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Short communication

The top ten global health supply chain issues: Perspectives from the field

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ABSTRACT

In the battle for global health, supply chains are often found wanting. Yet most of what is known about in-country pharmaceutical supply chains resides in the experiences of individual stakeholders, with limited amounts of this knowledge captured in technical reports and papers. This short communication taps into the collective experience and wisdom of global health supply chain professionals through interviews and surveys to identify and prioritize the top 10 global health pharmaceutical supply chain challenges: (1) lack of coordination, (2) inventory management, (3) absent demand information, (4) human resource dependency, (5) order management, (6) shortage avoidance, (7) expiration, (8) warehouse management, (9) temperature control, and (10) shipment visibility. As such, this work contributes to the foundational knowledge of global health pharmaceutical supply chains. These challenges must be addressed by researchers, policy makers, and practitioners alike if global pharmaceutical supply chains are to be developed and improved in emerging regions of the world.

1. Introduction

Heroes may win battles but it is capable supply chains that win wars. In the war against disease, supply chains are often found wanting. But exactly how are these supply chains wanting? And what should be done about it? This short communication brings together expert opinion to answer just such questions. To enable a better understanding of what the specific needs are to strengthen global health pharmaceutical delivery (GHPD) supply chains, we undertook interviews and surveys of professionals working in GHPD supply chains. Our premise is that from a reasonable sample of knowledgeable experts in the global health arena we can obtain a reasonable consensus of opinion on the key challenges in GHPD supply chains. From the interview and survey data, this communication identifies and prioritizes key GHPD supply chain challenges, and subsequently we develop a dependency model to determine the key underlying influences or drivers. This work informs research, policy, and practitioner agendas. As Yadav [1] emphasizes, understanding the challenges and needs in developing country public health systems is crucial for the OR/MS practitioner and researcher.

2. Methodology

A two-part methodology consisting of interviews and surveys was employed. In the first phase, a set of semi-structured interviews were conducted via telephone with 22 individuals. Interviewees were selected from various roles in global health and pharmaceutical supply chains from manufacturer to individual facility (details available from authors), each with substantial experience in their specific supply chain area.

Based on the results and input from the interviewees as well as a pre-survey pilot [2], a survey was developed and deployed using judgment sampling [3]. The survey asked respondents to rate 17 supply chain issues based on importance for successful drug delivery to patients and saving lives. The rating scale was a five point Likert scale whose intermediate points were labeled "Not Important", "Important", and "Critical". (Survey instrument is available from authors.) The target population was individuals working in GHPD supply chains that deal with pharmaceutical delivery and distribution; as such, surveys were distributed to global and in-country health supply chain professionals from the International Association of Public Health Logisticians (IAPHL). We restricted the survey to the delivery of pharmaceutical products in developing

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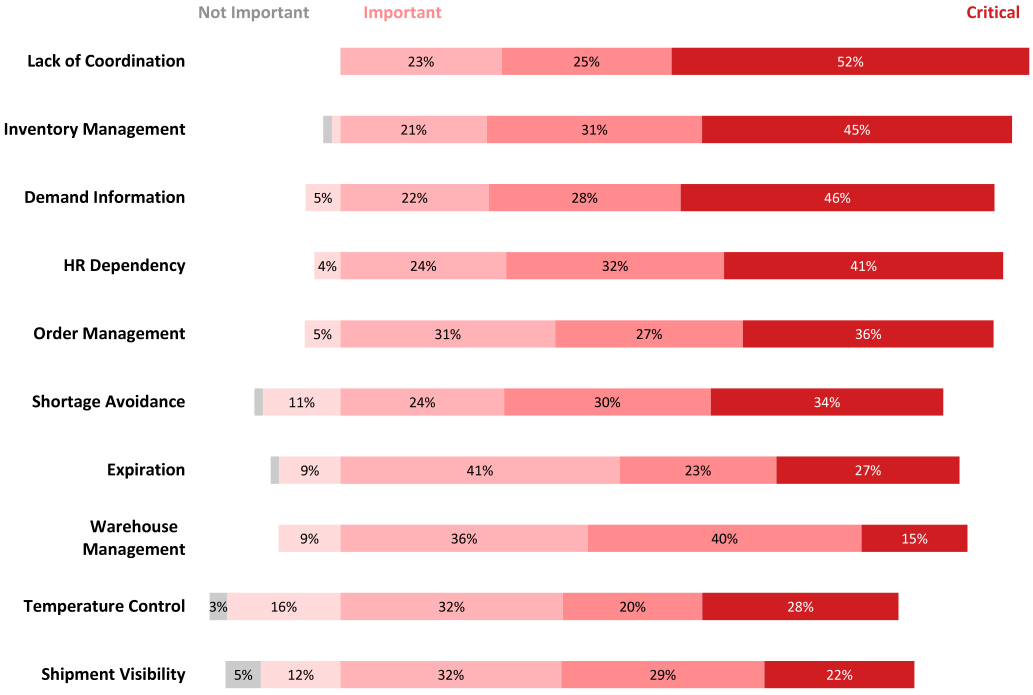

Fig. 1. Top 10 global health pharmaceutical supply chain issues ratings.

regions rather than on the broader overall delivery of health services and products throughout the globe.

From the interview and survey data, key GHPD supply chain challenges were identified and prioritized. The rank order of the top ten issues is based on the average of the survey respondents' ratings. From these identified challenges, key underlying influences or drivers are pinpointed via dependency. These drivers serve two purposes—first, they provide a background for framing future research questions in this arena; second, they provide decision makers a framework to set more effective policies in this arena. In fact, we conclude that working on other issues without addressing these "key drivers" will result in minimal improvement in practice.

3. Top 10 supply chain management issues

Interview and survey data were used to identify and prioritize the top ten issues in GHPD supply chains. These issues are as follows:

1. LACK OF COORDINATION, fragmentation, and silos of current system.
2. INVENTORY MANAGEMENT, including quantification, inventory levels, availability management, and stock counts.
3. DEMAND INFORMATION is often unknown and/or aggregated.
4. HUMAN RESOURCE DEPENDENCY on expertise, training, and personnel capacity.
5. ORDER MANAGEMENT, including planning, ordering, and follow-up.
6. SHORTAGE AVOIDANCE. Shortages lead to (expensive) emergency orders, frequent replenishment, frequent ordering, and high inventory.
7. EXPIRATION.
8. WAREHOUSE MANAGEMENT, including procedures and organization.
9. TEMPERATURE CONTROL, including monitoring and failure, in both transport and storage.
10. SHIPMENT VISIBILITY, including in-transit, delay, and arrival visibility.

Survey rating results can be found in Fig. 1, which shows the distribution of ratings. In the following subsections, the survey and interview findings are discussed in-depth as they relate to each of the issues. All statements are paraphrased from interviews or survey comments except where explicitly referenced.

3.1. Lack of coordination

The current system of health delivery is siloed, fragmented, and ultimately uncoordinated; this lack of coordination was cited as critical by more than half of survey respondents (Fig. 1). In fact, 100% of respondents rated it between important and critical.

After the 2005 *Paris Declaration on Aid Effectiveness* and the *Global Task Team on Improving AIDS Coordination* reported on the need for better coordination within global health, many initiatives were established for such goals [4]. However, such fragmentation is still clearly evidenced even in the separate but parallel structure of in-country supply chains. There is further division by product types, projects, and funding entities; even where and when to send an order may depend on the funder, product, project, etc. Such complexity in the system makes for difficult management and distribution of pharmaceuticals. Coordination can ensure comprehensive implementation, avoid duplication of effort, more optimal use of scarce resources, and improved supply chain performance.

But this coordination has clearly proved difficult to achieve among players, each with different and potentially conflicting priorities [1]; in fact, some survey respondents noted competition among functions and supply chains. Yet, for now, the issue of coordination remains unsettled. As Sridhar and Batniji [8] state, "the pluralism of global health institutions and the informal alliances on which power in global health rests make a unified and fully coordinated health system unlikely".

3.2. Inventory management

Managing inventory in GHPD supply chains is a complex challenge, especially considering the lack of information and unique