

# COVID-19 Supply Chain Considerations for Prescription Drugs in Dermatology

Andjela Egger BS,<sup>a</sup> Michael Abrouk MD,<sup>a</sup> Merrick Brodsky MD,<sup>b</sup> Robert S. Kirsner MD PhD<sup>a</sup>

<sup>a</sup>Dr. Phillip Frost Department of Dermatology & Cutaneous Surgery, University of Miami Miller School of Medicine, Miami, FL

<sup>b</sup>Department of Dermatology, University of Colorado, Boulder, CO

## INTRODUCTION

On January 30<sup>th</sup> the World Health Organization (WHO) declared a Public Health Emergency of International Concern (PHEIC), followed by an official announcement on February 11<sup>th</sup> that the outbreak was caused by a novel coronavirus (CoV) named COVID-19, the acronym for “corona virus disease 2019.”<sup>1</sup> COVID-19 is the latest in the series of global viral pandemics in the past 20 years including the severe acute respiratory syndrome coronavirus (SARS-CoV) in 2002 and 2003, the H1N1 influenza in 2009, and the Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia in 2012.<sup>1</sup> However, the COVID-19 pandemic emerged in a modern world that is both the most diverse and most deeply interconnected in terms of global healthcare economy and supply chain of pharmaceuticals in history. Many of the major pharmaceutical companies in the United States rely primarily on the active medical ingredients and medications that are manufactured overseas.<sup>2</sup> We looked at the 15 most commonly prescribed generic topical dermatology medications, and the locations of the major pharmaceutical factories producing generic forms of these medications (Table 1).<sup>3,4</sup> Of the top 15 most commonly prescribed topical dermatology generics, 13 were found to at least partially be manufactured in China in addition to the local and/or other international locations (Table 1). China was the emergence point of COVID-19 and the first country to undergo an alarming epidemic. Primary efforts are targeted at curbing further spread and rate at which the population is getting infected by employing strict isolation measures.<sup>2</sup> These measures including refraining from coming to work, so far proved successful in decelerating and stabilizing the disease in China.<sup>1</sup> However, the same measures have a negative impact on economy, pharmaceutical manufacturing, and exporting to other countries that are dependent on these pharmaceutical means. In other words, the COVID-19 epidemic that originated in China and has now evolved into a global pandemic across the world may have significant ramifications on the pharmaceutical supply chain of the commonly prescribed medications in dermatology. The concern exists for the possible deficits of the final manufacturing drug products from China, as well as the vast number of active drug ingredients that are exported for use and further modifications locally in the United States.<sup>2</sup> Moreover, should the pandemic expand, the possibility of factories

TABLE 1.

**Top 15 Most Commonly Prescribed Generic Topical Dermatology Medications With Respective Manufacturing Locations in China**

Top Prescribed Drug Name	Manufacturer Name	Manufacturer's Location in China (yes/no)
Econazole nitrate 1%	Perrigo	Yes
	Mylan	Yes
Clobetasol 0.05% Ointment	Fougera Pharmaceuticals**	Yes
	Glenmark Pharmaceuticals***	Yes
	Mylan	Yes
Hydrocortisone 0.1% solution	Taro Pharmaceuticals	No
Clobetasol 0.05% Gel	Fougera Pharmaceuticals**	Yes
	Perrigo	Yes
Clotrimazole 1% Solution	Teva Pharmaceuticals	Yes
Clobetasol 0.05% Cream	Fougera Pharmaceuticals**	Yes
	Glenmark Pharmaceuticals	Yes
	Mylan	Yes
Clobetasol Emollient 0.05% Cream	Fougera Pharmaceuticals** Novast Laboratories	Yes Yes
Clobetasol 0.05% Solution	Fougera Pharmaceuticals**	Yes
	Glenmark Pharmaceuticals	Yes
Erythromycin-Benzoyl Gel	Lyne Laboratoeis	No
	Tolmar	No
Tretinoin 0.025% Cream	Perrigo	Yes
Ketoconazole 2% Cream	Fougera Pharmaceuticals**	Yes
	Teva Pharmaceuticals	Yes
Gentamicin 0.1% Ointment	Fougera Pharmaceuticals**	Yes
	Perrigo	Yes
Gentamicin 0.1% Cream	Alpharma	Yes
	Fougera Pharmaceuticals**	Yes
	PharmaDerm (Altana Division)	Yes
Tretinoin 0.01% Gel	Perrigo	Yes
Erythromycin 2% Gel	Perrigo	Yes

\*Modified from Supplementary Table 1 from Li et al.<sup>3</sup>

\*\*Bought by Novartis

\*\*\*Partnership with Grandpharma (China)

remaining closed, more factories closing, and restrictions being placed on import/export between different countries could lead to a major shortfall to manufacture and deliver the very needed dermatology medications in the next several months and further. Chloroquine and hydroxychloroquine have demonstrated in vitro success in inhibiting SARS-CoV-2<sup>5</sup> and are now being utilized off-label for COVID-19. This is crucial because chloroquine and hydroxychloroquine are of utmost importance to dermatology as the mainstays of therapy in treating autoimmune and connective tissue disorders; increased demand to treat COVID-19 may lead to their deficits as well. The implications go beyond the field of dermatology as the effects of COVID-19 pandemic on worldwide pharmaceutical supply chain may have a major impact on drug prescription in other specialties and the entire medical field.

## DISCLOSURES

The authors have no conflicts.

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## AUTHOR CORRESPONDENCE

### Andjela Egger BS

E-mail:..... axn404@med.miami.edu