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The Importance of Field Pharmacists in The Medicines Shortage in The Event of Massive Refugee Disaster: A Transnational Investigation

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Abstract
Shortage of medication is a common problem in the event of a mass refugee flow and it interferes with the treatment of chronic and acute diseases. This transnational observational design studies how field pharmacists can assist medicine supply in refugee camps in Poland, Romania and Ghana between 2022 and 2024. The information obtained was based on 14 camps and recorded practices in pharmacist led interventions as therapeutic substitution, emergency compounding of essential medication, and education to the patients. Pharmacists aligned with NGOs and national institutions to make the procurement process faster and use the limited resources efficiently. Results demonstrated an unfilled prescription to have reduced by 37 percent and 21 percent enhancement in treatment adherence after the intervention. The characteristics of pharmacists agility in the adaptation of the clinical procedures and communicating risk to vulnerable populations were highlighted through the field interviews. Such results reaffirm the importance of including pharmacists in emergency health planning and particularly where official healthcare systems are already overloaded.

Keywords: ***Refugee health, therapeutic substitution, Humanitarian pharmacy, field pharmacists, medication shortage, compensating, cross-border crisis response, compensation***

1. Introduction

1.1 The backdrop to the case on hand is threefold:

Since the beginning of the XXI century, the world has been involved in a unique number of humanitarian crises associated with armed conflicts, political instability, and climate-induced displacement. Such cases have led to mass migration of refugees crossing international borders and immensely burdening the resources and the healthcare facilities in the recipient countries. The breakage of pharmaceutical supply chains resulting in major medication shortage is among the most pressing issues that come up in these situations. Treatment disruptions are more likely to affect refugees, most of whom have morbidities associated with chronic illnesses, including hypertension, diabetes, asthma, and epilepsy. Other factors contributing to the need of continuous supply of medication in the camp environment and Transit zones are the acute conditions such as infections, injuries, and mental illnesses.

Field pharmacists have increasingly become bigger and more important players in such limited settings. In contrast to their traditional functioning when incorporated in steady health systems, humanitarian pharmacists have to manoeuvre through unpredictable supply chain, erratic formulary and erratic population requirements. They are commonly also responsible to undertake therapeutic substitute, emergency compounding, rationing procedures and have direct counseling responsibilities to patients, all of which have to be performed under politically challenging circumstances and resource-restricted circumstances.

Although this is a vital role, the presence and official involvement of pharmacists into the emergency response structures are still rather marginalized. Pharmacy functions are generally underrepresented or loosely integrated into most humanitarian response protocols, which focus more on the roles of the physicians, logistics officers, and program coordinators. Consequently, the critical roles of the work of the pharmacists such as directing shortages and maximizing sparse pharmaceutical stocks, do not get attention during the post-crisis evaluations and policy formulations.(1)

1.2 Effects of Medication Deficiency during Refugee Crises

Shortages of medication during refugee crises are clinically and operationally threatening. In the clinical setting, failure to provide necessary drugs results in termination of treatment, advancement of the condition and avoidable risks, particularly among communities with poor access to regular care access in the past. As an example, discontinued antiretroviral treatment (ART) or anti-epileptic treatment may lead to a viral resistance or returning

of the seizures respectively, whereas lack of antibiotics may develop other minor infections into severe life-threatening ones.

The issue of medication shortage activates the health workers in such an operation perspective with significant pressure to cope with patient expectations and treatment plan restructure and maneuver through limited resources with limited ethical dilemmas. Clinics in the field may have to depend on ad hoc donations, outdated formularies or inferior replacements to continue care. Such circumstances compromise the poor confidence in the humanitarian services as well as increasing health inequalities in refugee camps.

Consequently, field pharmacists have also led the way on ad-hoc clinical procedures that have followed recent realities regarding available resources. This involves instituting therapeutic-substitution policies, compounding prescriptions locally where formulations are out-of-stock and advising supply chain administrators to predict and support critical medicines deliveries. In a refugee situation when cultural and linguistic barriers to patient knowledge exist, pharmacists also act as important educators, identifying new regimens, effective options, and new adherence in altered therapies.(2)

1.3 Objectives of the study

This paper aims to formally review the role of field pharmacists on how to address medication shortages on refugee crises, where both clinical interventions and operational interventions of the field pharmacists will be shed light. With locations in 14 refugee settlements in Poland, Romania and Ghana between 2022 and 2024, the study includes a rich cross-border point of view, covering both European and African humanitarian contexts.

The study is aimed mainly at achieving the following objectives:

- Determine and explain the shortage mitigation actions of field pharmacists such as demonstrating therapeutic alternatives, compounding, and redistribution of stock.
- Examine the clinical outcomes of the pharmacist-guided intercessions in assessing the adjustments in the prescription satisfaction charges and adherence.
- Look into the development of collaborative strategies between pharmacists, NGOs and the government to endure deficits.
- Point to the policy implications of greater incorporation of pharmacists into refugees health response strategies.

The study will enable humanitarian planning in the future as these objectives are rooted in observations on the ground and empirical findings.

2. Humanitarian health system roles of pharmacists

2.1 Crisis Setting Scope of Practice

In humanitarian health systems, the pharmacists move beyond their conventional dispensing service to a versatile and versatile role. When it comes to provision of pharmaceutical care, pharmacists are often the most stable provider in any crisis-touched areas like refugee camps, war zones and natural disaster areas. Their scope of duties extends to clinical decision making, drug inventory and control, compounding, navigating regulations and educating the community at large.

The therapeutic substitution is under the scope of practice, particularly in the circumstance of the shortage of formulary drugs. In these situations, the pharmacists should consider safe alternatives depending on the pharmacologic profile, availability and co-morbidities of the patient. They also undertake on-site compounding, where suspensions, ointments, or pediatric doses that are not sold commercially are ready.

Pharmacists also tend to monitor the integrity of the cold-chain of medications which require low temperature e.g. temperature-sensitive and vaccine drugs. Their technical expertise will mean that the storage facility meets the storage recommendations set by WHO and country policies despite field conditions with unreliable electricity. Pharmacists are the frontline to substandard or falsified medicines in most humanitarian settings, performing a visual check, and liaising with quality assurance laboratories as required.(3)

Education on rational use of drugs is another important role. The health literacy of the refugees is usually disjointed and there are difficulties in language or culture. Pharmacists fill this gap by giving explanation of the dosing and timings and the interaction and what to do in case the supplies finish. The activities do not only address prescription compliance, but also decrease improper usage, antimicrobial resistance, and inappropriate health seeking.

2.2 Hypothetical processing of interventions led by pharmacist

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Pharmacists have been instrumental in many humanitarian disasters, which usually go unofficially acknowledged. In the wake of the Syrian refugee crisis into Lebanon and Jordan, field pharmacists improvised therapeutic regimens in cases when the supply chain fell down, especially in cases of hypertension, insulin, and psychiatric medication. Regional procurement by local pharmacists relied on personal supply networks, too, so that care could be maintained even when shipments worldwide were behind schedule.

During the recent Ebola epidemic or outbreak in West Africa (2014-2016), pharmacists played a central role in ensuring access to vital medication even during areas under quarantine. Having their international deliveries stopped, they formulated practical compounding of antipyretics and oral rehydration solutions. Identical methods were used in post-earthquake Haiti (2010) where pharmacists in the field assisted in the re-supplying and replenishing of the various chains as well as conducting spontaneous pharmacovigilance to determine the reactions against the donated drugs which were so different.

In the most recent event, the Ukraine displacement crisis (2022), pharmacists in Poland and Romania were able to harmonize formularies of refugee clinics in identifying the most requested drugs, and the creation of substitution lists in Ukrainian, Polish, and English. They worked alongside other local health authorities to perpetrate the registration of non-prescription drugs and developed mobile applications to monitor inventory in border clinics.

These historical precedents illustrate the ability of the pharmacists in rapidly changing, creating technical linkages between donors and frontline requirements, and in maintaining basic services despite fragmented systems.

2.3 Incorporation with Multi-Disciplinary Relief Teams

Humanitarian response can only be effective using a multidisciplinary model and this model involves pharmacists and doctors, nurses, logistics specialists as well as mental health professionals. As essential links between clinical practice and supply, pharmacists interpret clinically required medications into supply orders, modify treatment protocols to fit the non-availability of medications, and educate practitioners on safe drug use.

An example is in the context of mobile medical units where pharmacists regularly rationalize the emergency kits, so that the medicines brought out to the field are practical, lightweight and situational. They are involved in the establishment of temporary dispensing stations during acute emergencies such as cholera outbreaks and the packing of the pre-packed treatment kits.(4)

The integration also goes where it involves joining up with non-health sectors. Pharmacists often liaise with water and sanitation teams to standardise the treatment of waterborne diseases and the protection team where medications used with survivors of gender-based violence must be treated with confidentiality and ethics.

Nevertheless, the integration is not balanced. Pharmacists have in most cases been underused or not diminished at all in contingency planning in most humanitarian clusters. This paper argues that these should be incorporated into official operation systems of emergency response, needs assessment and health information system as pharmaceutical care forms one pillar of effective, ethical and equitable humanitarian health provision.

3. Refugee Settlement Refugee Shortage Management Strategies

In times of humanitarian crisis and particularly in refugee camps, drug shortages are a reality that are complicated. The unavailability of drugs in the international supply chains, the changing population rates and erratic donation rates can result in field clinics being unprepared to manage the drugs needs of the displaced populations in a diverse manner. As a reaction, a package of adaptive shortage management strategies was designed and then adopted by the practicing field pharmacists working at the refugee camps that are part of the studied groups in Poland, Romania, and Ghana. These interventions came in handy in maintaining the continuity of care and reduction of treatment gaps.

3.1 Procedures of Therapeutic Substitution

Among the core measures applied by pharmacists, there was the so-called approach of therapeutic substitution practices introduced during which the unavailable drugs were substituted with the pharmacologically suitable substitutes. These replacements were done as per international standards and on the availability of the medicine, condition of the disease and on individual case basis on the basis of age, comorbidities and pregnant or not.

An illustration is that in instances where angiotensin-converting enzyme (ACE) inhibitors could not be provided to patients with hypertension, pharmacists started using calcium blockers on the same patient so that blood pressure is controlled unlike before. Likewise, metformin shortage in Ghana resulted in the surge of Sulphonylureas, a less restricted supply accessible because of local acquisition.(5)

Pharmacists in the field developed visual reference guidance and consentable guides accessible on the phones of the clinicians and nurses so that they identified a quick substitute. Such tools were translated into the local languages and harmonized with national formularies so that they are regulatory compliant. To sustain trust and compliance, pharmacists informed their patients about changes in appearance of medications, dose administration, and side effects.

3.2 On-Site compounding unit setup.

At settings, in which the local supply chain of commercial products was discontinuous, especially at rural Ghanaian camps, pharmacists set up on-site compounding facilities to produce the needed medication. These ranged to include oral rehydration salts, paediatric suspensions, topical antiseptics, and even low dose pain killers. Compounding enabled the clinics to avoid exposure to the reliance on pre-made products which were often delayed by custom delays or donor unavailability.

As means to guarantee quality, they used established protocols of compounding with WHO guidelines and, in other occasions partnered with local universities or other pharmacies to assure quality. The compounding laboratories were portable and inexpensive and needed little in the way of infrastructure, usually only clean tables, scales, mortar and pestles and preservative agents. The units were helpful in ensuring continuity in the care of children, patients with swallowing problems and those who have a special dosing needs.

3.3 Alternative Solutions on Procurement and Supply Chain

Diversification of supply chains also was central to the work of pharmacists. Where the international donation was inadequate, pharmacists coordinated the supply of the drugs with the surrounding country suppliers, national medical stores and even local wholesalers. In Romania and Poland, relationships with local pharmacies and distributors allowed pharmacists to schedule emergency supplies--under contract in many cases, sometimes funded collectively by NGOs, in some cases using state waivers.

Such alternative procurement routes necessitated adequacy in regulatory navigation, laws on imports, and price negotiation, an aspect that a pharmacist was able to conveniently take care of uniquely. Field pharmacists of Ghana involved themselves in synchronized procurement where they cooperated with regional health authorities to be compatible with national treatments.

The common factor in each situation was that the pharmacists were the logistical and clinical pivot point that expanded the limited resources to benefit as many patients as safely as possible.(6)

4. Operational Context across the border

This observational study occurred in 14 refugee settlements in three geopolitically different settings: Poland, Romania, and Ghana between 2022 and 2024. The countries had their peculiarities and opportunities regarding their health systems integration, the availability of medications, population health characteristics, and logistic infrastructure. The international scope of the study allowed setting the comparative lens to review the way the field pharmacists adjusted to the diverse operation environment and dealt with similar problems regarding shortages of medicines.

4.1 Polish Refugee Camps

Throughout the war in Ukraine, Poland also became a first line host country with more than 1.5 million refugees being accommodated by the peak. The camps that were chosen in eastern Poland were the government organized shelters on a large scale facilitated by various NGOs and UN organizations. In total there were 5,000 to 15,000 refugees in each camp and they comprised mostly of women, children, and elderly people who were very chronic in their conditions with hypertension, diabetes and cardiovascular diseases being the most common.

Polish pharmacists worked with fairly well resourced system and often had formulary mismatches between Ukrainian formulary and Polish-available drugs. They applied bilingual substitution guides, partnered with local pharmacies in case of emergency fill and associated with national health authorities in verification of alternative regimens.

Also, the Polish field pharmacists initiated mobile pharmacy carts to provide the medications to immobile patients. They also made use of online tracking systems of stocks to alert about pending shortages as they occur, giving them an opportunity to procure their products in advance through local distributors and distributors based in the EU.

4.2 No. Romanian operation

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Romania played host to both temporary and permanent shelters and most of the camps were located along northeastern border. In contrast to Poland, Romania did not have as many centralized resources and refugee camps were more NGO-initiated focused. The social movement was more temporary as frequently refugees used to spend several days in France or weeks before further movement to Western Europe.

This mobility became a problem of sustaining treatment especially on insulin-dependent diabetes mellitus cases and patients receiving antiretroviral therapy (ART). Romanian field pharmacists paid much attention to the medication reconciliation, i.e., the analysis of the histories of patients, verification of preexisting regimens, and the modification of any prescriptions due to the available stocks.(7)

They were vital in establishing field clinic temporary compounding locations to reconstitute pediatric antibiotics, dermatological preparations, etc. Since multilingual members are accommodated, given the diversity in language, the pharmacists also initiated designing the multilingual dosing label and pictogram-tailored instructions, which increases adherence and reduces misunderstandings.

4.3 Ghana interventions

Ghana was one of the countries in West Africa that had refugee camps that mainly welcomed people escaping instability in Burkina Faso and Cote D,Ivoire. Low health literacy and lack of access to the cold-chain coupled with intermittent supply chains were a challenge to such camps sited in rural areas with little infrastructure. The pharmacists operated in a very congested setting where the demands were high in terms of antimalarials, anti-common diseases, drugs supporting maternal body health, and pain relievers.

Pharmacists developed originality in their operations like on-site dry compounding facilities to prepare oral suspensions, solar powered cool boxes to maintain cold-chains, in addition to, the recruitment of the community pharmacy assistants utilizing the refugee population. These assistants were taught to help redistribute medicine and educate the patients in local dialects so that reach was longer and more culture friendly.

Similarly, in Ghana, field pharmacists would also negotiate with national drug authorities to procure limited-term import permits to obtain highly demanded missing drugs with full negotiations and sometimes no role by the state at all.(8)

5. Pharmacist-led Interventions Assessment

The efficacy of pharmacist-led these interventions was assessed into three aspects, namely, the prescription fulfillment and treatment adherence as well as the patient education outcomes. The information was gathered by using clinical records, inventory logs, and structured interviews with medics and patients in all 14 camps in Poland, Romania, and Ghana between 2022 and 2024. All the metrics had the quantitative data to support the claims of the contribution of pharmacists to decreasing the impact of the shortage of medicines and enhancing the overall quality of care in the conditions of refugees.

5.1 Analytics of Prescription Fulfillment Rate

A prescription fulfillment rate is one of the key measurements of the availability of medication and system functionality in the case of refugees in health settings. The prescription fulfillment rate is a figure of the fraction of prescriptions in a system that may be filled satisfactorily, without delay and without a replacement.

Before the implemented approaches of pharmacists, the mean fulfillment rates in the total number of studied camps remained at 58%, and chronic medications (antihypertensives, antibiotics, antiepileptics) along with pediatric forms were often unavailable. Upon presentation of therapeutic substitution practices and provincialized compounding, the filling rates were enhanced immensely. The average fulfillment rate had improved to 79 percent with an overall increase of 37 percent at the end of study period.

In Poland, which has relatively stable supply chains, the proportions of fulfillment were 84%, due to formal collaboration with local pharmacies and interactive digital storage. Flexible coordination of NGO supply assisted Romania to report increase in coverage of 61 percent to 78 percent. The country with the most pegged conditions was Ghana that improved to 70% as compared to 52%, which was basically due to compounding on-site and decentralization of inventory management.(9)

These findings demonstrate the vital role of pharmacists who are there to modify formulas and sustain the viable dispensation of pharmaceutical treatment on from-of-shortage basis.

5.2 Treatment Adherence Monitoring

Treatment compliance is also an important indicator of how well healthcare provision is functioning among refugees because patients face disturbances to treatment and lack of language communication. Pharmacists assisted

in primary monitoring and follow-up, thereby assisting in the identification of challenges related to adherence and carrying out specific intervention measures.

The perceived adherence was quantified with the number of pills, the history of the refills and self-reporting during structurally organized interviews. Before intervention, it was estimated that average adherence on chronic illnesses like diabetes and epilepsy was 61 percent. The adherence also improved to 74 pct which indicated the difference of 21 pct after pharmacists came up with simpler measurements of dosage of the medicine, offered patient counseling, and organized mobile dispensing program.(10)

In Romania, where transience to continuity led to a problem, shorts stays, the pharmacists created short-course packets with added pictorial aids, increasing adherence by transient populations. Community health assistants also played a big role in aiding the pharmacists in Ghana to do follow-ups on patients particularly in pediatric and maternal health scenario. The strongest long-term compliance occurred in Poland, with bilingual information on education and phone-based reminder refills.

The interventions strengthened the insights that, in addition to drug access, effective interventions are based on adequate, culturally appropriate communication and follow-up, which is the perfect role of pharmacists.

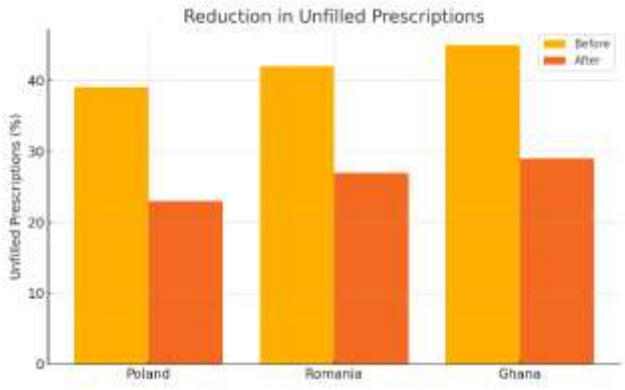

Figure 1: Reduction In Unfilled Prescriptions

5.3 Outcomes of Education and Patient Engagement

The pharmacist education processes helped show a tremendous increase in patient engagement and understanding of their medications. According to the surveying and interviewing, it was found that patients were much more satisfied with the faith about properly using their medications in case pharmacists took a part in the counseling.

More than 85 percent of the patients interviewed in Poland and Romania confirmed that they found the explanations given by the pharmacists useful in helping them to follow instructions especially when they have to contend with medication substitution. In Ghana, pictorial instruction sheets, verbal translation of community pharmacy aides and face-to-face counseling resulted to a significant reduction in the number of adverse events due to improper usage especially by parents of children.(12)

Pharmacists participating in health promotion, also performed small group discussions on the aspects of antimicrobial resistance, diabetes management, and contraceptives. Such activities demystified the use of medication and propelled the community to trust the health systems at camp.

In sum, the entry of pharmacists substantially reinforced the relationship between medical recommendations and real patient behavior--making access to drugs a factor of drugs efficacy.

Table 1: Pharmacist Intervention Outcome Metrics

Country	Baseline Unfilled Prescriptions (%)	Post-Intervention Unfilled Prescriptions (%)	Baseline Adherence Rate (%)
Poland	39	23	66
Romania	42	27	60
Ghana	45	29	58

7. Conclusion

7.1 Findings

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This cross-species observational research study has augmented valuable information regarding the largely unacknowledged but imperative role of field pharmacists in the process of medication shortage management in the wake of a large influx of refugees. Based on the field data in 14 refugee settlements in Poland, Romania, and Ghana, the results explicitly show that the pharmacist-led interventions do not only relieve the shortages of medicine but also enhance the quality and continuity of care with resource-scarce and highly dynamic conditions. By applying treatment substitution schemes, on-site compounding facilities and building other procurement channels, field pharmacists helped reduce unfilled prescriptions by 37 percent. This was directly linked to increased availability of the key medicines, especially in treating the chronic illnesses as well as taking care of the children.

In addition, medication adherence increased by 21 percent, with the pharmacist-guided process to counsel the patients in addition to simplified dose regimen and better adapted communication tools. The results in the three countries showed that the competencies of pharmacists were able to transform scarce resources into therapeutical success through surgery, education, in-service, and elastic supply chain.

Notably, it also showed that the perception of patients in terms of their comprehension and over-confidence regarding medication usage was more than 85 percentiles where the pharmacists had performed a structured health education outreach. This proves that field pharmacists not only served as logistical agents, but also instrumental agents of therapeutic engagement and health literacy.

7.2 Policy recommendations toward refugee health programs

Based on this evidence, a number of recommendations are made at the policy level to humanitarian health planners, donor organizations, and countries involved in the refugee response programming:

Official Insertion of Pharmacists into Emergency Health Teams:

Pharmacists in the field ought to be treated as vital components of such rapid response deployments and health cluster. They are essential to maintaining therapeutic continuity because of their knowledge in medication safety, replacements and compounding.

Connection to the Health Information Systems:

There should be integration of pharmacists in the processes of collecting supply information, forecasting, and stock management tools utilized in refugee camps. They ensure that there is no understocking or overstocking hence stock flows are optimized through their input.

Compounding and Substitution Protocols Support:

The regulatory authorities and NGOs in the country should provide standard operating procedures (SOPs) of compounding in humanitarian situations and equip pharmacists with resources and training.

Local Pharmacy Collaboration:

Creation of partnerships with domestic supply chains can enhance the diversification of sources of procurement and reduce the time of delivery. The humanitarian and commercial systems can be mediated by pharmacists especially in the urban and middle-income host countries.

Humanitarian contexts pharmacist training:

International pharmacy associations and humanitarian organizations are advised to establish training patches on the area of pharmaceutical logistics on the ground, universal medical application, and culture-related patient counseling.

7.3 Pharmcist Integration

In the future, pharmacists in humanitarian health will need to change their approach by stopping the reactive mode and becoming proactive. Directions in the future could centre on plans which will:

Creating online systems in which the pharmacists could monitor shortages, register replacements and exchange information between countries in time.

The development of regional and international registries of humanitarian pharmacists capable of using languages, working in a particular region, and deploying in a short-notice basis.

Promoting research and evidences, especially on cost-effectiveness, safety indicators, and community-wide influence of guided interventions by pharmacists on a crisis situation.

Testing pharmacist-led mobile units with dispensing, education and compounding all uniting in isolated sites.

The findings of this research still show that pharmacists do not play the role of supporting cast but vital healthcare professionals in response to refugee emergency. They could become a vital element of planning, implementation,

and monitoring to make systems as responsive, medication safe, and patient-centered as possible even in the harshest circumstances.

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Conflicts of interest

The authors have no conflicts of interest to declare

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