at the institution and in travel. It has been safe and convenient for patients in clinical trials to receive oral IP by mail. IDS pharmacies require guidance from clinical trial sponsors who hold the IND as to whether oral IP may continue to be mailed to patients following the end of the COVID-19 pandemic. In addition, FDA must provide direction on shipping of IND-exempt IP across state lines. Federal regulations are necessary to

meet a patient-centered vision of clinical trial care.

These innovative best practices learned during the COVID-19 pandemic should be continued in day-to-day IDS practice moving forward. Utilization of technology and investigational drug software platforms has allowed a shift from operational and regulatory requirements to allow pharmacists time to help teams continue innovative research processes centering on the patient with cancer. This patient-centered focus should continue to be the emphasis for advancements in IDS pharmacy services to allow enrollment of a vast, diverse, and inclusive patient population onto cancer clinical trials.

Disclosures

The authors have declared no potential conflicts of interest.

Additional information

The HOPA IDS Sig comprises pharmacists who perform logistical duties of investigational medication procurement, regulatory compliance documentation, drug dispensing, and medication sterile and nonsterile compounding and preparation as well as oversight of the clinical safety and care of patients on clinical trials.

References

1. Food and Drug Administration. Coronavirus disease 2019 (COVID-19). Accessed February 21, 2022. https://www.fda.gov/emergency-preparedness-and-response/counterterrorism-and-emerging-threats/coronavirus-disease-2019-covid-19
2. National Archives. CFR Title 21, Chapter I, Subchapter D, Part 312. Accessed February 21, 2022. https://www.ecfr.gov/current/title-21/chapter-I/subchapter-D/part-312?toc=1
3. International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use. ICH harmonized tripartite guidelines: guideline for Good Clinical Practice. *J Postgrad Med*. 2001;47(1):45-50.
4. National Archives. CFR Title 21, Chapter I, Subchapter C, Part 211. Accessed February 15, 2022. https://www.ecfr.gov/current/title-21/chapter-I/subchapter-C/part-211
5. Kay SC, Luke DG, Tamer HR. ASHP guidelines for the management of investigational drug products. *Am J Health-Syst Pharm*. 2018;75(8):561-573.
6. American Society of Health-System Pharmacists. ASHP guidelines on clinical drug research. *Am J Health-Syst Pharm*. 1998;55(4):369-375.
7. Hematology/Oncology Pharmacists Association. *HOPA Investigational Drug Service Best Practice Standards*. Hematology/Oncology Pharmacists Association; 2014. https://www.hoparx.org/images/hopa/resource-library/professional-tools/HOPA16_IDS_Guidelines.pdf
8. Amin S, Polley S, DeFrates S, et al. National Comprehensive Cancer Network investigational drug service consensus recommendations. *Am J Health-Syst Pharm*. 2022;79(6):486-491. doi:10.1093/ajhp/zxab455
9. Institute for Safe Medication Practices. Investigational drugs: product-related issues pose significant challenges (part I). Accessed February 14, 2022. https://www.ismp.org/resources/investigational-drugs-product-related-issues-pose-significant-challenges-part-i
10. Institute for Safe Medication Practices. Investigational drugs: strategies for sponsors, FDA, and clinical sites to prevent product-related errors (part II). Accessed February 14, 2022. https://www.ismp.org/resources/investigational-drugs-strategies-sponsors-fda-and-clinical-sites-prevent-product-related
11. Murthy VH, Krumholz HM, Gross CP. Participation in cancer clinical trials: race-, sex-, and age-based disparities. *JAMA*. 2004;291(22):2720-2726.
12. Tejeda HA, Green SB, Trimble EL, et al. Representation of African-Americans, Hispanics, and whites in National Cancer Institute cancer treatment trials. *J Natl Cancer Inst*. 1996;88(12):812-816.
13. American Association of Cancer Research. *AACR Cancer Disparities Progress Report 2020*. Accessed February 23, 2022. https://cancerprogressreport.aacr.org/wp-content/uploads/sites/2/2020/09/AACR_CDPR_2020.pdf
14. Unger JM, Cook E, Tai E, Bleyer A. Role of clinical trial participation in cancer research: barriers, evidence, and strategies. *Am Soc Clin Oncol Educ Book*. 2016;35:185-198.
15. Waterhouse DM, Harvey RD, Hurley P, et al. Early impact of COVID-19 on the conduct of oncology clinical trials and long-term opportunities for transformation: findings from an American Society of Clinical Oncology survey. *JCO Oncol Pract*. 2020;16(7):417-421.
16. Upadhaya S, Yu JX, Hodge J, Campbell J. COVID-19 impact on oncology clinical trials: a 1-year analysis. *Nat Rev Drug Discov*. 2021;20(6):415.
17. Boughey JC, Snyder RA, Kantor O, et al. Impact of COVID-19 pandemic on cancer clinical trials. *Ann Surg Oncol*. 2021;28(12):7311-7316.
18. Cinar P, Kubal T, Freifeld A, et al. Safety at the time of the COVID-19 pandemic: how to keep our oncology patients and healthcare workers safe. *J Natl Compr Cancer Netw*. 2020;18(5):504-509.
19. Doherty GF, Goksu M, de Paula BHR. Rethinking cancer clinical trials for COVID-19 and beyond. *Nat Cancer*. 2020;1(6):568-572.
20. National Cancer Institute. National Institutes of Health Guidance for shipment of oral IND agents to clinical trial subjects on clinical trials sponsored by the National Cancer Institute Cancer Therapy Evaluation Program. Published January 1, 2022. Accessed February 22, 2022. https://ctep.cancer.gov/content/docs/CTEP_Oral_IND_Agent_Shipment_Guideline.pdf
21. Aapro M, Bossi P, Dasari A, et al. Digital health for optimal supportive care in oncology: benefits, limits, and future perspectives. *Support Care Cancer*. 2020;28(10):4589-4612.
22. Zon RT, Kennedy EB, Adelson K, et al. Telehealth in oncology: ASCO standards and best practice recommendations. *JCO Oncol Pract*. 2021;17:546-564.
23. Food and Drug Administration. A risk-based approach to monitoring of clinical investigations: questions and answers guidance for industry. Published March 2019. https://www.fda.gov/media/121479/download
24. McIntyre C. Regulations guiding the interstate shipment of investigational product. *J Pharm Pract*. 2014;27(1):101-105.
25. Federal Aviation Administration, Department of Transportation. How to ship dangerous goods. Accessed February 24, 2022. https://www.faa.gov/hazmat/safecargo/how_to_ship/
26. International Air Transport Association. Dangerous goods: setting the standards leads to safety. Accessed February 25, 2022. https://www.iata.org/en/programs/cargo/dgr/
27. Siden R, Tankanow RM, Tamer HR. Understanding and preparing for clinical drug trial audits. *Am J Health-Syst Pharm*. 2002;59(23):2301,2306,2308.