Temple University
School of Pharmacy

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2021 Research Recognition Day

Abstract Book

Friday, April 16th

MESSAGE FROM THE DEAN

Since 2007, Temple University School of Pharmacy's Research Recognition Day is an annual tradition that celebrates the research accomplishments of our graduate and professional students and their faculty mentors. 2021 marks a break in tradition, from our usual in-person format to a pandemic-proof virtual format. We hope this format brings enhanced value for participants near and far.

At the Temple University School of Pharmacy, we provide opportunities to lead innovations in clinical practice as well as in basic and applied sciences while earning degrees in pharmacy, pharmaceutical sciences, and regulatory affairs and quality assurance. By bringing these disciplines together, we match the reality of the healthcare continuum from drug discovery to care delivery to health stewardship. Research Recognition Day offers a sampling of the work we do to perpetuate this endeavor.

This year, we have the honor of hosting Jake Brenner, MD, PhD, Assistant Professor and Attending Physician, Pulmonary, Allergy, & Critical Care Division, and Systems Pharmacology & Translational Therapeutics Department at the University of Pennsylvania as our Keynote Speaker. Dr. Brenner who is also the inventor of the AIR-AD medical device treatment for chronic obstructive pulmonary disease embodies the notion that the diligent pursuit of an idea can redirect the future for people affected by a disease.

The School is grateful for the presenting sponsorship from Genentech. Many thanks go to Dr. Brenner; Dan Castiglia, BSPharm '98, MS, Federal Account Manager - Northeast, Genentech, Lieutenant Colonel, US Air Force (ret); presenters, and evaluators, and our event committee, which includes faculty members, Drs. Van Hellerslia (Chair), Justina Frimpong, Swati Nagar, Oscar Perez, Tina Tran, and Ellen Walker; Assistant Dean Katie Battista; and students Conor Quinn and Tyler Achuff.

Thank you for your participation.

Jay Panyam, PhD
Dean & Professor

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AGENDA

12:00 - 12:15 p.m.:	Welcome Remarks by Jayanth Panyam, PhD, Dean and Professor, and by Dan Castiglia, BSPharm '98, MS, Lieutenant Colonel, US Air Force (ret), Federal Account Manager - Northeast, Genentech Speaker Introduction by Ellen Walker, PhD, Chair, Department of Pharmaceutical Sciences, Professor of Pharmacodynamics
12:15 - 1:15 p.m.:	Keynote Lecture, Nanomedicine for Acute Critical Illnesses: Drug Delivery to the Microvasculature by Jake Brenner, MD, PhD, Assistant Professor and Attending Physician, Pulmonary, Allergy, & Critical Care Division, and Systems Pharmacology & Translational Therapeutics Department at the University of Pennsylvania
1:15 - 1:45 p.m.:	Q&A Student Research Presenters
1:45 - 2:50 p.m.:	Select Oral Presentations & Student Awards
2:50 - 3:00 p.m.:	Closing Remarks

RESEARCH DAY EVALUATORS

Aneesh Argikar, PhD, Associate Director, Synteract

Michael Barros, PharmD, BCPS, BCACP, BC-ADM, CDE, Clinical Associate Professor, Temple University School of Pharmacy

Harold Bobrow, RPh, Adjunct Faculty, Temple University School of Pharmacy

Chris Bode, PhD, VP of Scientific & Corporate Communications, Absorption Systems

Ina Calligaro, PharmD, Senior Associate Dean for Professional Programs, Temple University School of Pharmacy

Dan Castiglia, BSPharm, MS, Federal Account Manager - Northeast, Genentech, A Member of the Roche Group

Kenneth Cleaver, PhD, Medical Product Consultant, Kenneth E. Cleaver Consulting, LLC

John Ellingboe, PhD, Managing Director, JE Pharma Consulting

Saba Emami, PharmD, MS, Associate Director, Merck

Rong Fan, PhD, Senior Scientist, Frontage Laboratories

Scott Greene, RPh, MS, Director of Experiential Programs, Philadelphia College of Pharmacy, University of the Sciences

Suzanne Heske, RPh, MS, Senior Director, Syneos Health

Sindhu John, PharmD, BCPS, MBA, Clinical Staff Pharmacist, St. Mary Medical Center

Santhosh Joseph, PharmD, Pharmacy Manager, Riteaid Pharmacy

Jan Kitzen, RPh, PhD, PRN Pharmacist, Retired

Matthew Korber, PharmD, Pharmacist, Temple University Hospital

Priyanka Kulkarni PhD, Research Scientist II, Takeda

Su-Yueh Lin MS, RPh, Executive Director, Regulatory Affairs Labeling & Promotion, Intercept Pharmaceutical Inc.

Michael Mancano, PharmD, Assistant Dean & Clinical Professor, Temple University School of Pharmacy

Tarek Mansour, PhD, CEO, Sabila Biosciences, LLC

Mariam Mikhael, PhD, Director of R&D, ProPhase Labs, Inc.

Margaret Miklich, PharmD, BCACP, Clinical Assistant Professor, Temple University School of Pharmacy

Mark Nelson, PhD, VP of Business & Science Development, Frontier Scientific & Subsidiary

Oscar Perez, MD, Assistant Professor, Temple University

Melissa Rotz, PharmD, BCPS, Clinical Associate Professor, Temple University School of Pharmacy

Ahmed Sarhan, DDS, MS, Clinical Assistant Professor, Tempel University Maurice H. Kornberg School of Dentistry

Gregory Shaeffer, MBA, RPh, Assistant Professor, University of MD Eastern Shore

Tina Tran, PharmD, Assistant Professor, Temple University School of Pharmacy

Eugene Trybulski, PhD, Director, Retired

Alfredo Traversa, PharmD, Clinical Assistant Professor, Chicago State University

Gerry Kean, BA Biology, Retired

Daniel VanDorn, PharmD, Senior Medical Science Liaison & Lead Scientist, Product Development, Genomind

Ellen Walker, PhD, Professor & Chair, Department of Pharmaceutical Sciences, Temple University School of Pharmacy

Jaydeep Yadav, PhD, Senior Scientist, Merck

Kiyo Yoda, PharmD, Pharmacy Clinical Coordinator, Paoli Hospital

Karen Zimm, RPh, MS, PhD, Associate Director, Johnson & Johnson, Adjunct Faculty, Temple University School of Pharmacy

POSTER ID	TITLE	PRIMARY STUDENT AUTHOR	SUBMITTING FACULTY/ RESEARCH SUPERVISOR:	YOUTUBE LINK
GRADUATE STUDENTS				
G1	Complex Cytochrome P450 kinetics due to multisubstrate binding and sequential metabolism	Zeyuan Wang	Ken Korzekwa	https://youtu.be/TYK324hVr0Q
G2	Impact of the lipid membrane headgroup on partitioning of ionizable molecules	Md Hridoy	Ken Korzekwa	https://youtu.be/KXVMdUJMmz4
G3	Optimization of mRNA delivery using biodegradable pyridinium cationic lipids	Md. Abu Sufian	Marc Ilies	https://youtu.be/xqGyadWVoQg
G4	Interaction of PEGylated and Non-PEGylated liposomes with phospholipase A1	Shibbir A. Khan	Marc Ilies	https://youtu.be/7TLx8O2ELfE
G5	Characterization of Ibrutinib a Bruton's Tyrosine kinase Inhibitor via HME	Bayan Asharouri	Reza Fassihi	https://youtu.be/tX2LZc-oK4o
G6	Live and let die: A NASH dilemma	Connor Quinn	Salim Merali	https://youtu.be/IRWb6De90wU
G7	In vitro midazolam metabolism and CYP atypical kinetics in SD rat microsomes	Tirtha Nandi	Swati Nagar	https://youtu.be/bNPrNjyysBw
G8	Concentration-Time profiles of Amlodipine and Glyburide in Rats: Predictions using a Continuous Absorption Model	Casey Radice	Swati Nagar	https://youtu.be/NHzdg93eSws
O1	The Effect of VEGFA Gene Cancer Mutations on VEGFA-Bevacizumab Binding Affinity	Nader Afifi	Carlos Barrero	https://youtu.be/5ZoPi-CJ6P0
PROFESSIONAL STUDENTS				
P1	Implementation of HIV/HCV POC Testing in Community Pharmacies: DC and GA	Zach Rebollido	Anisha Grover	https://youtu.be/Iy5MqnJVaGU
P2	Evaluation of Vasopressin Use in a Large Academic Teaching Institution	Kevin Nguyen	Christina Rose	https://youtu.be/CIfM6nnRaEE
P3	5-HT7 Receptor Antagonists For Treatment of Alzheimer's Disease	Kyle Taylor	Benjamin Blass	https://youtu.be/pOZfit3pNjQ
P4	Evaluation of Inhaled Drugs as Inhibitors of SARS-CoV2 - ACE2 Interaction	Varshita Parmar	Carlos Barrero	https://youtu.be/RfvfC8Ic-oc
P5	Effect of Cigarette Smoke on Cytokine production in Human Macrophages	Gabriel Vivas	Carlos Barrero	https://www.youtube.com/watch?v=PhwsmQnVbdw

P6	Targeting Glucose Metabolism Pathways Gene Mutations as Breast Cancer Biomarkers	Kyle W Taylor	Carlos Barrero	https://youtu.be/MsO-kcYla3s
P7	Utilization of intravenous acetaminophen in non-surgical ICU patients	Elayna Silfani	Craig Whitman	https://youtu.be/ZW1hnAeT3s4
P8	Factors associated with initiation of oral antineoplastic therapies	Jacqueline Nguyen	Justina Frimpong	https://youtu.be/pBWPiTNyZBs
P9	Inpatient Rituximab Use Evaluation	Tyler Achuff	Justina Frimpong	https://youtu.be/l_F0ghpcCUU
P10	Pharmacy student-led medication reconciliation reduces medication errors	Stephanie McLaughlin	Marissa Cavaretta	https://youtu.be/04mRRohYwCQ
P11	Appropriateness of antibiotic treatment duration at hospital discharge	Alexander Haines	Marissa Cavaretta	https://youtu.be/tf8g-Tba490
P12	Effect of urinalysis with reflex to culture on antibiotic prescribing	Justina Tesauro	Marissa Cavaretta	https://youtu.be/nm8jsMLXpjY
P13	Treatment of Antibody Mediated Rejection in Kidney Transplant Recipients	Diana Hoang	Nicole Sifontis	https://www.youtube.com/watch?v=XxNaWnfS5k8
P14	Standard vs. Extended Use of Thymoglobulin Induction in Kidney Transplantation	Albertina Coleman	Nicole Sifontis	https://youtu.be/-gToEb9vKJE
P15	Increased Risk Donor Kidney Transplant Outcomes at an Academic Medical Center	Amy Fariello	Nicole Sifontis	https://www.youtube.com/watch?v=0B8UnR-UC7c
P16	Impact of Low Versus High Kidney Donor Profile Index on Transplant Outcomes	Briana Coughlin	Nicole Sifontis	https://youtu.be/bhsjoZVsiAs
P17	Outcomes in HIV Positive Kidney and Liver Transplant Recipients	Neelesh Agarwal	Nicole Sifontis	https://youtu.be/8zLLJnz3vPA
P18	Evaluation of BP Measurement Technique Following Educational Intervention	Akhila Mathew	Nima M Patel-Shori	https://youtu.be/b1EVSt7GSNA
P19	Depression among pharmacy students: Prevalence and Risk Factors	Madiha Faruqi	Van Hellerslia	https://youtu.be/O2y8bR0ReHU
P20	The Mental Health of Pharmacy Students Amidst the COVID-19 Shutdown	Chandni Malani	Van Hellerslia	https://www.youtube.com/watch?v=ii6A2KNnu0c
P21	Implementation of HIV/HCV POC Testing in Community Pharmacies: FL	Analiz Velazquez	Anisha Grover	https://youtu.be/1aAmQFQtjG0

G1

Complex Cytochrome P450 kinetics due to multisubstrate binding and sequential metabolism.

Zeyuan Wang*, Erickson Paragas[1], Swati Nagar[1], Ken Korzekwa[1]

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PURPOSE:

The purpose of this study is to investigate the complexity of cytochrome P450 kinetics due to the large binding site. The active sites of CYPs are well reported to accommodate the binding of multiple substrates, which results to complex enzyme kinetics that deviates from Michaelis-Menten assumptions (atypical kinetics) including substrate inhibition, sigmoidal (auto-activation), biphasic, sequential metabolism and formation of multiple metabolites. We performed in silico simulations to provide a more mechanistic understanding of the impact of these complex CYP kinetics. Saturation kinetics data of model drug diazepam (DZP), midazolam and ticlopidine are generated to exemplify the complex models.

METHODS:

All simulation and model fitting are performed via Mathematica using both standard rate equations and numerical solutions of ordinary differential equations. Different models that exhibit single substrate (ES) and multiple substrates (ESS) forming one or multiple metabolites were simulated. Datasets were generated for saturation and substrate depletion experiments to simulate the different scenarios of substrate inhibition, sigmoidal (auto-activation), biphasic, and sequential metabolism. Meanwhile, a statistical analysis are performed to elucidate the advantage of monitoring multiple metabolites formation versus deriving the in vitro parameters from a single metabolite. The in vitro enzyme incubation assay are conducted with recombinant CYP3A4 enzyme. The relative enzyme kinetic parameters, including Km and kcat or apparent Km and apparent kcat are measured. The quantitation of metabolite formation are measured by LC/MS/MS.

RESULTS:

A significant concentration-dependent CLint was observed for sigmoidal kinetics compared to the other types of kinetics. The metabolite ratio provides an additional way to characterized single (ES) and multisubstrate binding (ESS) kinetics. Furthermore, the two-substrate two-metabolite model (ESSP1P2) generate a more precise model fitting results compared to one-metabolite model (ESP1P2).

CONCLUSIONS:

Numerical analysis is capable of simulating and analyzing in vitro data, whether it follows single (ES) or multisubstrate binding (ESS) kinetics. This approach does not rely to steady-state kinetic assumptions, initial-rate conditions and provides a more mechanistic understanding of the complex CYP kinetics including multiple-substrate binding and sequential metabolism.

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G2

Impact of the lipid membrane headgroup on partitioning of ionizable molecules

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BACKGROUND:

Passive permeability of drug molecules through biological membranes is a fundamentally important process which involves the partitioning of molecules into the lipid bilayer membrane and passive permeation across the membrane. More than 60% of the drugs intended for human use contain at least one ionizable group. Depending on the ionization constant (pKa) of ionizable groups, drug molecules may exist in various biological fluids both as their charged and neutral forms to varying extents. According to the widely known pH-partition hypothesis, only the neutral form of ionizable molecules can diffuse through the lipophilic bilayer membranes. However, a growing number of both experimental and molecular dynamics studies indicated violations of this hypothesis. Permeation of the charged species of ionizable compounds through partitioning into bilayer models has also been reported, though at a much slower rate compared to their neutral form. Therefore, the contribution of the charged forms to the total permeability of a molecule at a given pH may have been neglected by the oversimplified pH-partition hypothesis. According to some studies, the zwitterionic membrane lipid headgroups might interact with the ionizable group of molecules by forming a surface ion pair with it and help it position in the water accessible headgroup region, followed by its neutralization (change of pKa) by dynamic protonation for permeation across the membrane.

OBJECTIVE:

Our focus is to experimentally determine the impact of the polar headgroup on the membrane partitioning of charged species of Metoprolol (protonated) over a range of pHs (5-9).

METHOD:

A well-validated headgroup surrogate, hydrated diacetyl phosphatidylcholine (DAcPC) spiked with metoprolol and n-hexane as the surrogate for the lipophilic tail are incubated together for several hours. Metoprolol concentration in both phases is determined by LC-MS/MS.

RESULTS:

At this initial phase of this study, troubleshooting on the separation of metoprolol and internal standard from the hydrated DAcPC solution through solid-phase extraction, followed by metoprolol quantitation is being pursued.

CONCLUSION:

We will determine if the surrogate headgroup has any impact on partitioning and neutralization of a charged molecule within the membrane and therefore, influence the permeability of ionizable species.

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G3

Optimization of mRNA delivery using biodegradable pyridinium cationic lipids

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BACKGROUND:

Modified viruses were traditionally used as vectors for nucleic acid delivery. However, synthetic vectors are preferred these days over their viral counter parts due to reduced immunogenicity, large payload capacity and ease of manufacture. Pyridinium cationic amphiphiles (surfactants, gemini surfactants, lipids, lipophilic poly cations) were shown to be efficient and safe nucleic acid delivery agents by our lab and others [1]. Recently, our group have also shown that these amphiphiles can efficiently encapsulate and deliver a variety of nucleic acid payloads- pDNA, siRNA and mRNA. Moreover, in the same study, nitrogen to phosphorous ratio was found to vary across payload type [2].

OBJECTIVE:

To optimize a pyridinium cationic lipid-based mRNA delivery system with high transfection efficiency; to investigate the feasibility of using an 5/1 N/P charge ratio found previously as optimum for this type of nucleic acid; to optimize the molar ratio of co-lipid (cholesterol) in the delivery system; to investigate whether the presence or absence of pyridinium gemini surfactants has any impact on the transfection efficiency of the delivery system and to draw formulation-activity relationships within this class of pyridinium amphiphiles for nucleic acid delivery

METHOD:

Pyridinium lipid Spyrit-7, with or without pyridinium gemini surfactant Spyrit-68, was formulated into liposomes with cholesterol at 1:1 and 1:2 ratios using thin film hydration followed by sonication. Preformed liposomes were complexed with luciferase mRNA encoding firefly luciferase in 5:1 charge ratio. The hydrodynamic size and zeta potential of the liposomes and lipoplexes were measured using Nano-ZS Zetasizer (Malvern). Lipoplexes were assessed for transfection efficiency in MDA-MB-231 breast cancer cell line by measuring the amount of luciferase expressed post transfection.

RESULTS:

Increased molar ratio of cholesterol significantly increased transfection efficiency of the pyridinium lipid both in presence or absence of serum.

Addition of gemini surfactant in the formulation did not improve transfection of the pyridinium lipid compared to DOTAP even with increased molar ratio of co-lipid, cholesterol.

Transfection efficiency didn't seem to correlate with the zeta potential of the lipoplexes

CONCLUSIONS:

Molar ratio of co-lipid cholesterol significantly impacts the transfection efficiency of lipoplexes based on pyridinium lipid SPYRIT-7. Addition of 5 mole % gemini surfactant SPYRIT 68 in the lipoplexes does not improve the transfection efficiency of pyridinium lipid SPYRIT-7 compared to DOTAP. Transfection efficiency of the lipoplexes does not correlate with zeta potential, as N/P of 5/1 could efficiently mask the negative charge of mRNA in all lipoplex formulations.

1. Satyal U, Draghici B, Dragic LL, Zhang Q, Norris KW, Madesh M, Brailoiu E, Ilies MA. Interfacially Engineered Pyridinium Pseudogemini Surfactants as Versatile and Efficient Supramolecular Delivery Systems for DNA, siRNA, and mRNA. ACS Appl Mater Interfaces. 2017 Sep 6;9(35):29481-29495.

2. Draghici B, Ilies MA. Synthetic nucleic acid delivery systems: present and perspectives. J Med Chem. 2015 May 28;58(10):4091-130.

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G4

Interaction of PEGylated and Non-PEGylated liposomes with phospholipase A1

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PURPOSE:

- To determine the ability of the PLA1 to hydrolyze/destabilize PEGylated and non-PEGylated liposomes.
- To determine the main factors that are affecting the destabilization of the liposomes in the presence of PLA1
- To validate the established methods of liposomal poration through monitoring of calcein release from the liposomes

MATERIALS AND METHODS:

We developed liposomal systems comprised of DSPC/Cholesterol (1:1) with DSPE-PEG2000 at a molar ratio of 0%, 0.1%, and 5% as a stealth component. The liposomes were made by extrusion of the corresponding hydrated lipid films and were loaded with calcein as a model drug. The loaded liposomes were separated from unloaded drugs by SEC using sephadex column and were characterized by hydrodynamic radius measured by DLS. The calcium loading was validated by lysis with Triton X against the calibration curve. We incubated the liposomes with PLA 1 at different liposome/enzyme ratio at 370 C and measured the calcein release by fluorescence followed by lysis with Triton X. For DLS method experiment, Calcein loaded liposomes were taken in the cuvette and equilibrate to 37 0C for 15 min. After that, 10 uL of PLA1 was added into the cuvette and reading was taken every 3 min for upto 30 min and finally triton x was added to release the total content of the liposome and measured the size of the liposomes.

Result: The PLA1 does affect the stability of the liposomes and release calcein irrespective of its PEGylation or not. The maximum release of calcein after adding PLA1 is much lower in compared with the total release of calcein after giving Triton X, revealing a slow poration kinetics via PLA1 The amount of calcein released is not proportional to amount of enzyme applied. In DLS methods, it showed that PLA1 cannot totally ruptured the liposomes vesicles unlike the TritonX. This explains the lower release of liposomes after treating with the enzyme.

CONCLUSION:

PLA1 can dock on the liposomes and destabilize them whether they are PEGylated or non-PEGylated. The efficiency is low in compared to the total release. PLA1 cannot disrupt the liposomes completely. Both the fluorescence and the DLS method show similar results and can be used to monitor enzymatic activity on the liposomal systems.

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G5

Characterization of Ibrutinib a Bruton's Tyrosine kinase Inhibitor via Hot-Melt Extrusion HME

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BACKGROUND:

Ibrutinib (IMBRUVICA) is the first Bruton`s tyrosine kinase (BTK) inhibitor for oral administration approved by FDA in 2014, (1). It is the first-line treatment for B-cell malignancies (including Mantle cell lymphoma (MCL), Chronic lymphocytic leukemia, Chronic lymphocytic leukemia with 17p deletion, Waldenström's macroglobulinemia, Marginal zone lymphoma (MZL), Chronic graft versus host disease (cGVHD)), which are the most common hematologic neoplasia. Ibrutinib is a relatively safe alternative for the currently used treatment modalities that are associated with long-term toxicity and resistance (2). Ibrutinib is considered as Class-II drug according to the BCS, is practically insoluble in an aqueous medium, with 13 µg/ml solubility at PH 8.0 (3), and has polymorphic forms. Furthermore, recommended daily dose of ibrutinib is about 420 mg to 560 mg with severe gastrointestinal side effects, and poor patient compliance. This is considered a critical issue since ibrutinib is used chronically. Increase in drug solubility may provide desired blood levels at lower doses and potentially reduce GI side effects with improved patient compliance and better modality for patients with hepatic or other impairments.

OBJECTIVES AND METHODS:

To develop a high energy stable amorphous system (AS) of ibrutinib, using Copovidone (PlasdoneTM S-630 Ultra) as a carrier, and utilizing Hot-Melt Extrusion (HME). Amorphous solid dispersion based on HME is an efficient technique to overcome poor solubility problems and stabilize the drug`s metastable polymorphic forms. It is known that amorphous systems have high thermodynamic energy and tend to increase saturation solubility much higher than their crystalline counterpart. AS can effectively improve solubility and drug dissolution rate and may improve bioavailability of Class-II drug at lower doses, potentially reducing the aforementioned side effects.

RESULTS:

Series of extrudates at different drug loadings were characterized for their solid-state properties, using modulated differential scanning calorimetry (mDSC), X-ray powder diffraction (XRPD), and Thermogravimetric analysis (TGA). All performed analytical tests confirmed the formation of an amorphous solid dispersion system. Subsequently, dissolution tests under non-sink conditions were performed. The percentage dissolved ibrutinib was determined using a UV-Vis spectrophotometer at 260 nm. Results of all experiments are presented below and will be discussed, see Figures 1-6 (illustrated in the video).

CONCLUSION:

Based on preliminary results, we have been able to achieve enhancement in ibrutinib dissolution rate and solubility at supersaturated state exceeding saturation solubility of crystalline ibrutinib by 70%. These results are promising and will be valuable in the future development of solid dosage forms that potentially at doses lower than marketed drug dose and might provide significantly higher bioavailability profiles with reduced GI disturbances. Additionally, difficulty in selection of appropriate polymorphic form of this drug with multiple metastable forms may be evaded when using stable amorphous system.

1. Davids MS, Brown JR. Ibrutinib: A first in class covalent inhibitor of Bruton's tyrosine kinase. Futur Oncol. 2014;10(6):957–67.

2. Deeks ED. Ibrutinib: A Review in Chronic Lymphocytic Leukaemia. Drugs. 2017;77(2):225–36.

3. Mark Smyth, Erick Goldman DDW. Patent US 2013/0338172 A1. Vol. 1. 2013.

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G6

Live and let die: A NASH dilemma

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BACKGROUND:

Nonalcoholic steatohepatitis (NASH) is damage and inflammation of the liver arising from nonalcoholic fatty liver disease (NAFLD). NAFLD is the number one cause of chronic liver disease worldwide, with 25% of these patients developing NASH. This significantly increases the risk of cirrhosis and decompensated liver failure. The molecular mechanisms causing the transition from benign fatty liver disease to the more debilitating NASH are still not well understood.

OBJECTIVE:

To better understand the metabolic changes leading to the toxic inflammatory state of NASH and identify potential biomarkers and drug targets for treating NASH.

RESULTS:

In this study, we used a combination of proteomics and bioinformatics to study a western diet based animal model of NASH. We identified differential expression of key proteins involved in hallmark NASH toxicological features, including steatohepatitis, liver cell death, and fibrosis. The downregulation of glycine-N-methyltransferase (GNMT), the prominent regulator of S-adenosylmethionine (AdoMet), was a contributing factor to these networks. Targeted proteomics analysis was then used to confirm GNMT's downregulation and its effect on adjacent one-carbon metabolism pathways (remethylation, transsulfuration, polyamine metabolism). Our data show that AdoMet was increased fourfold in NASH, and there were increased levels of polyamine precursors and products of catabolism. These findings demonstrate the downregulation of GNMT in NASH can lead to an accumulation of the substrate AdoMet and reprogramming of one-carbon metabolism to activate polyamine metabolism. Activation of polyamine flux can lead to high oxidative stress levels, which was evident in our disease model by increased levels of lipid peroxidation product 4-hydroxynonenal. The downregulation of liver GNMT was further confirmed in a cohort of NASH patients with type II diabetes.

CONCLUSION:

This study identifies critical metabolic changes in NASH that can lead to the accumulation of AdoMet and the activation of polyamine metabolism. This underlying mechanism can potentially be targeted to prevent oxidative stress in NASH or stratify the heterogeneous patient population for personalized treatment.

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G7

In vitro midazolam metabolism and CYP atypical kinetics in SD rat microsomes

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BACKGROUND:
Historically, the conventional single binding Michaelis-Menten model has been used to characterize drug metabolism by cytochromes-P450 (CYPs). In contrast, over the last twenty years, the number of publications related to multiple binding 'atypical kinetics' have increased significantly, and it has been established that 'atypical kinetics' is actually not that 'atypical' in xenobiotics metabolism especially by CYPs. Atypical kinetics can take different forms including biphasic, sigmoidal, substrate inhibition etc.

OBJECTIVE:
Midazolam (MDZ) is a well-known CYP3A probe substrate widely used in drug-drug interaction studies related to CYP3A. The aim of the current research was to characterize the in vitro metabolic profile of MDZ in Sprague-Dawley (SD) rat liver microsomes (RLM) as well as by rat intestinal microsomes (RIM).

METHODS:
MDZ was incubated separately with RLM (0.05 mg/mL total protein) and RIM (0.5 mg/mL) for 10 minutes and 15 minutes respectively. Microsomal protein concentration and incubation time were decided based on time and protein linearity assays as well as previously published reports. The metabolite in RLM incubations was 4-hydroxymidazolam (4-OH MDZ) whereas both 1-hydroxymidazolam (1-OH MDZ) and 4-OH MDZ were detected in RIM incubations. Metabolite formation data were obtained from LC-MS/MS analysis. These data were analyzed by fitting single binding Michaelis-Menten model (ES model) and multiple binding model (ESS model) to the data using Wolfram Mathematica 12.2.2 student version. Finally, model comparison was conducted based on the corrected Akaike Information Criterion (AICc), mean squared sum of residuals (MSE), and residual plots. Based on the best-fit model, parameter estimation was reported to provide the kinetic profiles (Km, Kcat, and CLint).

RESULTS:
MDZ incubation with RLM were best explained by the ESS model. Specifically, it followed substrate inhibition kinetics providing a higher reaction velocity at lower concentration and a lower velocity at higher concentration. Similarly, MDZ incubation with RIM were also best described by the ESS model with a hyperbolic nature for 1-OH MDZ formation and a sigmoidal nature for 4-OH MDZ formation.

CONCLUSIONS:
Atypical kinetics successfully described MDZ metabolism by RIM and RLM. However, reaction phenotypic studies with rCYPs may further reveal if there is involvement of any other CYPs besides CYP3A in the metabolism of MDZ in SD rats. Tissue-specific differences were observed in RLM versus RIM. (Funding: NIGMS 2R01GM114369-05)

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G8

Concentration-Time profiles of Amlodipine and Glyburide in Rats: Predictions using a Continuous Absorption Model

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Most drugs are administered orally due to cost-efficacy and increased patient compliance. However, their absorption is subjected to complex biological processes and the drug's physicochemical properties. Prior to human trials, preclinical species such as rodents are utilized to evaluate efficacy and safety in vivo. Because animal studies are expensive and time-consuming, it is beneficial to predict a drug's pharmacokinetic profiles prior to in vivo studies. Pharmacokinetic modeling and simulation are useful for such predictions.

The small intestine and colon of male Sprague Dawley rats were divided into 10 unequal segments to measure the change in luminal pH under fed (n=4) and 12-hour fasted (n=4) conditions. Amlodipine, an antihypertensive, leads to vasodilation by inhibiting calcium ion influx across vascular smooth muscles. Glyburide, an oral anti-diabetic medication, stimulates insulin secretion by blocking ATP-dependent potassium channels in pancreatic beta cells. In vivo pharmacokinetic studies were performed to collect concentration time profiles for amlodipine and glyburide. Fasted (n=3) male Sprague Dawley rats were administered a solution containing 5 mg/kg of glyburide and 5 mg/kg amlodipine by oral gavage. Rats (n=3) were dosed 2 mg/kg of amlodipine and 4 mg/kg glyburide intravenously to collect pharmacokinetic parameters. Blood samples were collected up to 24 hours post-dose. Data were analyzed using both compartmental and non-compartmental analysis. A continuous rodent absorption model was developed to predict the concentration-time profiles of compounds based on in-house and literature anatomical data. Several physiological parameters were incorporated in the model, including luminal pH.

Fasted rats had a higher pH along the intestine, compared to fed rats. While the pH of the colon was higher in fasted rats, the cecum was not altered by fasted conditions. Both amlodipine and glyburide exhibited 2-compartment characteristics, which was input into the model to describe drug distribution and elimination. Current predictions using the rodent continuous absorption model do not accurately describe the exposure profile of glyburide. To refine the model, further anatomical data collection and incorporation of food effects are underway.

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01

The Effect of VEGFA gene Cancer Mutations on VEGFA-Bevacizumab Binding Affinity

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When human cells become cancerous, they also become 100 times more likely to genetically mutate than regular cells. The findings may explain why cells in a tumor have so many genetic mutations, but could suppress cancer treatments that target a particular gene controlling cancer malignancy. We are showing here how mutations can affect the binding affinity of monoclonal antibodies (mAb)to human genes. Vascular endothelial growth factor-A (VEGFA) plays a major role in angiogenesis in different cancer types. Bevacizumab (brand name is Avastin) mAb was designed to target the VEGFA and stops its binding to VEGFR2 receptor and hence the receptor is downregulated. Survival rates among patients receiving the drug and its efficacy varied with more than 50% of cases who required a combination of Avastin with other drugs and with chemotherapy which we suggest the effect of mutations play a major role in such findings. We tried to study mutations that occurs in real life in cancer patients that are located in the epitope and also near the epitope. We synthesized 6 peptides with 4 mutations that are frequent in different disease types and we made N-terminal biotinylation modification in the peptides for different studies with assays that requires Streptavidin -biotin markers. Our findings supported the hypothesis that such mutations affect the binding affinity of the drug towards the VEGFA protein. Our study is based on the Blitz technology that studies kinetics between the mAb and the protein.

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P1

Implementation of HIV/HCV POC Testing in Community Pharmacies: DC and GA

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PURPOSE:

Given the expansion and implementation of various outpatient services, the role of pharmacists has drastically changed. The ability to screen patients for various disease states in community pharmacies provides for rapid diagnosis, earlier medication management, and expanded opportunities in re-engagement of patients to primary/ specialty care. The purpose of this study is to identify if Clinical Laboratory Improvement Amendments (CLIA) waived pharmacies provide Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) Point-of-Care Testing (POCT) and to assess the frequency of positive test results in higher risk populations.

METHODS:

Data was collected from high risk population states (Washington District of Columbia, Louisiana, Georgia, and Florida) from August 2019 to April 2020. CLIA waived pharmacies were contacted via telephone for voluntary participation. Surveyors asked a series of questions from an electronic form about: knowledge of CLIA certificate of waiver, availability of HIV/HCV POCT, number of tests performed per month, number of positive tests per month, billing process and advertisement. These de-identified results were updated in real time into a spreadsheet, later categorized and analyzed.

RESULTS:

Of the 341 pharmacies contacted across Washington District of Columbia, Georgia, Florida and Louisiana, 297 pharmacy personnel accepted the interview via telephone with a majority as staff pharmacists (265, 89%). 192 of the 297 (64.6%) pharmacies contacted, conducted various POCT with only 6 offering HIV POCT and 8 offering HCV POCT (2% and 2.7%, respectively). Of the 6 pharmacies offering HIV POCT, four reported no testing, one averaged less than 1 test/month and one averaged 1-3 tests/month; from the two pharmacies that conducted HIV POCT, they averaged about 1-3 positive tests/year. Of the 8 pharmacies offering HCV POCT, four reported no testing, three averaged less than 1 up to 6 tests/month, and one >10 tests/month; from the 4 pharmacies that conducted HCV POCT, three averaged 1-3 positive tests/year and one >10 positive tests/year.

CONCLUSION:

CLIA-waived testing facilities for POCT offers great healthcare accessibility to the community and focus mainly on hypertension, diabetes, and hyperlipidemia while certain disease states such as HIV and HCV remain underserved. From the few pharmacies conducting HIV and HCV testing, there is a fair number of positive results helping guide patients with their next steps in care. Increasing awareness in HIV/HCV POCT and the number of tests conducted in outpatient settings is vital in improving outcomes in these high risk states.

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P2

Evaluation of Vasopressin Use in a Large Academic Teaching Institution

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INTRODUCTION:

Vasopressin is used in the treatment of vasodilatory shock. The Surviving Sepsis guidelines recommend adding vasopressin to norepinephrine (NE) in order to achieve MAP goal or decrease NE requirements. It is not recommended as a first-line vasopressor to increase MAP and caution should be used with doses greater than 0.3 units/min. The price of vasopressin has increased significantly making appropriate use crucial to patient care and pharmacy budgets.

OBJECTIVE:

This study looks to identify the use of vasopressin at Temple University Hospital (TUH) according to the Surviving Sepsis guideline recommendations. Additional endpoints will look at how this agent is used in regards to indication, dosing, and duration.

STUDY DESIGN:

This is a retrospective evaluation in adult patients who received an infusion of vasopressin from January 1, 2019 to January 1, 2020.

METHODS:

This evaluation included all adult patients that were administered a vasopressin infusion at Temple University Hospital. The primary objective of this evaluation was to describe the indication for vasopressin, median dose, other vasoactive agents used prior to initiation, duration and sequence of vasopressor discontinuation.

RESULTS:

Forty-eight patients were evaluated and 43 were included. The most common indication for vasopressin was septic shock 17/43 (39.5%) patients, followed by vasoplegic shock post-cardiac surgery in 14/43 (32.6%) patients. The median starting dose was 0.02 units/min and the median highest dose used was 0.04 unit/min. The median duration used was 14 hrs. Norepinephrine was initiated before vasopressin in 24/43 (55.8%) of patients and 12/43 (27.9%) used vasopressin as monotherapy. Vasopressin was the first discontinued vasoactive agent in 23 (53.5%) patients.

CONCLUSION:

Vasopressin is being used as a second-line vasopressor in the majority of patients and is being used at doses recommended by guidelines. Further analysis will evaluate indications for monotherapy, time to goal MAP was achieved after initiation and whether vasopressor therapy was re-initiated after vasopressin discontinuation.

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P3

5-HT7 Receptor Antagonists For Treatment of Alzheimer's Disease

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Alzheimer's Disease (AD) is a common progressive disease that results in loss of memory, disorientation, and a gradual decline in physical ability. AD affects the brain by causing buildup of Tau protein tangles and Amyloid plaques in the brain. Current therapy includes only mild, short lived treatment of symptoms, making new medication therapy necessary. Serotonin (5-HT) is a common neurotransmitter found in the corticolimbic network with a great deal of roles in regulating other neurotransmitters, roles in memory, and psychomotor ability. 5HT-7 antagonist SB269970 has shown reversal of memory deficits, restored psychomotor ability, and a decreased Tau protein aggregation of up to 60% amongst different studies. Mice trials with injection of Tau proteins show that coinjection of 5HT7R knockdown rescues Tau stimulated memory impairment. With this evidence, 5HT-7 antagonism is a meaningful target for novel treatment of Alzheimer's. Compound 170073 has shown to have high selectivity for 5HT-7 versus other 5-HT families and analysis of brain/plasma ratios show that it can get into the brain. The Triple Transgenic 3xTg-AD mice model is the most accurate way to represent human AD pathophysiology and should be implemented. With this data, we have a high certainty that this compound will show positive effects in Alzheimer's patients and should be further examined for the end goal of human treatment.

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P4

Evaluation of Inhaled Drugs as Inhibitors of SARS-CoV2 - ACE2 Interaction

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RATIONALE:

Coronavirus Disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID-19 was declared a pandemic in March 2020, and up today has led to more than 33 million of infections and over one million deaths around the world. The Spike Glycoprotein (protein S) on the surface of the virus binds to the ACE-2 enzyme to invade and replicate in the alveolar host cell. The mortality, virulence, and long-lasting effects on the body makes finding a proper drug therapy imperative. Although there are some drugs that have shown to be beneficial in providing symptomatic relief from the disease, no drugs that can block the binding of the viral particle to the host cell have been described.

OBJECTIVES:

The objective of this study is to discover an FDA approved drug that has been safely administered through the airway and could disrupt the binding of the Protein S to the human alveolar cells. Like neutralizing antibodies generated by a vaccine, drugs that can prevent the electrostatic interaction between the proteins S from the virus and its ACE-2 receptor could alter the binding interaction and lead to inhibition of viral invasion, replication and further disease progression.

METHODS:

We developed an in vitro assay to detect the binding the protein S to A549 lung tumor cell line, using a high content imaging analysis confocal microscopy. Commercially available recombinant protein S with a six-Histidine tag was incubated with confluent A549 cells plated in a 384 well plate for 2h in basal culture media at 37 °C. The binding interaction between the protein S and the A549 cell was detected by adding a fluorescent antibody against the six-histidine tag. The binding inhibitory effects of the drugs were tested at 25 mM including N-acetylcysteine, dexamethasone, theophylline, heparin and albuterol.

RESULTS:

Our methodology allows us to detect the binding interaction of the protein S and target lung cells, furthermore, we were able to test the inhibitory effect of selected drugs. We fund Heparin as the most relevant drug to inhibit this binding interaction.

CONCLUSIONS:

We identify Heparin as a possible drug that can prevent SARS-CoV-2 binding to the target host cells. Literature search supports this repurposing application. We also found a clinical trial that has been developed to test if nebulized heparin may reduce the severity of lung injury caused by COVID-19. As future directions, we will expand our studies to explore additional drugs.

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P5

Effect of Cigarette Smoke on Cytokine production in Human Macrophages

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Macrophages are cells found in almost all tissues in the body, they are in charge of engulfing and killing invading microorganisms. They also induce inflammation by cytokine secretion. Cytokines, like TNF; IL-1; and IL-6 have many inflammatory effects. Cigarette smoke (CS) is the main cause of several chronic diseases like COPD; Lung cancer; Cardiovascular disease and severe Covid-19 cytokine storm.

We want to evaluate the effect of cigarette smoke on macrophages and the production of cytokines. Several studies and literature have been used as reference to measured cytokines secretion and cigarette smoke response. Using this information, we created alternative methods to evaluate the direct production of cytokines.

The Operetta CLS High Control Analysis System machinery use Confocal Microscopy, used for determination of exposure of human macrophages to cigarette smoke; measuring of ROS in life imaging analysis; measurement of cytokines by confocal and high content imaging analysis.

In the experiment, cell viability, reactive oxygen species (ROS) and cytokines production (IL-6, IL-1b and TNF-a) were measured by life-cell staining and indirect immunofluorescence. Glass bottom plates coated with poly-lysines (PLL) were prepared. Cigarette substrate, were tested using 5 ul of Cigarette Smoke Condensate (CSC) added to 500 ul of serum free-base media dilutions.

After the experiment was conducted, as results, we found decrease in cell viability and increase ROS from the mitochondria in high of CSC. CSC Induced increasing production of all three cytokines inducing IL1-b production predominantly.

To Sum up, cigarette smoke by itself induces several changes in the innate immunity. This methodology can be powerful tool to further explore the additional effects of different pathogens or different stimulus in the involvement of increased inflammation in other diseases like COPD or cytokine storm of covid-19.

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P6

Targeting Glucose Metabolism Pathways Gene Mutations as Breast Cancer Biomarkers

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Breast cancer is extremely common in women and early diagnosis is imperative for positive outcomes. Even with gold standard testing, cancer can be missed. The purpose of this project is to analyze data from breast cancer tumors to identify a signature of protein biomarkers. We targeted dysregulated glucose metabolism pathway genes as a specific source for putative biomarkers. We identified 211 initial genes involved in glucose metabolism pathways from Biological Magnetic Resonance Data Bank. We found 517 overexpressed breast cancer genes and 1,147 secreted genes from breast cancer from analyzing RNA-Seq data of 1,022 breast cancer tumors from The Cancer Genome Atlas (TCGA). This allows us to cross-reference with the 1,147 unique proteins previously identified from the secretome of three breast cancer cell lines. In addition, glucose metabolism gene mutation rate was evaluated in cBioPortal and the top mutations were selected for our analysis.

Our findings include 8 genes that are overexpressed, 21 genes that are secreted, and 85 genes in the high rate mutation group from the glucose metabolism pathway. 14 genes were found to fit 2 or more criteria and are worth further investigation as putative biomarkers for breast cancer. Of interest, 1 gene, PDHA1 was found to fit all 3 selection criteria. This gene plays a key role in modulating the glucose metabolism towards the Warburg effect or Oxidative phosphorylation in cancer cells. These results will allow us to develop a target method for identifying highly abundant proteins within the glucose metabolism that are secreted into the plasma of the breast cancer patients.

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P7

Utilization of intravenous acetaminophen in non-surgical ICU patients

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BACKGROUND:

Pain is a common occurrence in critically ill patients. While studies have shown that the use of intravenous (IV) acetaminophen provides significant reduction in post-operative pain and opioid requirements in surgical patients, little evidence supports its use in non-surgical critically ill patients.

OBJECTIVE:

Describe the use of IV acetaminophen, associated clinical effects and toxicities in non-surgical critically ill patients at Temple University Hospital (TUH).

METHODS:

This was a single-center, retrospective, chart-review study. Institutional review board approval was obtained prior to data collection. Patients admitted to TUH between August 2016 and July 2019 were identified using the Pharmacy Informatics database and assessed for inclusion using electronic medical records. Inclusion criteria were ≥18 years of age, admission to the medical/respiratory intensive care unit, and having received at least one dose of IV acetaminophen. Patients were excluded if they were minors, pregnant, imprisoned or were receiving IV acetaminophen to manage surgical or procedural-related pain.

RESULTS:

35 subjects were included; 19 males with mean age 58.9 years (±17.6). Past medical history included hypertension (22), chronic lung disease (19), coronary artery disease (14), diabetes mellitus (13), and heart failure (8). Average ICU length of stay was 16 days (±17.1), average hospital length of stay 22.7 days (±18.7). Sepsis/infection was the primary ICU admission diagnosis for a majority of subjects (n=16). Most subjects received IV acetaminophen for pain (n=18), fever (n=15) or both (n=2). The most commonly ordered dose was 1000 mg (n=32), and subjects most often received one dose (n=22). Within 3 hours after the first dose of IV acetaminophen, 2 subjects (5.7%) experienced decreased mean arterial pressure by ≥15% or decreased systolic blood pressure by ≥20%. Two subjects required increases in vasopressor dose after the use of IV acetaminophen. No subjects required new or additional vasopressors after use of IV acetaminophen. Five subjects (14.3%) experienced increases in LFTs greater than 3 times the upper limit of normal within 7 days after receiving IV acetaminophen.

CONCLUSION:

This study suggests that IV acetaminophen is a safe option for the management of pain and fever in non-surgical critically ill patients. Significant reductions in blood pressure rarely occurred in the study population. These findings support close monitoring of LFTs, even with short term use of IV acetaminophen. Future, larger studies are needed to confirm these findings.

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P8

Factors Associated with Initiation of Oral Antineoplastic Therapies in an Urban Academic Medical Center

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INTRODUCTION:

Limited information exists surrounding the potential barriers that may contribute to delays in receipt of oral antineoplastic therapy that may impact our patients. Notably, the need for a timely initiation of therapy is important, especially if the intent is curative.

RESEARCH QUESTION OR HYPOTHESIS:

To identify barriers within our patient population affecting time to initiation of oral antineoplastic therapy in hopes to address these gaps moving forward.

STUDY DESIGN:

Single-center, retrospective chart review

METHODS:

Adult patients, above 18 years of age, with a diagnosis of cancer, treated by physicians at an urban academic medical center were included if they were prescribed an oral antineoplastic agent from June 2018 to January of 2020. Prescriptions that were initially sent to our institution's preferred Specialty Pharmacy were specifically evaluated. The primary endpoint was to determine the proportion of patients with the following barriers leading potentially to delays in initiation: costs/financial burden, pharmacy processing delays, issues with insurance, insurance denial, delays in contacting patient/ caregiver, delays in delivery, in-network pharmacy required, and/or prescription inadvertently sent to non-specialty pharmacy. Secondary endpoints included assessing the time involved in the initial processing of the oral antineoplastic prescription (date prescription generated to the date prescription filled). Descriptive statistics were used to analyze the endpoints.

RESULTS:

A total of 105 patients were reviewed. A majority of these patients were African American around the age of 66, with the following primary malignancies: prostate, breast, colon/rectal, hepatobiliary, renal, or lung. The most common barriers identified in more than 15% of patients were: issues with prescription insurance (36.9%), delays in contacting patient/caregiver (30.6%), in-network pharmacy required (21.9%), followed by delays in delivery (19.6%). Average time to fill was 13.7 days (range: 1-64 days; standard deviation: 11.3).

CONCLUSION:

In conclusion, issues with prescription insurance, delays in contacting the patient/caregiver, and restrictions on pharmacy allowed to fill the prescription were amongst the common barriers identified that represent areas that we can target for improvement moving forward.

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P9

Appropriateness of Inpatient Rituximab Administration

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BACKGROUND/INTRODUCTION/PURPOSE:

Giving parenteral antineoplastic, including rituximab, in the outpatient setting has been linked to decreased hospital cost, increased revenue, lower risk of infections, and decreased inpatient hospital stays.1-2 This study evaluates the appropriateness of rituximab administration in the inpatient setting and the factors that affect the need for inpatient administration of rituximab.

METHODS:

This is a retrospective chart review of patients who received rituximab in the inpatient settings at Temple University Hospital between February 2019 to July 2020. Baseline characteristics compiled into the RedCap database for analysis. The primary endpoint of this study was to evaluate the reasons for admission and indications for rituximab administration; and the secondary endpoint was to evaluate whether the use of Rituximab in an inpatient setting was appropriate. Appropriateness was determined by if the patient was admitted for chemotherapy administration solely or whether the reason for admission was unknown.

RESULTS:

A total of 43 patients were reviewed in this study. Total number of rituximab doses administered inpatient was 74 during the study period. The majority of patients received rituximab for oncologic reasons (52.4%) versus non-oncologic reasons (47.6%). The most common reasons for inpatient administration of rituximab included the following: acute hypoxic respiratory failure (21%), complication of cancer (21%), and chemotherapy administration (22%). In terms of opportunities for outpatient administration of rituximab, 18 of the 74 (24%) total rituximab infusions could have been transitioned to the outpatient setting.

CONCLUSIONS:

Although there are circumstances that necessitate inpatient chemotherapy, transitioning regimens to the outpatient setting has many advantages for patients. Twenty-four percent of these rituximab infusions could have been transitioned to the outpatient setting, which would benefit both the patient and the hospital.

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P10

Pharmacy student-led medication reconciliation reduces medication errors

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PURPOSE:

Medication reconciliation is a vital component to the hospital admission process. A Temple University Hospital (TUH) survey found only 22% of medical residents take routine medication histories at admission and time constraints are the biggest barrier so SureScripts is relied on for outpatient medication information. The most qualified to conduct medication histories are pharmacy personnel but they are still underutilized. The purpose of this study is to quantify the discrepancies and medication related problems identified by pharmacy students from Temple University School of Pharmacy and compare this to the data generated from SureScripts and physician medication reconciliation at TUH.

METHODS:

This is a single-centered, retrospective chart review. Internal medicine patients were eligible for the study if they were between 18-89 years old, admitted and discharged from TUH between 9/6/2018 to 12/31/2019, and had a best practice medication history performed by a TUSP pharmacy student during their admission. Patients were excluded if they did not have SureScripts or a pharmacy student note available in the chart, discharged to hospice, living in a skilled nursing facility (SNF), and if the hospital stay was less than 24 hours. The primary outcome of this study is the percentage of medication errors identified by pharmacy student-led medication reconciliation at admission. The secondary outcomes included the types of drug related problems identified and the percentage of admission medication errors carried over to the discharge summary.

RESULTS:

Of the 100 patient charts reviewed in this study, 96 charts were found to have at least 1 medication error. A total of 774 errors were identified with 679 (88%) being prescription medications. Of those, the most common error was omission of a medication (85%), followed by erroneous addition of medications (59%), dose error (37%), frequency (28%), adherence (27%), drug-drug interaction (2%), and drug indication interaction (2%). Upon discharge, only 22% of patients had an accurate medication list reflected on their discharge summary.

CONCLUSION:

Our study suggests that Surescripts should not be relied on solely for outpatient medication information during the medication reconciliation process. The use of pharmacy students to provide medication reconciliation will prevent medication errors during hospital stays. Medication reconciliation should be conducted again prior to discharge to reduce medication errors on discharge summaries.

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P11

Appropriateness of antibiotic treatment duration at hospital discharge

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Antimicrobial resistance is associated with significant clinical and economic costs. Antimicrobial stewardship programs have been implemented to combat this threat. However, stewardship initiatives usually occur in the inpatient setting and are often lacking at the time of transitions of care, i.e. at the time of hospital discharge. This study assesses the appropriateness of antibiotic treatment duration at the time of discharge from our institution based on published guidelines and clinical parameters for multiple common infections. This study looks to assess the appropriateness of antibiotic treatment duration at the time of discharge from Temple University Hospital (TUH) based on published guidelines and clinical parameters for multiple common infections, whether antibiotics prescribed at discharge are necessary, and appropriateness of antibiotic therapy at discharge. This was a retrospective chart review conducted at Temple University Hospital in Philadelphia, PA. A sample of 300 adult patients discharged on oral antibiotics during a 3 month period of 2019 was analyzed. Patients required a diagnosis of community acquired pneumonia (CAP), hospital-acquired pneumonia (HAP), cystitis, pyelonephritis, skin and soft tissue infection (SSTI), intra-abdominal infection (IAI), COPD exacerbation, or bronchitis. The primary outcome was the difference in duration of antibiotic therapy prescribed compared to that recommended by clinical guidelines. Additional outcomes were durations of therapy compared to the minimum supported by clinical trials and beyond the point of clinical stability. Appropriateness of therapy and clinical stability were determined by a physician trained in Infectious Diseases. Of the 300 patients reviewed, thi study saw a Charlson Comorbidity Index (Median, IQR) of 3.5 (1-6), average duration of hospitalization, days (Median, IQR) of 4 (2-5), and COPD being the most common disease state, 19% (n=58). Antibiotics are often given longer than necessary on hospital discharge. In this study, patients received a median 2 days of excess antibiotics compared to recommended guidelines. A pilot stewardship program is being developed to address this problem.

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P12

Effect of urinalysis with reflex to culture on antibiotic prescribing

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Asymptomatic bacteriuria is often inappropriately treated in clinical practice. The use of antimicrobials has been linked to poor outcomes including resistance and adverse effects. Researchers have explored ways to reduce inappropriate prescribing. Some have considered a possible correlation between changes in laboratory ordering and initiating treatment. Temple University Hospital (TUH) recently initiated a program in which a urinalysis will reflex to culture only in the presence of pyuria. Prior to this change, pre-intervention data demonstrated that patients not indicated for treatment were receiving antibiotic therapy. The purpose of this study is to assess the protocol's impact on inappropriate antibiotic prescribing.

This is a single-center, quasi-experimental, retrospective chart review. Internal medicine patients were eligible for the post-intervention group if they were at least 18 years old and admitted to TUH after the new protocol was implemented (1/01/2019 to 06/30/2019). During that period, patients were required to have a documented urinalysis and a positive urine culture. The study was approved by the Institutional Review Board, but patients did not have to consent due to low study risk. Patients were excluded if they were discharged within 72 hours of a urine culture order, treated for another infection, admitted to the intensive care unit, or were undergoing a urologic/surgical procedure. Patients were also not eligible if they were pregnant or had a leukopenia (white blood cells below 2). Similar to the pre-intervention group, there were 167 patients in the post-intervention group. A total of 334 patients was required to detect a 15% difference between the groups in therapy initiation. The primary outcome was to determine the number of patients with a positive urine culture treated inappropriately after the new protocol. Evaluating the inappropriateness of treatment included consideration of urinary symptoms per the Infectious Diseases Society of America Guidelines (IDSA). The length of therapy and type of antimicrobial were analyzed for each individual. Chi-Square and Fisher exact were used for categorical variables and the Wilcoxon was used for continuous variables.

The baseline population encompassed 167 patients with an average age of 64 and were predominantly females (65%). About 20% of participants were considered to be immunocompromised and 52% had a catheter. Following the new intervention, there were 144 (86%) patients treated with antimicrobial therapy. The majority of individuals were managed with beta lactam antibiotics. Based on presentation of urinary symptoms defined by IDSA, only 91 (54.5%) patients were considered to be true candidates for antimicrobial therapy. This result was not statistically significant compared to the pre-intervention population with a p value of 0.15. Out of the 76 patients that were treated inappropriately 75 of them experienced no urinary symptoms and were given treatment. Additionally, there was a statistically significant difference for duration of antibiotic treatment with a p value of 0.044. The post intervention had a treatment duration of 8.0 (5.0-11.0) compared to the pre-intervention duration of 9.0 (6.0-13.0).

The initiation of the urinalysis with reflex to culture did not seem to play a role in decreasing inappropriate antimicrobial prescribing in adult patients with bacteriuria. Rather, there was a numerical increase in inappropriate prescribing. The continued unnecessary use of antibiotics will put patients at risk for clinical complications, such as antimicrobial resistance. However, the new protocol did significantly shorten therapy by one day. This retrospective study clearly illustrates that further research is needed to investigate innovative ways to better manage patients with positive urine cultures.

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P13

Treatment of Antibody Mediated Rejection in Kidney Transplant Recipients

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BACKGROUND:
Antibody mediated rejection (AMR) occurs in about 5-7% of all kidney transplant recipients causing histological changes that can result in allograft dysfunction and graft loss. It occurs more commonly within the first 3 months post-transplant but continues to pose challenges for long term graft survival. Currently, there are various options available for the treatment of AMR but no standardized evidence-based guideline has been established.

OBJECTIVE:
The purpose of the study is to determine the outcomes in our kidney transplant recipient diagnoses with AMR and to evaluate the treatment regimens employed.

STUDY DESIGN:
Retrospective, single center, observational study from January 2017 to December 2019 at an urban academic medical center.

METHODS:
All consecutive adult kidney transplant recipients with biopsy confirmed AMR were included in the study. Primary endpoints included the type and effectiveness of AMR treatment regimens as it pertains to improvement in renal function, and one-year graft and patient survival.

RESULTS:
35 kidney transplant recipients with AMR met inclusion criteria during the study period and 30 were evaluable. Mean age was 50 ± 12 years. Male 53%; Female 47%. Racial groups consisted of African American (47%), Caucasian (37%), Hispanic (13%) and 1 Asian (3%). Median time to AMR diagnosis was 76 days (IQR 54-228). Treatment for AMR consisted of surveillance (n=15, 50%), IVIG and plasmapheresis related regimen (n=9, 30%), rituximab related regimen (n=2, 7%), thymoglobulin related regimen (n=2, 7%), alemtuzumab related regimen (n=1, 3%), thymoglobulin and alemtuzumab regimen (n=1, 3%). Resolution of AMR defined as renal function returned to baseline was observed in 73% of recipients. There were no patient deaths or graft loss during the study period.

CONCLUSION:
Our study suggests favorable outcomes in patients who experienced antibody mediated rejection in our cohort. Longer follow up is warranted to assess the long-term impact on graft and patient survival.

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P14

Standard vs. Extended Use of Thymoglobulin Induction in Kidney Transplantation

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PURPOSE:

Thymoglobulin induction along with modern maintenance immunosuppression has been found to have a significant reduction in acute rejection in kidney transplantation. The recommended duration to complete thymoglobulin is within 4-7 days after kidney transplant (KT). Due to its toxicity profile and cost, some centers have moved towards an expanded duration of thymoglobulin in the outpatient setting, but the efficacy of this strategy is unknown. The purpose of this research was to evaluate outcomes in KT recipients who received standard vs. extended duration of thymoglobulin.

METHODS:

All KT recipients who received thymoglobulin induction between January 1st, 2017 to December 31st 2019 were included. Patients were divided into two groups (standard therapy (ST): completion of thymoglobulin induction within 7 days of KT) and (extended therapy (ET): completion of thymoglobulin induction after 7 days after KT). The primary outcomes were the incidence of delayed graft function (DGF), biopsy confirmed acute rejection at 6 months and graft and patient survival at 12 months .The majority of patients were middle-aged, male, and African American (43% in the ST group vs. 60% in the ET group; $p< 0.01$). The majority of patients received maintenance immunosuppression with tacrolimus, mycophenolate with or without prednisone. The incidence of acute rejection was 15% vs 12% in the ST group vs. ET group, respectively; $p=0.15$. There was no graft loss at 12 months. There were two non-kidney related deaths (1 death in each group) at 12 months.

CONCLUSIONS:

This data suggests that extended use of thymoglobulin for induction therapy is common at our institution. This strategy did not appear to negatively impact short term kidney transplant outcomes such as acute rejection. KT recipients who experienced DGF were more likely to receive ET most likely to delay the start of calcineurin inhibitors. Larger studies are warranted to fully evaluate the impact of this strategy in kidney transplantation.

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P15

Increased Risk Donor Kidney Transplant Outcomes at an Academic Medical Center

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Increased risk donor (IRD) organs are being accepted at lower rates than non-IRD organs. Potential risk outcomes such as delayed graft function and acute rejection, that are prominently associated with mortality outcomes, were studied. The purpose of our study was to compare the outcomes for kidney recipients who received IRD organs to those patients who did not receive IRD organs in 12 months post-transplant at our institution.145 charts were reviewed and 38 patients met our inclusion criteria in the study for the CDC high risk population and 94 patients met our inclusion criteria in the study for the non- high risk population.

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P16

Impact of Low Versus High Kidney Donor Profile Index on Transplant Outcomes

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INTRODUCTION:

Since the new Kidney Allocation System (KAS) was implemented in 2014, there have been a few registry based analyses evaluating the impact of low vs. high KDPI kidneys on transplant outcomes. Limited data exist regarding outcomes in those with high immunologic risk.

RESEARCH QUESTION OR HYPOTHESIS:

This study investigated the association between KDPI and transplant outcomes in a largely African American (AA), highly sensitized, kidney transplant cohort.

STUDY DESIGN:

Single-center, retrospective, chart review of adult kidney transplant (KT) recipients transplanted at our institution from 1/1/2016-12/31/2018.

METHODS:

All patients who received a deceased donor kidney transplant during the study period were included and divided into 2 KDPI groups: KDPI 0-20% and KDPI 21-100%. These categories were chosen since KDPI values of less than 20% have shown to have the best outcomes. The incidence of delayed graft function (DGF), acute rejection, graft and patient survival were compared among the groups at 12 months post-transplant. ANOVA and nonparametric analyses were utilized as appropriate.

RESULTS/CONCLUSION:

Our findings suggest similar transplant outcomes between KDPI groups in high risk kidney transplant recipients, early post-transplant. Longer follow up is warranted to fully validate these results.

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P17

Outcomes in HIV Positive Kidney and Liver Transplant Recipients

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HIV patients comprise 1.5% of the United States End Stage Renal Disease population and this percentage continues to rise.1 Although the risks associated with solid organ transplants are higher in patients with HIV vs. non-HIV transplant recipients, transplantation offers a viable alternative to dialysis in this population. Historically, HIV positive recipients experienced and increased risk of acute rejection and graft failure compared to HIV negative recipients and their transplant course is often complicated by infectious complications and drug-drug interactions between antiretroviral therapy needed to suppress HIV and their long-term immunosuppressive medications needed for graft function.2 The risk of serious infections in organ recipients are determined by interaction between patients' epidemiological exposures and net state of immunosuppression.3 Patients with a baseline CD4 less than 350 can receive transplants but the outcomes and risk of infection is significantly increased. The current rejection rate for HIV positive patients receiving a kidney transplant is 15%.4 With an increasing number of HIV positive patients living longer and meeting the criteria for transplant candidacy, clinicians are increasingly having to manage this special population post-transplant. The advent of newer antiretroviral medications for HIV that portend improved efficacy and fewer drug interactions have anecdotally allowed for successful long term outcomes in the HIV positive transplant recipients. Therefore the purpose of this study is to evaluate the transplant outcomes in the HIV positive abdominal organ transplant recipients at our institution. This information may help guide our current immunosuppressive strategies when dealing with this special population in the future.

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Evaluation of BP Measurement Technique Following Educational Intervention

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The American Heart Association/American Cardiology Conference (AHA/ACC) have developed guidelines for optimal blood pressure (BP) measurement that includes specific preparatory steps and multiple measurements.2 Failure to comply with these steps may result in falsely elevated or decreased readings. These new guidelines are especially important in conjunction with the 2015 SPRINT trial, which has described health and mortality benefits associated with more rigorous control of blood pressure, but also increasing rates of adverse medication effects.3 It is essential that we understand the factors that impact differences in blood pressure measurement not only for scientific accuracy, but also to prevent undue morbidity in our patients secondary to medication overuse or underuse. We previously looked at the differences in blood pressures obtained using the 2017 AHA/ACC guidelines and those gathered using typical clinical practices. In that study, there was an average difference of 8.5 mmHg, a statistically significant decrease in systolic BP obtained in accordance to AHA/ACC measurement guidelines vs typical clinic practice ($p<0.001$).6 We planned to implement an educational intervention, modeled after the Target:BPTM campaign put forth by AHA and AMA.4 We hypothesize that the educational intervention will minimize the differences in blood pressure values and improve upon blood pressure measurement techniques in the typical clinic practice.

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P19

Depression among pharmacy students: Prevalence and Risk Factors

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BACKGROUND:
Studies have shown that depression is prevalent amongst undergraduate and graduate students and is associated with a negative impact on academic performance. Although depression has been extensively studied in medical students and residents with rates nearing 30%, limited data exists regarding mental health in pharmacy students.

OBJECTIVE:
The purpose of this study is to determine the prevalence of depression among first, second, and third-year pharmacy students using a validated 9-item Patient Health Questionnaire (PHQ-9) screening tool and self-reported depression as diagnosed by a health care professional. Furthermore, this study seeks to determine the student characteristics and predictors most closely correlated with moderate-severe depressive symptoms.

METHODS:
Upon approval from Investigational Review Board (IRB), an email was sent to pharmacy students enrolled at Temple University School of Pharmacy with a link to a survey hosted by REDCap, a secure, web-based software platform designed to support data capture for research studies. The survey collected data relating to demographics, depressive symptoms, and relative sources of stress. The online survey was available for data collection from February 3, 2020 through February 19, 2020. Only first through third year students older than 18 years of age and capable of consenting in written English were eligible to participate. Fourth-year pharmacy students were excluded. The primary endpoint of the study was to determine the prevalence of moderate to severe depressive symptoms as indicated by a score of ≥10 on the PHQ-9 depression screening tool. The secondary endpoint was to recognize the specific student characteristics or circumstances predictive of moderate to severe depressive symptoms as identified in the subgroup populations with a PHQ-9 score ≥10.

RESULTS:
Of the 424 students eligible to participate, 108 completed surveys were obtained. Results showed that 45.5% of participants screened positive for depression. Characteristics related to depression included race, presence of a foreign-born parent and current grade point average (GPA). Multivariable logistic regression analysis showed that a GPA <3.0 was predictive for screening positive for depression. Characteristics predictive of screening negative for depression included the presence of at least one foreign-born parent and Asian race.

CONCLUSION:
Results of this study reveal that the prevalence of depression in pharmacy students may be higher than what current data suggests. Further research is warranted in order to implement adequate supportive measures targeted to promote academic success and overall wellbeing amongst pharmacy students.

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P20

The Mental Health of Pharmacy Students Amidst the COVID-19 Shutdown

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BACKGROUND:

In a February 2020 cross-sectional survey of pharmacy students, the prevalence rate of depression was 45.5%. In March of 2020, following the emergence and outbreak of Sars-CoV-2 all undergraduate and graduate students were forced to return home and isolate themselves in an online learning environment. Significant consequences on the general population's mental health would be anticipated.

OBJECTIVE:

This study seeks to determine the prevalence and anxiety amongst first, second- and third-year pharmacy students in the context of living through the COVID-19 pandemic and subsequent isolation and virtual learning. Furthermore, it seeks to determine how often students are adopting known behaviors that promote wellbeing such as: adequate sleep, exercise, mindful meditation, and expressing gratitude.

METHODS:

Upon approval from the Investigational Review Board (IRB), an email with a link to a survey which was sent on March 6, 2021. Redcap was utilized to format the survey settings and collect data. Inclusion criteria consisted of PharmD students enrolled in the first three years at the Temple University School of Pharmacy (TUSP), students older than 18 years of age, and capable of understanding the English language. Exclusion criteria included Fourth-year pharmacy students at TUSP. A primary endpoint of this study is to assess the prevalence of moderate to severe depression and anxiety symptoms indicated by a score higher than or equal to ten on the PHQ9 depression scale and GAD7 anxiety scale. A secondary endpoint is to determine lifestyle of students and specific characteristics to identify causative reasons for depression within the identified subgroup.

RESULTS:

Data collection is ongoing. So far in our preliminary results, we have 102 completed survey results. The rate of depression and anxiety was 57% and 47.8 % respectively in our sample. From the data gathered thus far, 74.1% students adopted moderate exercise routine and 63.5% of students adapted a form of light exercise regime. About 56.3% of students practiced gratitude and 23.9% practiced meditation at least once a week. Approximately 45 .5% of the students reported seven or more hours on a typical night and while 18.2% of students reported sleeping seven or more hours on the night prior to exams.

CONCLUSION:

Preliminary results suggest that the prevalence of depression and anxiety appears higher than rates previously reported prior to COVID.

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Implementation of HIV/HCV POC Testing in Community Pharmacies: FL

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Given the expansion and implementation of various outpatient services, the role of pharmacists has drastically changed. The ability to screen patients for various disease states in community pharmacies provides for rapid diagnosis, earlier medication management, and expanded opportunities in re-engagement of patients to primary/ specialty care. The purpose of this study is to identify if Clinical Laboratory Improvement Amendments (CLIA) waived pharmacies provide Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) Point-of-Care Testing (POCT) and to assess the frequency of positive test results in higher risk populations. Data was collected from high-risk population states (D.C., Louisiana, Georgia, and Florida) from August 2019 to December 2020. CLIA waived pharmacies were contacted via telephone for voluntary participation. Surveyors asked a series of questions from an electronic form about: knowledge of CLIA certificate of waiver, availability of HIV/HCV POCT, number of tests performed per month, number of positive tests per month, billing and advertisement. These de-identified results were updated in real time into a spreadsheet, later categorized and analyzed. Of the 472 pharmacies contacted across D.C, Georgia, Florida and Louisiana, 426 pharmacy personnel accepted the interview via telephone with a majority of employees interviewed being staff pharmacists (69%). 378 of the 426 (89%) pharmacies contacted, conducted various POCT with only 6 offering HIV POCT and 8 offering HCV POCT (2% and 2.7%, respectively). The POCT test were mostly offered by walk-ins or appointments, however there was also a great majority of pharmacies who were unsure or provided no POCT accessibility. Of the 6 pharmacies offering HIV POCT, four reported no testing, one averaged less than 1 test/month and one averaged 1-3 tests/month; from the two pharmacies that conducted HIV POCT, they averaged about 1-3 positive tests/year. Of the 8 pharmacies offering HCV POCT, four reported no testing, three averaged less than 1 up to 6 tests/month, and one >10 tests/month; from the 4 pharmacies that conducted HCV POCT, three averaged 1-3 positive tests/year and one >10 positive tests/year. CLIA-waived testing facilities for POCT offers great healthcare accessibility to the community and focus mainly on hypertension, diabetes, and hyperlipidemia while certain disease states such as HIV and HCV remain underserved. From the few pharmacies conducting HIV and HCV testing, there is a fair number of positive results helping guide patients with their next steps in care. Increasing awareness in HIV/HCV POCT and the number of tests conducted in outpatient settings is vital in improving outcomes in these high-risk states.

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