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Case Study on Azithromycin in Pharmamarket

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Abstract: This case analysis delves into the position of azithromycin in the international pharmaceutical market, tracing its evolution, marketplace dynamics, and challenges over the years. Registered in the early 1990s, azithromycin transformed the course of bacterial infections treatment with its broad-spectrum activity, abbreviated duration of therapy, and improved side-effect profile. The marketplace success of the drug was fuelled by the convenience of treatment, which ranked it as the preferred antibiotic both among healthcare practitioners and patients. Nevertheless, its market trajectory changed with the expiration of its patent in 2005, which led to the widespread availability of generics, whose effect on its pricing and market share was significantly adverse. Moreover, azithromycin also attracted attention following the COVID-19 pandemic when it was researched as a possible treatment for the disease despite the subsequent trials discrediting its efficacy for the same. This case study shows how critical azithromycin has been to dealing with global health issues, specifically in poor parts of the world, where generics have widened treatment access. It also tackles newer issues such as antibiotic resistance and changing regulations. The conclusion is that the success of GlaxoSmithKline underscores the challenges of balancing competitiveness in the pharmaceutical business while meeting public health demands and shifting treatment approaches.

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I. INTRODUCTION OF PHARMAMARKETING

Pharmamarketing is the planned promotion and communication of pharmaceuticals to different stakeholders, including patients, healthcare professionals, and healthcare stakeholders. Pharmamarketing encompasses a variety of marketing initiatives, including advertising, sales promotion, online campaigns, and educational outreach, all designed to promote awareness and demand for pharmaceuticals. The objective is to shape physicians' prescribing decisions, educate patients on treatment and therapy, and adhere to business regulations. Owing to ethical and regulatory complexity in the medical sector, marketing by pharma is strictly governed to ensure transparency of information and safeguard patient welfare while promoting medication effectively.

II. SCOPE OF PHARMAMARKETING :

Pharmamarketing is expansive and multi-dimensional and encompasses diverse domains of the pharma business with a emphasis to promote medicine and healthcare-related items to diversified market participants. Prime domains within pharmamarketing are:

- **Healthcare Professional Marketing**: Physicians, pharmacists, and other health professionals as marketing targets by drug representatives, professional journals, and meetings. Most often used are promotion of efficacy, safety of drugs, and outcomes in terms of patient impact on physicians' prescribing behaviors.
- **Direct-to-Consumer (DTC) Marketing**: In some regions, pharmaceutical companies market directly to consumers through advertising campaigns in the media, offering information about specific treatments and encouraging patients to consult their healthcare providers.
- **Digital and Social Media Marketing**: Due to the internet revolution, pharma firms are now employing digital media to connect with healthcare professionals as well as patients. They are using websites, social media, email campaigns, and educational materials to spread awareness regarding diseases and treatments.
- **Market Research and Data Analytics**: Pharmaceutical marketing entails extensive research to know market trends, patient needs, competitor activity, and regulatory environments. Analytics aid in personalizing marketing strategies to optimize impact and efficiency.
- **Brand Management and Product Positioning**: Pharmaceutical firms strive to create powerful brand identities for their products, distinguishing them from the competition. Powerful positioning aids in building loyalty and recognition in the market.
- **Regulatory Compliance and Ethical Marketing**: Pharmaceutical marketing has to comply with rigorous regulations so that all statements regarding drug safety and efficacy are true and transparent. Adherence to local and global regulations (such as the FDA in the United

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States or EMA in the European Union) is essential to prevent legal troubles.

- **Patient Support Programs**: Firms create programs that assist patients in managing their diseases, such as patient education, financial support programs, and adherence aids.

- **Global Marketing**: Pharmaceutical marketing is international in scope, encompassing adapting strategies to suit local regulatory, cultural, and market environments.

Concisely, the market for pharmamarketing is extensive and entails sophisticated strategies that necessitate knowledge of various markets, stakeholder requirements, ethical behavior, and regulatory environments. It is critical to the success of pharma businesses and has the ultimate goal of enhancing public health.

III. FUTURE PROSPECTIVE OF PHARMAMARKETING:

The future of pharmamarketing is changing at a fast pace because of technological advancements, shifting consumer trends, and a more complex healthcare environment. The following are some of the major trends and future directions for pharmamarketing:

A. Digital Transformation and AI Integration

- **Personalized Marketing:** Artificial intelligence (AI) and big data enable pharma businesses to develop highly customized marketing campaigns. With patient and healthcare provider information, companies can provide individualized treatment and customize their messages to specific market segments.

- **Predictive Analytics:** Predictive analytics powered by AI will allow for better forecasting of market trends, treatment uptake, and patient requirements. This will assist in optimizing marketing strategies and sales forecasting.

- **Telemedicine Growth:** With more widespread use of telemedicine, pharma marketing will evolve to reach out to virtual consultations, online medications, and digital wellness solutions.

B. Patient-Centric Strategies

- **Patient Empowerment:** Pharma organizations are increasingly engaging in patient empowerment by offering more information content, digital condition management tools, and support services. Patient engagement through apps, virtual health assistants, and patient communities will expand.

- **Direct-to-Consumer Marketing:** As patients become more informed and take a more active role in managing their health, pharma companies are likely to increase direct-to-consumer (DTC) marketing, especially in regions where it's allowed, emphasizing product benefits and lifestyle improvements.

C. Regulatory and Ethical Challenges

- **More Rigorous Regulation:** Pharma marketing will be defined in the future by shifting regulatory regimes over patient confidentiality (e.g., GDPR, HIPAA) and ethics. All of digital marketing, data mining, and patient activation programs must meet more severe regulations governing advertisement and data privacy.

- **Transparency and Trust:** Trust will become increasingly important as patients will expect transparency in the promotion of pharmaceutical products. Ethical promotion practices and transparent, unbiased information will be the cornerstone of building relationships with healthcare professionals and patients.

D. Emergence of Influencer and KOL Marketing

- **Key Opinion Leaders (KOLs):** Pharma companies will still make use of KOLs, researchers, and doctors to amplify credibility and trust. These professionals will act as voices in informing both healthcare professionals and patients on new treatments.

- **Influencer Marketing**: While this is just beginning to develop in the pharma industry, partnerships with patient advocates and healthcare influencers may gain greater prominence, particularly on sites such as Instagram and YouTube, where users post personal health narratives.

E. Value-Based Healthcare Marketing

- **Outcome-Based Marketing:** As healthcare becomes increasingly value-based, pharma marketing will be geared towards proving real-world outcomes and cost-effectiveness of medicines. Firms will emphasize how their products enhance patients' health outcomes while being cost-effective for health systems.

- **Partnerships with Health Care Providers:** There will be a greater emphasis on partnering with health care providers, hospitals, and payers to align marketing strategy with patient-focused objectives and to market therapies that generate the most value for health systems.

F. Greater Use of Virtual and Augmented Reality

Virtual Reality (VR) and Augmented Reality (AR) will have a greater impact on pharmaceutical marketing through the improvement of patient education, medical training, and physician interaction. Virtual simulation of medical conditions or drug action can make it easier for healthcare professionals and patients to comprehend complex therapies.

G. Globalization and Market Expansion

- **Emerging Markets**: pharma marketing will continue to expand into emerging markets, particularly in Asia, Africa, and Latin America, as these markets continue to

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see the development of their healthcare infrastructure as well as greater access to drugs. Adapting marketing to the specific cultural, economic, and healthcare conditions within these regions will be critical.

- **Localization of Strategies**: As global markets become increasingly integrated, pharmaceutical firms will be required to localize marketing efforts to meet local regulations and address unique requirements of differing populations.

H. Sustainability and Social Responsibility

Corporate Social Responsibility (CSR): Pharma firms will be increasingly called upon to demonstrate their commitment to social causes and sustainability, whether environmental, equitable access to drugs, or community health initiatives. These commitments will probably be emphasized in marketing efforts to enhance brand image.

Sustainable Packaging: As green issues increase, there will be a demand for sustainable packaging and distribution practices. Drug companies can promote minimizing carbon footprints or using green packaging to attract environmentally friendly consumers and healthcare professionals.

I. Blockchain for Transparency

- Supply Chain Transparency: Blockchain technology can contribute significantly towards pharma marketing by making drug manufacturing and distribution processes transparent, minimizing the chances of counterfeit drugs. Marketing can emphasize these steps to establish consumer and healthcare professional confidence.

- *Drug Profile :*

Drug Profile: Azithromycin
Generic Name: Azithromycin
Brand Names: Zithromax, Zmax, Azithro, and others
Drug Class: Macrolide Antibiotic
Therapeutic Class: Antibiotic
FDA Approval: 1991

- *Mechanism of Action*

Azithromycin acts by binding to the 50S bacterial ribosomal subunit and inhibiting the synthesis of protein. This disrupts the proliferation of the bacteria and their cause of infection. It is highly active against Gram-positive and Gram-negative bacteria as well as certain atypical agents such as Chlamydia, Mycoplasma, and Legionella.

- *Indications*

Azithromycin has a broad variety of infections against which it can be used for treatment, some of which are:
• **Respiratory tract infections**: Such as pneumonia, bronchitis, and sinusitis.
•**Soft tissue and skin infections:** Frequently due to Streptococcus or Staphylococcus species.
•**Sexually transmitted diseases (STIs):** Especially for Chlamydia trachomatis and in combination with other drugs for gonorrhea.
•**Ear infections:** Otitis media, particularly in children.
•**Gastrointestinal infections**: For instance, infections due to Campylobacter jejuni.
•**Prophylaxis:** In HIV patients or individuals at risk of Mycobacterium avium complex infections.

- *Pharmacokinetics*

One of the most important advantages of azithromycin is its half-life, which is long enough to permit a shortened course of therapy. Azithromycin is well absorbed by mouth, and its tissue penetration is very good, i.e., it can accumulate within tissues and permit once-daily dosing. Following administration, azithromycin achieves high levels within tissues and cells, including in the respiratory tract, which is responsible for its efficacy in respiratory infections.

- *Efficacy*

Azithromycin has been shown to be very effective against many of the more common infections. Its once-daily dosing and fairly brief duration of therapy (3 to 5 days for all but the most serious indications) make it an easy choice for both patients and providers. Azithromycin's broad-spectrum coverage enables it to be employed empirically when the exact causative pathogen is not known.

Though, its effectiveness is undermined by bacterial resistance, particularly with misuse or excessive use of antibiotics. Azithromycin resistance, for instance, has been reported, especially among Streptococcus pneumoniae, Haemophilus influenzae, and some Neisseria gonorrhoeae strains. The emerging patterns of resistance pose a concern to sustaining its long-term efficacy.

- *Side Effects*

Azithromycin is usually well tolerated. Nonetheless, like all drugs, it has the potential to result in side effects, such as:
•**Gastrointestinal complaints:** Diarrhea, nausea, abdominal cramps, and vomiting are the most frequent side effects.
•**Cardiovascular complications:** Azithromycin is linked with a minimal risk of QT interval prolongation, potentially causing arrhythmias, particularly in patients who have pre-existing heart disease or when coadministered with other drugs prolonging the QT interval.
•**Allergic reactions:** Rashes, itching, or swelling may take place in some patients.
• **Hepatotoxicity:** Although unusual, abnormalities of liver enzymes and jaundice can occur.

- *Drug Interactions*

Azithromycin itself has few drug interactions, although it will interact with drugs affecting cardiac rhythm, especially those prolonging the QT interval. Be cautious when using it with:
• Antiarrhythmic drugs (e.g., amiodarone, sotalol)
• Specific antidepressants (e.g., citalopram, escitalopram)
• Antifungals (, fluconazole)

- *Special Considerations*

- **Pregnancy and Breastfeeding:** Azithromycin is generally safe to be used during pregnancy, especially during the second and third trimesters. It is also secreted

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into breast milk in minimal quantities, but the risk to a lactating infant is deemed low.

- **Renal and Hepatic Impairment:** In patients with liver impairment, azithromycin should be used with caution because of the possibility of drug accumulation in the body.
- **Resistance Issues:** The development of resistance, particularly among prevalent respiratory pathogens, indicates the need to use azithromycin cautiously and only when a healthcare professional prescribes it following proper diagnostic assessment.

IV. FUTURE PROSPECTIVE OF AZITHROMYCIN :

The future of azithromycin is determined by a number of factors, such as changing medical requirements, the creation of new therapeutic uses, and possible challenges like antibiotic resistance. The following are some of the most important points that can determine the future of azithromycin:

A. Wider Therapeutic Uses

- **Chronic Respiratory Diseases:** Azithromycin has also been investigated for its possible application in chronic respiratory diseases such as chronic obstructive pulmonary disease (COPD) and cystic fibrosis. Its anti-inflammatory action, as well as its antibacterial activity, could potentially treat these diseases by preventing exacerbations and enhancing lung function.
- **Tuberculosis (TB):** Azithromycin is being investigated as part of combination therapies for drug-resistant tuberculosis (TB). Its role in TB treatment, especially against strains resistant to traditional first-line antibiotics, could expand.
- **COVID-19 and Other Viral Infections**: Although azithromycin was investigated as a therapeutic agent in COVID-19 at the onset of the pandemic (although its effectiveness was primarily unresearched), there still could be utility for it in combination therapy or in treating post-viral infections.
- **Malaria:** Azithromycin is also under investigation as a component of combination regimens for malaria in areas where drug resistance is high. It could be an option or an additive therapy in the treatment of malaria.

B. Antibiotic Stewardship and Resistance

- **Antibiotic Resistance:** The rise of antibiotic resistance remains a major concern for all antibiotics, including azithromycin. Overuse and misuse in both human and veterinary medicine have led to macrolide resistance in some bacterial strains. In the future, azithromycin's role in the fight against infections will depend on efforts to maintain its efficacy, including more stringent antibiotic stewardship and improved diagnostics to ensure proper use.
- **Alternative Formulations:** To minimize resistance, the drug industry could try new formulations or combinations of azithromycin with other antibiotics or adjuvants that would make it more effective and avoid resistance formation.

C. Formulation and Drug Delivery Innovations

- **Long-Acting Formulations:** Long-acting injectable or extended-release forms of azithromycin may enhance patient compliance, especially among patients with chronic infections such as COPD or chronic sinusitis. This would enable less frequent dosing and better infection control.
- **Targeted Drug Delivery:** New developments in drug delivery systems, e.g., nanotechnology or liposomal formulations, might allow azithromycin to be delivered directly to the infection site, enhancing its effectiveness at the expense of fewer side effects.

D. Enhanced Combination Therapies

- **Use in Combination with Other Antibiotics**: Azithromycin might be used together with new or current antibiotics to treat multi-drug resistant infections. Beta-lactam, fluoroquinolone, or tetracycline combinations might increase the broad-spectrum antibacterial activity and avoid or counteract resistance.
- **Adjunctive Therapies:** Azithromycin might continue to find use as part of multi-drug therapy in certain infections, like HIV (to prevent opportunistic infection) or eradication of H. pylori, enhancing the global treatment outcome.

E. Accessibility and Global Health

- **Global Availability in Low-Resource Environments:** Azithromycin's relatively low price and well-documented safety profile make it a crucial antibiotic in most low- and middle-income nations. It is one of the drugs of choice in the treatment of sexually transmitted diseases (STIs), pneumonia, and diarrheal diseases, especially where healthcare access is poor. Global initiatives to increase access to azithromycin in poor communities could be central to its ongoing use worldwide.
- **Mass Drug Administration (MDA):** Azithromycin has been utilized in large-scale Mass Drug Administration (MDA) campaigns to treat diseases such as trachoma and lymphatic filariasis. Future MDA campaigns can further utilize azithromycin as a component of global efforts for neglected tropical diseases (NTDs).

F. Emphasis on Anti-Inflammatory Properties

- **Non-Antibiotic Applications:** In addition to its antibiotic use, azithromycin's anti-inflammatory activity could give rise to new indications. This includes its potential application in autoimmune diseases, inflammatory bowel disease (IBD), and other diseases where inflammation is a key factor in disease progression. Its immune-modulating activity may expand its therapeutic use beyond classical bacterial infections.

G. Regulatory and Policy Changes

- Tighter Controls Over Antibiotic Usage: Increased concerns regarding antibiotic resistance could bring more stringent controls around the use of azithromycin

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and other antibiotics. This might lead to more targeted prescribing habits and enhanced stewardship in order to protect the future use of azithromycin.

- **Global Health Policies:** Efforts by organizations such as the World Health Organization and Centers for Disease Control and Prevention to fight antimicrobial resistance (AMR) will continue to influence the use and regulation of antibiotics, including azithromycin, across the globe.

H. Pharmacovigilance and Post-Marketing Surveillance

- **Long-Term Use Monitoring**: As azithromycin remains so commonly prescribed, especially for chronic diseases, long-term safety monitoring and pharmacovigilance will be important. New adverse effects or interactions can occur, and regulatory agencies will continue to monitor and resolve these concerns.
- **Patient-Centered Care:** Greater focus can be put on tracking adherence and patient outcomes in the real world and assisting treatment protocols and overall effectiveness of azithromycin as an infection treatment.

V. CONCLUSION

The future of azithromycin is bright, with research continuing to investigate new therapeutic uses, enhanced formulations, and combinations with other drugs. But challenges like antibiotic resistance and the changing regulatory environment will need to be managed carefully to maintain its effectiveness. Through personalized therapy, increased indications, and worldwide availability, azithromycin can continue to play a important role in the treatment of infectious diseases globally for many years to come.

REFERENCES

[1]. Panpanich R, Lerttrakarnnon P. Azithromycin for acute lower respiratory tract infections [M]// The Cochrane Library. John Wiley & Sons, Ltd, 2000: CD001954. [Google Scholar]

[2]. Hicks LA, Taylor TH, Hunkler RJ. U.S. outpatient antibiotic prescribing, 2010. N Engl J Med Overseas Ed 2013;368:1461–10.1056/NEJMc1212055 [DOI] [PubMed] [Google Scholar]

[3]. Clavenna A, Bonati M. Differences in antibiotic prescribing in paediatric outpatients. Arch Dis Child 2011;96:590–5. 10.1136/adc.2010.183541 [DOI] [PubMed] [Google Scholar]

[4]. Franchi C, Sequi M, Bonati M, et al. Differences in outpatient antibiotic prescription in Italy's Lombardy region. Infection 2011;39:299–308. 10.1007/s15010-011-0129-1 [DOI] [PubMed] [Google Scholar]

[5]. Grijalva CG, Nuorti JP, Griffin MR. Antibiotic prescription rates for acute respiratory tract infections in US ambulatory settings. JAMA 2009;302:758–66. 10.1001/jama.2009.1163 [DOI] [PMC free article] [PubMed] [Google Scholar]

[6]. Langtry HD, Azithromycin BJA. A review of its use in paediatric infectious diseases. Drugs 1998;56:273–97. [DOI] [PubMed] [Google Scholar]

[7]. Solomon AW, World Health Organization,, International Trachoma Initiative . Trachoma control: a guide for programme managers, 2006. [Google Scholar]

[8]. Porco TC, Gebre T, Ayele B, et al. Effect of mass distribution of azithromycin for trachoma control on overall mortality in Ethiopian children. JAMA 2009;302:962–8. 10.1001/jama.2009.1266 [DOI] [PubMed] [Google Scholar]

[9]. Keenan JD, Ayele B, Gebre T, et al. Childhood mortality in a cohort treated with mass azithromycin for trachoma. Clinical Infectious Diseases 2011;52:883–8. 10.1093/cid/cir069 [DOI] [PMC free article] [PubMed] [Google Scholar]

[10]. Keenan JD, Bailey RL, West SK, et al. Azithromycin to reduce childhood mortality in sub-Saharan Africa. N Engl J Med 2018;378:1583–92. 10.1056/NEJMoa1715474 [DOI] [PMC free article] [PubMed] [Google Scholar]

[11]. The UPPSALA monitoring centre The use of the WHO-UMC system for standardized case causality assessment.
Available: http://www.who.int/medicines/areas/quality_safety/safety_efficacy/WHOcausality_assessment.pdf [Accessed 05 Oct 2018].

[12]. Joint Formulary Committee British National formulary. London: BMJ Group and Pharmaceutical Press, 2018. [Google Scholar]

[13]. Medicine and healthcare products regulatory agency Azithromycin 500 Mg powder for infusion. Available: http://www.mhra.gov.uk [Accessed 05 Oct 2018].

[14]. Juurlink DN. The cardiovascular safety of azithromycin. CMAJ 2014;186:1127–8. 10.1503/cmaj.140572 [DOI] [PMC free article] [PubMed] [Google Scholar]

[15]. Ray WA, Murray KT, Hall K, et al. Azithromycin and the risk of cardiovascular death. N Engl J Med 2012;366:1881–90. 10.1056/NEJMoa1003833 [DOI] [PMC free article] [PubMed] [Google Scholar]

[16]. Svanström H, Pasternak B, Hviid A. Use of azithromycin and death from cardiovascular causes. N Engl J Med 2013;368:1704–12. 10.1056/NEJMoa1300799 [DOI] [PubMed] [Google Scholar]

[17]. Choi Y, Lim H-S, Chung D, et al. Risk evaluation of Azithromycin-Induced QT prolongation in real-world practice. Biomed Res Int 2018;2018:1–8. 10.1155/2018/1574806 [DOI] [PMC free article] [PubMed] [Google Scholar]

[18]. Anon Azithromycin: pyloric stenosis in neonates [J]. Prescribe International 2016;25. [PubMed] [Google Scholar]

[19]. Morrison W. Infantile hypertrophic pyloric stenosis in infants treated with azithromycin. Pediatr Infect Dis J 2007;26:186–8. 10.1097/01.inf.0000253063.87338.60 [DOI] [PubMed] [Google Scholar]

[20]. Eberly MD, Eide MB, Thompson JL, et al. Azithromycin in early infancy and pyloric stenosis. Pediatrics 2015;135:483–8. 10.1542/peds.2014-

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar1943

2026 [DOI] [PMC free article] [PubMed] [Google Scholar]
[21]. Friedman DS, Robinette Curtis C, Schauer SL, et al. Surveillance for transmission and antibiotic adverse events among neonates and adults exposed to a healthcare worker with pertussis. Infect Control Hosp Epidemiol 2004;25:967–73. 10.1086/502328 [DOI] [PubMed] [Google Scholar]
[22]. Smith C, Egunsola O, Choonara I, et al. Use and safety of azithromycin in neonates: a systematic review. BMJ Open 2015;5:e008194 10.1136/bmjopen-2015-008194 [DOI] [PMC free article] [PubMed] [Google Scholar]
[23]. Higgins J, Green S. Cochrane handbook for systematic reviews of interventions. Chi Chester, UK: The Cochrane Library, John Wiley &Sons, 2011. [Google Scholar]
[24]. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ 2009;339:b2535–35. 10.1136/bmj.b2535 [DOI] [PMC free article] [PubMed] [Google Scholar]
[25]. Cochrane bias method group Assessing risk of bias in included studies. Available: http://bmg.cochrane.org/assessing-risk-bias-includedstudies [Accessed 05 Oct 2018].
[26]. Wells GA, Shea B, O'Connell D, et al. The Newcastle-Ottawa scale (NOS) for assessing the quality if nonrandomized studies in meta analyses. Available: http://www.ohri.ca/programs/clinicalepidemiology/oxford.htm [Accessed 05 Oct 2018].
[27]. Joanna Briggs Institute reviewer's manual. Available: https://wiki.joannabriggs.org/display/MANUAL/Joanna+Briggs+Institute+Reviewer%27s+Manual [Accessed 05 Oct 2018].
[28]. The UPPSALA monitoring centre The use of the WHO-UMC system for standardized case causality assessment.. Available: http://who-umc.org/Graphics/24734.pdf [Accessed 05 Oct 2018].
[29]. Rothman KJ, Lanes S, Sacks ST. The reporting odds ratio and its advantages over the proportional reporting ratio. Pharmacoepidem. Drug Safe. 2004;13:519–23. 10.1002/pds.1001 [DOI] [PubMed] [Google Scholar]