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PRESCRIPTION RECORD REVIEW – FINAL REPORT

GUYANA SAFER INJECTION PROJECT

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PRESCRIPTION RECORD REVIEW – FINAL REPORT

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This report contains the final analysis and comparison of the baseline and follow-up studies undertaken through interviews, observations and record reviews led by John Snow, Inc., subcontractor to Initiatives Inc., pertaining to injection drug prescriptions in Guyana.

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EXECUTIVE SUMMARY

This document provides the final analysis of the Guyana Safer Injection Project Prescription Record Review (PRR) study undertaken over the period 2006-2008. The report includes analysis of the follow-up PRR, covering the period August 2007 – January 2008, comparison of baseline and follow-up injection prevalence, and evaluation of intervention efforts. Baseline data was collected and analyzed in 2007, with results presented in the PRR Baseline Report.

The Prescription Record Review (PRR) is a two-part study that collected data on actual prescriptions from out-patient department patient records in an effort to establish pre- and post intervention prescription trends at selected study public hospitals in Guyana. The pre-/post intervention assessment design allows GSIP to measure the effectiveness of health-worker training and other project activities in reducing the overall proportion of prescriptions that include injectable medications. The pre-intervention assessment, completed in June 2007, established existing prescribing patterns and injection prevalence in Guyana during the period August 2006-January 2007.

Based on these baseline study results, GSIP and the Guyana Ministry of Health designed and implemented a range of safer injection training activities at West Demerara Hospital with the specific goal of reducing unnecessary injections. Using a comprehensive team approach, intervention efforts targeted health workers across disciplines as well as patient advocates working together to support the goal of safer and rational injections. Key training themes included rational drug use education, expansion of patient counselling to improve prescription adherence, and reduction of patient demand for injectables through patient education and awareness.

Following interventions, data was collected at West Demerara Hospital using the same methods, procedures and calendar months employed in the baseline study period. The baseline study phase also sampled cases from Bartica Hospital; however due to the extremely modest prevalence of OPD injections per patient and therefore minimal opportunity to show change through program interventions, this facility was not included in the follow-up study. Three hundred records were sampled at West Demerara for the follow-up study period.

The main findings from the PRR follow-up sample:

- Sampled patient case records yielded a total of 1,047 prescriptions over the six month study period. Of these 83 medications were injectable, comprising 8% of total prescriptions.
- Sixty-three cases sampled (21%) were prescribed at least one injectable medication. Within this group, an average of 1.3 injectable medications was prescribed per patient.
- The overall percentage of cases receiving at least one injectable medication was very similar by gender, at about 20% of females and 22% of males.

- Analysis of cases by single diagnosis (70% of cases) and by diagnostic grouping (100% of cases) highlights conditions and symptoms for which injectables were prescribed but may not always be necessary: back/body/limb pain/ache, diarrhea or dehydration (uncomplicated), respiratory infections, skin lesions, and skin rash.

The follow-up PRR also employed a review of pharmaceutical stock records for prescribed medications in an effort to ascertain the impact of stock-outs on prescribing practices. This part of the study was limited by the non-availability of written pharmacy stock records because the pharmacy was understaffed during five out of six follow-up study months. Results suggest quite a few drugs were completely stocked-out at the hospital during the follow-up study months, including pariton (injectable and non-injectable forms), primaquine (non-injectable), ampicillin (non-injectable), and chloroquine (non-injectable) (see Appendix 7 for full listing). Several others showed shorter stock-out periods, from 1-3 months. For the conditions where ‘unnecessary’ injections were prescribed, alternative non-injectable formulations were generally found to be in stock and available during study period months. This finding points away from stock status as a prominent factor influencing the choice of injectable medications.

As in the baseline, the follow-up PRR included an interview designed to capture information about how and why prescribers make choices to prescribe injectable or non-injectable formulations when treating patients. Interview responses indicate that respondents perceive a low number of injectable medications prescribed at the hospitals where they work, and that the choice to prescribe injectable medications depends on the specific factors of each patient’s case, especially severity. Similar to the baseline, all respondents reported experience with patients who request injections, but most claimed they do not take such requests into consideration when making prescribing decisions. In terms of factors that encourage doctors to prescribe injections, respondents noted stock-outs of oral medications, patient demand for injections, belief that patients will not complete an oral regimen and preference for giving an injectable ‘stat’ dose at the facility that should be followed by an oral regimen.

After completing analysis of the follow-up data, pre-intervention and post-intervention results were compared to assess the impact of prescriber training towards reducing the prevalence of unnecessary injections. The main results are summarized below.

- Proportion of cases receiving one or more injections declined from 29% at baseline to 21%* at follow-up (see Table 15).
- Decline from 11% to 8%* in proportion of total prescriptions issued in injectable formulation (see Table 15).
- The prevalence of unnecessary injections declined from 34% at baseline to 30% at follow-up* (see Table 17).

* Statistically significant difference at the 0.05 level ($p < 0.001$)

- Use of injections to treat ‘Body/back/limb ache/pain’ cases declined from 41% at baseline to 11% at follow-up. Change was seen in other diagnostic groups, but the small sample size prevents further comment. See Table 18 for more details.

Based on the results presented, we can cautiously conclude that there has been some post-intervention behavior change. The statistically significant decline in patient cases receiving injections, prevalence of injectable prescriptions and prevalence of unnecessary injections suggests that exposure to rational drug use interventions has resulted in behavior change at West Demerara Hospital. Unnecessary injections, in particular, declined; these were precisely the injections targeted by the interventions because they can be treated with an equally effective oral prescription.

At the same time, with the post-intervention prevalence of unnecessary injections at 30% there is room for continued improvement. Maintaining the gains achieved by GSIP interventions and making further improvements cannot be taken for granted. .

Recommendations:

The findings from the study indicate that the emphasis placed on the following interventions had a positive effect on the results:

- Training prescribers on the risk and practice of rational injection use increases understanding and cogent prescription decisions. The Ministry should consider working with the medical schools to include this training in their curricula and with the medical associations to ensure annual or bi-annual updates on standard treatment guidelines.
- Finalizing the standard treatment guidelines, ensuring they include, where appropriate, non-injectables as the first line of treatment and instituting a process for monitoring rational drug use at outpatient departments would favorably impact the process.
- The training on and the formulary job aid tool was considered helpful by the prescribers in identifying the conditions and treatment which have equally efficacious oral treatments. The Ministry of Health could consider expanding the contents of the tool to include additional conditions and broadening its distribution
- The study and training discussions identified conditions for which appropriate oral treatments were either not on the essential drug list or out of stock. The impending national standard treatment guidelines should be used to develop a coherent list of non-injectables and, especially for hospitals, daily updates on available essential medications should be disseminated to prescribers
- Training of pharmacist and pharmacy assistants in prescription adherence counseling was valuable in providing guidance to patients about the key details on dosage instructions and recognizing and handling potential side effects. The Ministry should consider incorporating the training into pharmacy and pharmacy assistant programs, training pharmacists on supervision practices, reviewing patient flow to reduce waiting time and increase quality of care and scaling up the dissemination of the pharmacist assistant job aid.

ACRONYMS AND ABBREVIATIONS

BCC	Behavior Change Communication
FJA	Formulary Job Aid
GSIP	Guyana Safer Injection Project
MOH	Ministry of Health
OPD	Out-Patient Department
ORS	Oral Rehydration Salts
PRR	Prescription Record Review
RDU	Rational Drug Use
WDH	West Demerara Hospital

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1. INTRODUCTION

The Prescription Record Review (PRR) study was designed as a two-part cross-sectional study to determine prescribing patterns (baseline) and to measure the effectiveness of the training and other project activities in reducing the overall proportion of prescriptions that include injectable medications (follow-up). The assessment was divided into two phases. First, data was collected from prescriptions recorded in outpatient registers in two large hospitals during a baseline study period, prior to focused interventions at the study facilities. Second, similar data was collected during a follow-up study period after these interventions were implemented. This study design permits the Guyana Safer Injection Project (GSIP) and the Guyana Ministry of Health (MOH) to identify strengths and weaknesses in training and other project activities, as well as external factors, and to develop recommendations.

This document reports the findings from the follow-up phase of the PRR study, compares the follow-up results to the baseline study findings, and evaluates safer injection intervention efforts. Patient and stock records were collected retroactively in February 2008 for the study period August 2007 – January 2008.

2. STUDY OVERVIEW AND OBJECTIVES

The follow-up PRR study is phase two of a two-part review of patient prescription records. It was implemented one year after the baseline phase of the prescription record review and after interventions with prescribers had begun. The PRR study protocol called for interventions to be completed prior to the follow-up phase of the PRR in order to ascertain the impact of interventions. However, after the follow-up phase had begun it was determined that additional interventions with prescribers at West Demerara Hospital were needed. These were completed in October 2007, and so the intervention and follow-up segments of the PRR overlap by three months. Follow-up data was collected during the same calendar months as the baseline data collection in order to control for any seasonality effects. Furthermore, data was collected using the same protocol, tools, and one of two facilities at follow-up, so that each facility served as its own control.

The PRR study was designed to achieve the following primary objectives:

1. Compare the prevalence of curative injections pre-intervention versus post-intervention across all cases and for specific diagnostic groups which are common enough to have quantifiable results;
2. Ascertain the extent to which stock-outs of non-injectable medication alternatives, injectable medications or injection devices may affect the increase or decrease in use of injections.

3. METHODS

3.1 Sentinel Sites

West Demerara Hospital and Bartica Hospital were originally selected as sentinel sites as a convenience sample in order to ensure that the following basic criteria for facility selection were respected:

- 1) Willingness of senior facility management to participate by facilitating or permitting data collection in their facility.
- 2) Presence of an outpatient department or area at the facility that generates at least 300 cases over a 6 month period so that the quantitative requirements of this study could be met
- 3) Willingness and availability of facility staff to assist with data collection in each study period (baseline and follow-up).
- 4) Timing of interventions. Training and other interventions of interest should be planned at the facilities, but those activities should not have begun. Interventions should start after the baseline study period is complete and be completed by the start of the follow-up study period.
- 5) Feasibility of using existing outpatient records for both baseline and follow-up studies.
- 6) Availability of stock room records to obtain information on stock-outs of key medications and injection device with dates of those stock-outs, if any.
- 7) Quality of patient records and stock room registers sufficient for collecting necessary data. Records must be legible and include specific dates.

GSIP recognized that use of these criteria had the potential to introduce selection bias, but this was considered a reasonable limitation of this study given that each selected facility served as its own control over time, and that the objective was to assess whether the GSIP interventions were effective in these facilities.

In this study, only Outpatient Department (OPD) records in the selected hospitals were reviewed. The purpose of this selection criterion was to minimize the complexities inherent in analyzing cases admitted for inpatient care that might have required injectable medications for reasons that would not necessarily be fully documented in the patient registration records. In using only outpatient records, it was assumed that the cases would be less complex (since patients with severe illness would be likely to be referred for admission immediately rather than being treated in the outpatient department). This was expected to facilitate the analysis as to which injections were medically necessary.

Follow-up site selection

The original study protocol called for baseline and follow-up data collection to be carried out at both study facilities, with interventions conducted at both facilities between PRR

study phases. Based on the results of the baseline PRR, it was determined that use of injections at Bartica Hospital was sufficiently low as to allow little room for change through interventions. For this reason interventions and follow-up data collection were implemented at West Demerara Hospital only. Interventions, follow-up results and comparisons reported here are in respect to West Demerara Hospital only.

3.2 Sample Design

The total number of records to review was calculated as 300 per study period per facility, as shown in Table 1. The table reflects the omission of Bartica Hospital from the follow-up phase of data collection.

Table 1: Sample Design

Facility name	Baseline desired sample size	Follow-up desired sample size	Total
Bartica Hospital	300		300
West Demerara Hospital	300	300	600
Total	600	300	900

This sample size was based on the estimated number of cases needed to assess a low level of injection prevalence among 100 outpatient cases, multiplied by a factor of 3 in order to account for the number of facilities and analyze the results by sex of patient (male or female), and type of prescriber (physician or MEDEX) for each facility with a minimal margin of error. Additional analysis by age groups and/or specific common diseases or disease groups, was also performed across the overall sample of all facilities participating in this study. Collecting 300 cases per facility, for a total 600 cases for the study period, permits statistical testing at 95% confidence level or greater as well as permitting testing of changes over time across all cases.

In accordance with the PRR study protocol, the follow-up study was conducted during the same months as the baseline PRR (August-January) in order to control for seasonality effects. Records were sampled evenly from each of the six months in the designated study period from August 2007 to January 2008. The data collector reviewed the outpatient registers to count the total number of cases recorded for a given month. The data collector divided this number by the number of cases needed per month (i.e. 50) to determine the sampling interval. Using a random number starting point, the data collector then systematically selected the cases to be extracted and reviewed.¹ If a patient case was missing required information, the next case in the register was extracted and the interval started again from that record. This process was repeated for each month in the six month period to complete the sample of 300 cases required.

¹ Systematic selection rather than random selection is being used to ensure that the cases are spread across the entire month and to minimize sampling error since the cases are recorded in the outpatient department registers in a list.

3.3 Patient Data Collection

Once 300 patient visits for the study period were identified at each facility, the patient ID# was used to locate the full record of the patient visit corresponding to the case date identified. (This number was used only for the purposes of finding the complementary data in the full record and was not recorded in the study dataset.) The following variables were abstracted from the patient record for entry into the study dataset:

- Day, month and year of patient visit
- Gender
- Age
- Primary diagnosis²
- All secondary diagnoses (if available)
- Names of all medications used for treatment/prescription (with each to be listed separately in the dataset in the order in which they appeared in the prescription register)
- Whether each medication listed was prescribed in an injectable or non-injectable preparation³
- Number of *pricks*, or separate injectable doses, per prescription of injectable medication (this information was not recorded in some patient records at the two study hospitals, in which case one injection was assumed for each injectable medication prescribed)⁴
- Job title of prescriber

Patient confidentiality was maintained through the use of local hospital staff as facilitators. At West Demerara Hospital, patient record cards, which contain patient names, were only viewed by records department staff that have routine access to such information. Patient names were removed from the records prior to being released to the GSIP data collector. In addition, GSIP and local health facility staff assisting with patient data collection signed a confidentiality agreement prior to the start of data collection, all of which were filed at the GSIP office.

During patient data collection, an effort was made to avoid incomplete records. An incomplete record was defined as a record containing neither a diagnosis nor a prescription, and lacking any notation as to actions taken, such as admission to ward or transfer. West Demerara records staff explained that this happens when a patient signs in for an appointment but leaves before seeing the doctor. It may also reflect oversight on the part of the prescriber (e.g. during times of high patient volume). In such cases, the next available complete record was selected as a replacement, and was noted as a

² For each case, the diagnoses were recorded in the database using a prepared listing based on the field test of this activity. Cases with a diagnosis which did not fit one of the pre-established diagnoses in the listing were reviewed and coded by the local consultant and project staff with a medical background.

³ It should be noted that it was not possible to tell from the prescription record if any substitutions were made at the time the prescription was filled. This data collection was intended to assess the prescription pattern itself, not the actual pattern of compliance or consumption by patients.

⁴ In some countries, a patient may receive multiple injections as part of the same prescription to treat a particular condition.

replacement record in the comments section. Records containing either a diagnosis or a prescription, but not both, were accepted as eligible records. The baseline study period analyzed 595 total records – 295 from Bartica Hospital and 300 from West Demerara Hospital. In the follow-up study phase, the full sample from West Demerara was 300 patient cases.

During baseline data collection, it was discovered that data on the number of pricks per prescription of injectable medication was limited. At West Demerara Hospital it was only recorded for some prescriptions at baseline, and it was not recorded during the follow-up phase. Consequently, the analysis that follows will focus on proportion of injectable medications rather than number of pricks administered.

3.4 Pharmaceutical and Supply Stock Data Collection

Through a combination of review of stock records and conversations with dispensary and stock room staff, data were collected on the availability of stock items during the period August 2007 – January 2008. Stock records for those medicines prescribed during the follow-up study period were examined to ascertain whether the medication was in or out of stock during each of the six months of the follow-up study period. Unlike the baseline study, the non-availability of written dispensary stock records at follow-up made it necessary to collect pharmaceutical stock data from drug bond purchase records. This was due to the dispensary being understaffed during the follow-up study period. For the baseline study phase a list was formulated of alternative medications and/or alternative formulations for all medications prescribed during the baseline study period. This list was also used in the follow-up phase.

The protocol also called for non-pharmaceutical supply data to be collected, which was completed at the baseline phase. However, no supply stock data was available at the follow-up phase. Consequently these data cannot be included in the baseline – follow-up comparison.

3.5 Data Entry and Analysis

Data entry and preliminary analysis were performed using the Microsoft Access database. The database was designed by John Snow Inc. and catalogued data separately by patient records, medical stock records and supply stock records. The format of the database was developed for use across multiple countries, based on a version first employed in Uganda.

At West Demerara Hospital, data entry was done on site. Facility staff assisted by reading de-identified patient data out loud to the data collector, who entered information directly into the study database.

The analysis of this dataset was conducted according to the objectives and guidelines set forth in the PRR study protocol. The same analysis plan was used for both baseline and

follow-up data analysis for the purpose of comparison. The analysis plan included assessing the percent of all prescribed medications which were *prescribed in injectable formulations* and calculating *the percent of cases* which included one or more medications prescribed in injectable formulations. Since a given medication may be administered in multiple doses, each of which may entail a separate injection, the study protocol also called for an assessment of the number of *pricks*, or separate injectable doses, which were given to the patients in this study. As this information was not recorded in patient records, number of pricks was dropped from the analysis. Data on gender, age, and prescriber type were also analyzed.

3.6 Prescriber Interviews

All prescribers working in the outpatient department at both study facilities were invited to participate in a brief qualitative interview. An informational recruitment letter was presented to all candidates to introduce them to the GSIP PRR study and explain the interview requirements. The letter further explained the voluntary nature of the interview. For those who consented to participate, interviews were conducted in a private office. The interview consisted of 16 questions designed to capture information about how and why prescribers make their choices to prescribe injectable or non-injectable formulations when treating patients. See Appendix 1 for the interview questionnaire.

4. SUMMARY OF BASELINE STUDY RESULTS

Of the 595 patient records analyzed in the baseline study, 18 % (107 cases) received at least one injectable medication. This proportion was higher at West Demerara compared to Bartica Hospital, 29% versus 7%. Results are summarized in Table 2.

Table 2: Baseline cases prescribed one or more injectable medications by gender, facility and in aggregate

	Total patient cases	Patient cases with at least one injectable medication prescribed	% of cases with at least one injectable prescribed	Total patient cases	Patient cases with at least one injectable medication prescribed	% of cases with at least one injectable prescribed	Total patient cases	Patient cases with at least one injectable medication prescribed	% of cases with at least one injectable prescribed
	WDH			Bartica			Total		
Female	184	48	26%	158	13	8%	342	61	18%
Male	116	39	34%	137	7	5%	253	46	18%
Total	300	87	29%	295	20	7%	595	107	18%

From the 595 cases collected and analyzed, a total of 776 diagnoses were recorded. At Bartica Hospital and for all cases combined between the two facilities, ‘Hypertension’ was the most frequent diagnosis. At West Demerara Hospital, ‘Body/back/limb ache/pain’ was the most common and ‘Hypertension’ ranked third. At Bartica Hospital 733 medications were prescribed during the baseline study period, of which 28 were injectables. Thus 4% of prescriptions were in injectable formulation. Injectable

prescriptions did not vary by gender. At West Demerara 1065 prescriptions were issued during the baseline study period, of which 115 were injectable formulations. Thus 11% of the medications prescribed were injectable. Injection prevalence varied slightly by gender. Results are summarized in Table 3.

Table 3: Baseline prevalence of injectable prescriptions by gender, facility and in aggregate

	Total medications prescribed	Number of injectable medications prescribed	% of medications prescribed as injectable formulations	Total medications prescribed	Number of injectable medications prescribed	% of medications prescribed as injectable formulations	Total medications prescribed	Number of injectable medications prescribed	% of medications prescribed as injectable formulations
	WDH			Bartica			Total		
Female	667	65	10%	433	18	4%	1,100	83	8%
Male	398	50	13%	300	10	3%	698	60	9%
Total	1,065	115	11%	733	28	4%	1,798	143	8%

5. PRESCRIBER INTERVENTIONS AT WEST DEMERARA HOSPITAL

Due to the high prevalence of injections at West Demerara Hospital, the Guyana Safer Injection Project in conjunction with the Guyana Ministry of Health designed and implemented interventions at WDH prior to and during the follow-up study months. Using a team approach, intervention efforts targeted health workers across disciplines as well as patient advocates working together to support the goal of safer injections⁵, with tools and training tailored to each group's specific role. This multi-disciplinary team approach was formulated in response to baseline qualitative findings from physician interviews of high patient load, insufficient doctor-patient consultation time, and low trust in patient prescription adherence.

As the prescription issuer, physicians were a primary target for GSIP intervention efforts. Physicians first received training in rational drug use (RDU). RDU is defined as the appropriate choice of treatment taking into consideration the individual patient, diagnosis and cost to the patient and community. The aim of RDU education is to minimize cost and risk (including needle stick injuries and transmission of blood born disease) to patients, health care workers and the community through appropriate treatment. The prescriber training sessions focused on preventing the overuse of therapeutic injections by reviewing the advantages and disadvantages of injections vs. oral formulations, the circumstances under which injections are appropriate choice of treatment, and factors influencing the use of unnecessary injections. Most importantly prescribers were informed about available and effective oral medications that can easily be substituted for injectables.

To further support rational drug use in practice, physicians were issued with the GSIP-developed formulary job aid (FJA). The FJA is a resource intended to aid in prescribing

⁵ One of the first intervention efforts conducted by GSIP was a meeting with key management officials at WDH to address collaborations within the system (prescribers, providers, pharmacy, and registry).

the first line of drug treatment. It focuses on conditions identified from the baseline PRR where injections had been prescribed when non-injectables could have been used. For these select conditions, the FJA provides internationally accepted guidelines for first line treatment.

In addition to medical doctors, GSIP intervention efforts targeted pharmacists and pharmacy assistants to provide medication counseling to patients. The need for patient counseling was highlighted by the qualitative findings from the baseline PRR that doctors may choose injectable medications when they believe that patients will not adhere to an oral regimen. Providing patients with information and being sure that patients understand the information is critical to the success of oral treatment regimens. By providing patient counseling, pharmacists support both the patient, who may have a greater chance at a successful treatment outcome, and physicians, who may have higher confidence in a patient's ability to follow prescription instructions.

Intervention efforts directed at pharmacists consisted of two main elements, both intended to promote patient adherence⁶. First, like physicians, pharmacists were also issued a formulary job aid. The pharmacist's FJA is a simplified version of that used by prescribers, with key guidance to provide to patients. It provides information on the use, adverse effects, contra-indications, etc. of drugs and key advice to be given to the patient at point of service, for example how many times a day to take medication. In addition, GSIP trained pharmacists in the GATHER method. This represents Greet, Ask, Tell, Help, Explain and Return/Refer. The purpose of the acronym is to remind health workers of the key features of effective counselling: establish rapport, gather information from the patient, share information with the patient, and help the patient to make informed decisions.

Pharmacists and pharmacy assistants were trained immediately prior to the start of the follow-up PRR time period.⁷ Pharmacist training was followed up with on-the-job monitoring by GSIP staff through December 2007.

Additional GSIP intervention efforts focused on the role of the patient in achieving safer injections, specifically changing patient perceptions and reducing patient demand for injections. GSIP developed communication tools with two key patient messages: 1) oral formulations are as effective as injections; and 2) it is okay for patients to discuss treatment options with their physician and to request oral formulations. Nurses and other providers⁸ were trained in how to conduct patient education sessions using GSIP tools such as the tablet poster (Appendix 2). In addition, to promote community awareness a local NGO, RESLOCARE, was trained on key injection safety messages with emphasis

⁶ Intervention activities targeted at pharmacy staff were informed by exit interviews of hospital pharmacy clients and focus interviews with pharmacy staff

⁷ First training took place on July 31, 2007 and the second training on August 09, 2007, for only very minimal overlap with the study period.

⁸ Other providers include laboratory, dental care workers and MEDEX since they provide injections or deal with needles.

placed on helping patients talk to their doctors about the use of orals. These training activities took place during the follow-up study period.⁹

6. FOLLOW-UP STUDY RESULTS

6.1 Patient Data Results

At the end of data collection, the follow-up study database contained 300 patient records from West Demerara Hospital. According to the protocol guidelines, vaccinations and injectable contraceptives were to be disallowed from analysis. There were only two cases sampled at follow-up where these types of injections were prescribed, and both were retained for analysis because other medications were also prescribed.

From the 300 cases collected and analyzed, a total of 361 diagnoses were recorded. At West Demerara Hospital, 69 records listed two or more diagnoses (23% of cases) while 21 cases had no recorded diagnosis (7%). The most common diagnoses are recorded in Table 4. Fever was the most common diagnosis sampled during the follow-up period, followed by diabetes mellitus and hypertension. At this facility the top five diagnoses represented around one third of all sampled diagnoses. See Appendix 3 for a complete list of diagnoses.

Table 4: Follow-Up Results: Most common diagnoses at WDH

Diagnosis	Number of cases	Percent (N=361)
Fever	29	8%
Diabetes Mellitus	27	7%
Hypertension	27	7%
Respiratory Infection	25	7%
Vomiting	16	4%
Top 5 cumulative	124	34%

A total of 1,047 medicines were prescribed during the follow-up study period. West Demerara prescriptions comprised 83 injectables, or 8% of total prescriptions, as shown in Table 5 below. Of 300 sampled cases, 21% were prescribed one or more injectable medications, and of these cases, an average of 1.31 (83/63) injectable medications were prescribed per patient (Appendix 4).

The follow-up sample can be further described by patient characteristics. By gender, there were 166 female patients in the sample and 134 male cases; the proportion of males was 45%. The overall percentage of cases receiving at least one injectable medication was very similar by gender, at about 20% of females and 22% of males. Males received a greater number of prescribed injectables on average, at 10% compared to 7% for females. Table 5 below illustrates the follow-up results from West Demerara by gender.

⁹ Nurse/provider training took place on August 18-19, 2007 and NGO training took place on September 26, 2007.

Table 5: Follow-Up Results: Injectable prescriptions by gender

	Total patient cases	Patient cases with at least one injectable medication prescribed	Percentage of cases with at least one injectable prescribed	Total medications prescribed	Number of injectable medications prescribed	Percent injectables prescribed
Female	166	33	20%	616	42	7%
Male	134	30	22%	431	41	10%
TOTAL	300	63	21%	1,047	83	8%

When analyzed by age group, patient cases from the ‘6-15’ and ‘26-35’ age groups had the highest percentage with at least one injectable prescribed at 31% and 29% respectively. The ‘16-25’ and ‘56-65’ age groups were least likely to be prescribed an injection at West Demerara for the follow-up. See Table 6 for further information by age groups.

Table 6: Follow-Up: Frequency of injections by age group

Age group	Total patient cases	Patient cases with at least one injectable medication prescribed	Percentage of all cases with at least one injectable prescribed	Number of injectable medications prescribed
≤5	36	10	28%	10
6-15	32	10	31%	11
16-25	38	3	8%	4
26-35	38	11	29%	15
36-45	48	12	25%	18
46-55	46	9	20%	13
56-65	38	4	11%	6
>65	24	4	17%	6

Prescriptions from the follow-up cannot be examined by prescriber type because all prescribers working at West Demerara Hospital during the follow-up study period were doctors, none were MEDEX.

6.2 Injectable Prescriptions by Single Diagnosis

Prescriptions can be further examined by specific diagnoses, though the large range of conditions and symptoms extracted from the patient records yielded small sample sizes. For cases with multiple diagnoses (approximately 23% of the total sample), the data collected is not formatted to attribute prescriptions to a particular diagnosis. Therefore, injectable prescriptions may be listed under each diagnosis; that is to say they may be

counted more than once if taken together. To avoid these confounding effects, Table 7 first examines only those cases with a single diagnosis.

Table 7 shows more specific results using cases where only one diagnosis was recorded per case; the injectable medications prescribed can be entirely attributed to the listed diagnosis. For several diagnoses, there were cases that received an injection where it is usually not warranted according to standard international treatment guidelines. Results show 3 cases (14%) of ‘Respiratory infection’ where injections were prescribed¹⁰, though injectable medications are not normally required to treat this diagnosis. Similarly, ‘Abdominal pain’ rarely requires an injectable medication for treatment, yet 3 out of 4 total abdominal pain cases at follow-up had injections prescribed. Of 16 ‘Body/back/limb pain/ache’ cases, 2 were prescribed an injection where it may not have been required for treatment. This raises the question of possible overuse of injections for these diagnoses. ‘Headache’ and ‘Hypertension’ are also presented in Table 4; no injections were prescribed for either of these diagnoses by themselves, suggesting rational injection use is being employed in those cases. For cases with no diagnosis recorded, called ‘Signs or symptoms of illness undefined,’ only 10% were prescribed injections. As there is no indication of why an injection was prescribed, the study does not consider these injections to be reasonable.

Table 7: Follow-Up: Average injectables prescribed for single diagnosis cases

Diagnosis	Total singular diagnosis patient cases	Patient cases with at least one injectable medication prescribed	Percentage of cases with at least one injectable prescribed ^a
Abdominal Pain	4	3	[75%]
Abscess	6	0	[0%]
Asthma	5	2	[40%]
Body/back/limb pain/ache	16	2	[13%]
Cold or cough-no pneumonia	0	0	NA
Diabetes mellitus	11	3	[27%]
Diarrhea or dehydration, uncomplicated	3	2	[67%]
Headache or migraine	6	0	[0%]
Hypertension	6	0	[0%]
Laceration	8	1	[13%]
Malaria	1	0	[0%]
Respiratory infection	21	3	14%
Signs or symptoms of illness undefined	21	2	10%
Skin lesion	4	2	[50%]
Skin rash	6	2	[33%]
Trauma-accidents and injuries	20	4	20%
Urinary Tract Infection	8	0	[0%]
Vomiting	2	2	[100%]

^a Percentages in brackets are based on a sample of fewer than 20 cases.

¹⁰ Cases were treated with dimenhydrinate and seclophen injections.

6.3 Treatment of Cases with Multiple Diagnoses

The second stage of analysis by diagnosis was a three-part process. First, relevant conditions from across the entire study sample were categorized by whether or not they normally warrant a prescription for an injectable medication. Second, cases with multiple diagnoses were re-labeled into diagnostic groups based on this categorization and combined with the single diagnosis cases for further analysis. Finally, the total sample as represented by the diagnostic groups was analyzed according to whether cases received a prescription for an injection that was ‘reasonable’ or ‘unnecessary.’ This final step allowed the study to determine the prevalence of ‘unnecessary’ injections overall.

For the first part of this process in the absence of standard treatment guidelines, GSIP in-country personnel with a medical background categorized each condition collected over the follow-up period (where it had not already been obtained for the baseline) according to whether or not the condition would normally require an injectable medication for treatment in the context of Guyana (i.e. ‘yes,’ ‘no,’ ‘maybe,’ or ‘unknown’) as show in Appendix 5. These labels were added to the single diagnosis cases in the study database.

After looking at the single diagnosis cases by themselves, the second stage of analysis looked at the remaining 23% of cases with multiple diagnoses recorded. Because medications prescribed to persons with multiple diagnoses could not be attributed to one diagnosis in particular, diagnostic groupings were created for these cases. Using the ‘yes,’ ‘no,’ ‘maybe,’ or ‘unknown’ ranking described above, each multiple diagnosis case was labeled according to the likelihood that it would ever require an injection for treatment. Then, the entire sample was used for final analysis. Frequencies of the final diagnostic groups by facility can be found in Appendix 6.

The following results were found across the follow-up sample of cases. Of the 300 cases sampled at West Demerara Hospital during the PRR follow-up phase, 34% were classified as ‘yes,’ an injection was a reasonable prescription. Sixteen percent were classified as ‘maybe’ (i.e. an injection is reasonable in some cases, often based on severity), 43% were classified as ‘no,’ meaning an injection was not reasonable, and 7% were ‘unknown’ because the conditions recorded were too general to make a determination or there was no diagnosis or symptom recorded. See Table 8.

Table 8: Follow-Up: Classification of need for injectable medication for treatment,

Basic labels	Number of cases	Proportion of all cases	Second round of labeling	Proportion of all cases
‘Yes’	103	34%	“Reasonable”	50%
‘Maybe’	48	16%		
‘No’	127	43%	“Unnecessary”	50%
‘Unknown’	22	7%		
All cases	300	100%	All cases	100%

It was important for this analysis to classify sampled cases as either having been prescribed injections that were ‘unnecessary’ or ‘reasonable’ in order to determine whether rational use of injections was taking place. However, there were a large number of ‘maybe’ and ‘unknown’ cases that also needed to be categorized. For this analysis, the cases that were classified as ‘maybe’ were combined with the group classified as ‘yes’, since they *may have* warranted an injection, to create a group of 151 cases where the injection prescribed was ‘reasonable’. Cases where the reason for giving an injection was not documented in the patient record were called ‘unknown’ and were added to those classified as ‘no,’ since they were not considered to require an injection if there was not enough information on a specific diagnosis. This created a group of 149 cases where injections for treatment were considered to be ‘unnecessary.’

Once these cases were classified this way, they were reviewed in terms of whether or not the case received a prescription for injectable medication. Those cases in the ‘no’ group that were prescribed an injectable medication were considered to have been prescribed an injection that was ‘unnecessary.’ The prevalence of these cases at West Demerara Hospital for the follow-up study period was 30%, or 19 out of 63 cases prescribed at least one injectable medication following the analytical procedure described above. Out of the entire sample of 300 cases, 6% received an ‘unnecessary’ injection. See Table 9 below for details.

Table 9: Follow-Up: Prevalence of ‘unnecessary’ injections

Hospital	Cases with at least one injection prescribed	Cases receiving ‘unnecessary’ injections	Proportion of cases with at least one ‘unnecessary’ injection prescribed
West Demerara	63	19	30%

There were several conditions that had more than one case with ‘unnecessary’ injectable prescriptions. These included ‘back/body/limb pain/ache,’ ‘diarrhea or dehydration (uncomplicated),’ ‘respiratory infections,’ ‘skin lesions,’ and ‘skin rash.’ However, sample sizes by conditions were very small at follow-up and the percentage of cases with unnecessary injections in each of these groups was generally low. ‘Skin lesion’ cases stand out as those that may require attention in terms of rational injection use, half of the 4 cases received prescriptions for injectable medication that were probably not necessary. Also, several cases of ‘diarrhea or dehydration (uncomplicated)’ were treated with an injection but could have been treated with oral rehydration salts (ORS) or another non-injectable alternative. See Table 10 below for details of ‘unnecessary’ injections by condition.

Table 10: Follow-Up: ‘Unnecessary’ injections by diagnostic group

Diagnostic group^a	Number of cases	Cases with unnecessary injection prescribed	%^b
Back/body/limb pain/ache	19	2	[11%]
Diarrhea or dehydration (uncomplicated)	3	2	[67%]
Respiratory infections	21	3	14%
Skin lesions	4	2	[50%]
Skin rash	6	2	[33%]
Signs and symptoms of illness undefined	21	2	10%
TOTAL	74	13	

^a Table displays only those diagnostic groups found to have more than 1 unnecessary injection.

^b Percentages in this table that are in brackets are based on a sample of fewer than 20 cases.

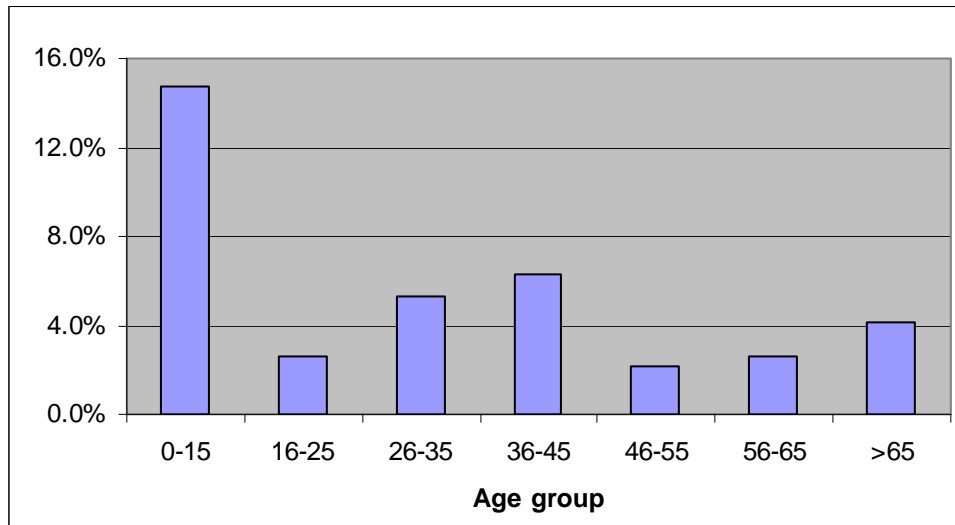
Unlike the baseline, sampled cases of ‘headache or migraine’ at follow-up were not treated with injections suggesting some improvement in patterns of rational injection prescribing for this diagnosis. Compared to the baseline, the prevalence of ‘back/body/limb pain/ache’ cases with injections prescribed seems to be lower at follow-up, as well. For all other conditions, sample sizes where an injection was prescribed but considered ‘unnecessary’ were too small to consider individually. This stage of analysis reinforced conclusions drawn from the analysis of single cases that the diagnoses of ‘back/body/limb pain/ache,’ ‘diarrhea or dehydration (uncomplicated),’ ‘respiratory infections,’ ‘skin lesions,’ and ‘skin rash’ are conditions for which unnecessary injections could be reduced at this particular hospital in Guyana (see Table 7)¹¹.

After creating a definition for ‘unnecessary’ injections, this study looked at those injections again by gender, age group and prescriber variables. At West Demerara there was still no significant difference between ‘unnecessary’ injections prescribed to men versus women.

Overall, the age range with the highest proportion of ‘unnecessary’ injections prescribed at West Demerara was patients between 0-15 years old, as shown in Figure 1. In the group aged 0-5, the proportion of cases sampled with ‘unnecessary’ injections prescribed was 14%. For those 6-15 years old, the prevalence was 16%. Unnecessary injections in these age groups were prescribed for a variety of diagnoses, including diarrhea/dehydration and respiratory infection, which were treated with dimenhydrinate and sclophen injections.

¹¹ Respiratory infection cases received dimenhydrinate and gravol injections. Skin condition cases were treated with pariton, sclophen and hydrocortisone succinate injections

Figure 1: Follow-Up: Percent of patients receiving an unnecessary injection by age group



6.4 Pharmaceutical Stock Data Results

Medications prescribed to sample patients during the follow-up period were classified by how long they were out of stock over the 6 months of the study period. Sixty-eight percent of prescribed medications (78 out of 114) were in stock all 6 months of the follow-up study period, while the percent available 3 months or more was slightly higher at 82% (93 out of 114). Details of stock availability for different types of drugs are shown in Table 11 below. The list of medications prescribed at each facility and the stock availability of each item can be found in Appendix 7.

Table 11: Follow-Up: Pharmaceutical stock availability

	Frequency of medicines that were...				Total
	In stock all months	In stock at least 3 months	In stock less than 3 months	Record missing ^a	
Injectables	22	1	2	0	25
Non-injectables	56	14	12	7	89
Total	78	15	14	7	114

^aRecord missing for 4 months or more of baseline study period.

A list of alternative medications was not formulated for all prescribed medications as it was in the baseline PRR so pharmacy stock information is limited to those medications prescribed to sampled cases. Using information about alternative treatments from the baseline analysis some insights can be ascertained; of all 83 injectable medications prescribed over the sample period, slightly more than half (53%) had a known non-injectable alternative in stock at the time they were prescribed. In fact, looking at the prescribing pattern from the patient records, patients were commonly given an injectable

‘stat’ dose of a medication at the hospital and then a prescription for the same medication in non-injectable form as follow-up treatment. Of the 83 injectable medications prescribed, 27 (33%) had either no non-injectable alternative or no non-injectable alternative in stock, and 12 (14%) could not be determined because a non-injectable alternative (if any) was not known. See Table 12 below.

Table 12: Follow-Up: Alternative non-injectable medication stock availability

	Number of injectable medications prescribed	% of total injectable medications prescribed
Non-injectable alternative was in stock	44	53%
No alternative to injectable medication or no alternative in stock	27	33%
Unknown	12	14%

For those conditions where injectable medications were prescribed but not warranted (i.e. ‘unnecessary’ injections), information was reviewed on stock outs of alternative medications of a different formulation type (i.e. non-injectable) to see if supply of those alternatives had any effect on why an injectable medication was prescribed. GSIP in-country staff provided information on the names of acceptable alternatives to injectable drugs to treat conditions for which unnecessary injections were prescribed. The following are listed in this report because they were the only conditions at follow-up for which more than one case was prescribed an ‘unnecessary’ injection: ‘back/body/limb pain/ache,’ ‘diarrhea or dehydration (uncomplicated),’ ‘respiratory infections,’ ‘skin lesions,’ and ‘skin rash.’

For ‘back/body/limb pain/ache,’ alternative medications in non-injectable form include aspirin, ibuprofen and voltaren tabs, all available throughout most of the follow-up study period months. There were stockouts of voltaren in August and September 2007, but aspirin and ibuprofen tabs were available at that time. In addition, the 2 cases with ‘back/body/limb pain/ache’ that were prescribed ‘unnecessary’ injections were seen in October and January, when all three alternatives were in stock. Therefore, the records show that one or more alternative drugs in oral formulation were available at the time prescriptions were made to both cases prescribed injections.

For ‘diarrhea or dehydration (uncomplicated),’ again two cases were prescribed ‘unnecessary’ injections. Both of these cases could have been treated with ORS, which was available at all times during the follow-up period and would be a less risky treatment for this diagnosis.

For ‘respiratory infections,’ there was no data on amoxil tabs, one of the alternative non-injectable treatments for this diagnosis. However, there were no stockouts of septrin tabs or erythromycin tabs during any of the follow-up months, and either of these two could have been prescribed to the 3 respiratory infections cases that were prescribed injectable medications.

Finally, skin lesion and skin rash cases were observed to have unnecessary injections in the follow-up study period based on the lack of detail in the patient records. Though severe skin allergy or severe reaction in leprosy may require an injection, oral medication is generally the first line of treatment for skin conditions. According to GSIP medical personnel, scabies can be treated with benzyl benzoate lotion; ring worm can be treated with griseofulvin tablets; and pinea-versicolor can be treated with miconazole (multiple non-injectable formulations), Whitfield's ointment or clotrimazole (multiple non-injectable formulations). These medications were available for the majority of the study period (see Appendix 7).

6.5 Prescriber Interview Results

A total of five out of five prescribers working in the OPD at West Demerara consented to participate in the interview (100% participation) during follow-up data collection. Their responses are summarized below.

In terms of treating a simple fever, most of the prescriber respondents believed that orals were just as effective as injectable medications. When treating patients, 2 out of 5 prescribers mentioned that in addition to telling them how to take the medications prescribed and potential side effects, they would tell their patients an oral medication is just as good as an injectable one. Out of 10 patients seen, prescribers reported the majority of cases (7-10) would be prescribed medications at the time of their OPD visit, but of those receiving prescriptions, very few were perceived to require an injectable medication. Similar to the baseline, respondents commonly reported severity of patient's condition as a deciding factor in determining whether to treat with an injectable medication over a non-injectable alternative.

Several conditions were mentioned by respondents where injectable medications were thought to be most necessary. These included diabetes, trauma and/or bleeding, pain, infections, stroke, severe diarrhea or dehydration, vomiting, and ingestion of poison. It was interesting to note that several prescribers named a shortage of oral medications as a factor in choosing to prescribe injectable medications. This is consistent with evidence from this follow-up study that stockouts of oral alternatives (for a medication such as Buscopan) coincided with cases that had prescriptions for injectable formulations of the same drug. Several prescribers also noted that patient preference for injections and fear that patients will not complete an oral regimen affected their decisions to prescribe injectable medications. One prescriber noted that a 'stat' injection is sometimes necessary to complement an oral treatment, which is also consistent with data seen from the patient records.

The frequency of patients who were perceived to request injections varied widely but most of the prescribers stated they would be very unlikely to give the client an injection if they asked for it when a non-injectable was initially prescribed. See Table 13 for details on the responses prescribers gave when asked how they would respond to a patient who requested an injection.

The majority (4/5) of prescribers interviewed were working at West Demerara Hospital during the time of GSIP intervention and reported that they received information about prescribing injections and the benefits of prescribing oral medications through a training workshop. Three of these prescribers reported their last training was in the previous 3-6 months, indicating that the workshop they attended was likely one of the GSIP workshops held in August and/or October 2007. During the interview, respondents also viewed a behavior change communication (BCC) poster developed by GSIP to promote tablet use; 4 out of 5 found this poster useful. All of the respondents reported that posters were useful for themselves and for their patients. When asked for suggestions of what would make it easier to prescribe oral medications instead of injections, 2 prescribers mentioned more training and supervision, 2 prescribers mentioned a better supply of oral medications, 1 mentioned patients who complete the oral treatment regimen, and 1 mentioned more information received through media outlets such as television, radio, or posters.

Table 13: Follow-Up: Interview responses to question 11*

Responder ID	Q11. Imagine that I am a patient with a fever. You prescribe an oral to me but I asked for an injection. What would you say or do in response?
1	"I am the Doctor and I know what is best and there is no need for injection."
2	"I am the Doctor and you are the patient. I know what is best for you."
3	"We only use injection when fever is high, especially in children for fear of seizures but adults can use oral treatment."
4	"The severity of illness does not warrant injection. Oral medication is just as effective."
5	"Use tablet first. If you don't get relief, I will give you an injection."

**NB: responses may have been paraphrased for grammar and structure.*

7. BASELINE AND FOLLOW-UP COMPARISON

Table 14: Baseline and Follow-Up at West Demerara Hospital: Most common diagnoses

Diagnosis	Baseline		Follow-up	
	Number of cases	Percent (N=401)	Number of cases	Percent (N=361)
Fever	18	4%	29	8%
Diabetes Mellitus	28	7%	27	7%
Hypertension	40	10%	27	7%
Respiratory Infection	5	1%	25	7%
Vomiting	18	4%	16	4%
Body/back/limb ache/pain	44	11%	9	2%
Trauma, accidents and injuries	44	11%	23 ^a	6%
Cold or cough – no pneumonia	33	8%	1 ^a	<1%

^a Taken from diagnostic groupings rather than individual diagnoses

The follow-up study sample shows fewer cases with injectable prescriptions, in total and by gender (see Table 15). The total number of patient cases with one or more injectable medications declined from 87 to 63 cases, which is a decline of 28%. The decline in the number of patient cases with injections between baseline and follow-up is statistically significant at the 0.05 level ($p < 0.001$). Female cases with one or more injectable prescriptions declined by 31% while male cases declined by 23%.

Prevalence of injections also declined for specific age groups between baseline and follow-up. Particularly noteworthy is the decline in injections used to treat the age group 16-25. At baseline 42% of cases in this age group received an injection, while at follow-up this had declined to 8%. One factor influencing this result may be the different mix of diagnoses observed in the two study periods. The baseline sample had 4 vomiting cases (counting all single and multiple diagnosis cases), all treated with injections; no vomiting diagnosis was observed at follow-up among 16-25 year olds. Similarly, two out of three asthma cases at baseline were treated with injections, while only 1 case was observed at follow-up, which did not receive an injectable prescription.

Table 15: Baseline and Follow-Up at WDH: Injectable prescriptions by gender

	Total patient cases	Patient cases with at least one injectable medication prescribed	Percentage of cases with at least one injectable prescribed	Total medications prescribed	Number of injectable medications prescribed	Percent injectables prescribed
Baseline						
Female	184	48	26%	667	65	10%
Male	116	39	34%	398	50	13%
Total	300	87	29% ¹²	1,065	115	11% ¹³
Follow-up						
Female	166	33	20%	616	42	7%
Male	134	30	22%	431	41	10%
TOTAL	300	63	21% ¹⁴	1,047	83	8% ¹⁵

The total number of injectable medications prescribed at West Demerara Hospital also declined, from 11% to 8%, as shown in Table 15. This 28% decline in injectable prescriptions between baseline and follow-up is statistically significant at the 0.05 level (p<0.001). Both female and male patients experienced reduced number of injectable prescriptions, from 10% to 7% for women and from 13% to 10% for men.

Table 16: Baseline and Follow-Up at WDH: Average injectables prescribed for cases with single recorded diagnosis

Diagnosis	Total singular diagnosis patient cases	Patient cases with at least one injectable medication prescribed	Percentage of cases with at least one injectable prescribed	Total singular diagnosis patient cases	Patient cases with at least one injectable medication prescribed	Percentage of cases with at least one injectable prescribed ^a
Baseline				Follow-up		
Abdominal Pain	6	4	[67%]	4	3	[75%]
Abscess	5	2	[40%]	6	0	[0%]
Asthma	10	7	[70%]	5	2	[40%]
Body/back/limb pain/ache	28	14	50%	16	2	[13%]
Cold or cough-no pneumonia	14	0	[0%]	0	0	NA
Diabetes mellitus	9	3	[33%]	11	3	[27%]

¹² 95% confidence interval (28.7%, 29.3%)

¹³ 95% confidence interval (10.9%, 11.1%)

¹⁴ 95% confidence interval (20.7%, 21.3%)

¹⁵ 95% confidence interval (7.9%, 8.1%)

Diarrhea or dehydration, uncomplicated	2	0	[0%]	3	2	[67%]
Dizziness or weakness	4	2	[50%]	0	0	NA
Headache or migraine	8	3	[38%]	6	0	[0%]
Hypertension	9	1	[11%]	6	0	[0%]
Laceration	0	0	NA	8	1	[13%]
Malaria	0	0	NA	1	0	[0%]
Respiratory infection	3	0	[0%]	21	3	14%
Signs or symptoms of illness undefined	4 ^b	0	[0%]	21	2	10%
Skin lesion	0	0	NA	4	2	[50%]
Skin rash/disease ^c	10	1	[10%]	6	2	[33%]
Trauma-accidents and injuries	41	12	29%	20	4	20%
Urinary Tract Infection	2	0	[0%]	8	0	[0%]
Vomiting	2	2	[100%]	2	2	[100%]

^a Percentages in brackets are based on a sample of fewer than 20 cases.
^b From diagnostic grouping, diagnoses originally recorded as blank or unknown
^c Recorded as 'skin disease, scabies, dermatitis' at baseline and as 'skin rash' at follow-up

Table 16 shows injectables received in each study period by selected single diagnosis (multi-diagnoses cases omitted from this stage of the analysis for reasons described above). At both baseline and follow-up a high percentage of 'Trauma-accidents and injuries' received at least one injectable medication; injections are an acceptable first-line of treatment for these diagnoses so this is considered rational injection use. For 'Body/back/limb ache/pain', on the other hand, injections are not considered necessary as a first line of treatment. The percent of cases with this diagnosis that received an injectable prescription declined from 50% (14 out of 28) to 13% (2 out of 16). However, the follow-up sample size (n<20) is too small for further comment. Other conditions with injections during both study phases but with small sample sizes include: headache/migraine where use of injection dropped to 0 at follow-up; skin conditions (rash, lesions, disease) where use of injections increased from baseline to follow-up (injections considered unnecessary); and vomiting (use of injection is okay) where injection prevalence remained unchanged.

Table 17: Baseline and Follow-Up at WDH: Cases prescribed at least one injectable medication and ‘unnecessary’ injections

Hospital	Cases with at least one injection prescribed	Cases receiving ‘unnecessary’ injections	Proportion of cases with at least one ‘unnecessary’ injection prescribed
Baseline	87	30	34% ¹⁶
Follow-up	63	19	30% ¹⁷

In addition to a decline in the prevalence of injectable prescriptions from baseline to follow-up, the number of unnecessary injections also declined from 34% of prescribed injections at baseline to 30% of prescribed injections at follow-up. This is a statistically significant decline in the prevalence of unnecessary injections between baseline and follow-up (significant at the .05 level, $p < .001$). Most diagnostic groupings with unnecessary injections, however, are too small ($n < 20$) to draw conclusions. ‘Body/back/limb pain/ache’ was a common diagnostic group in both study periods. The decline in prevalence of unnecessary injections for this group, from 41% to 11% suggests post-intervention behavior change. Had injections remained at their baseline level, we would have expected to observe approximately 7 injections in this group at follow-up, given the frequency of diagnosis. This suggests the prevention of 5 unnecessary injections. However, the prevalence of unnecessary injections remains high, which suggests room for improvement. In addition, some diagnostic groupings, such as respiratory infections and skin conditions, showed increases in unnecessary injectable prescriptions. As observed above, the small sample sizes per diagnosis prevent drawing firm conclusions regarding rational drug use and the impact of GSIP interventions. However, these results suggest that further attention may be needed for these conditions, perhaps through additional prescriber training or through standard treatment guidelines. See Tables 16 and 18 for further details.

Table 18: Baseline and Follow-Up at WDH: ‘Unnecessary’ injections by diagnostic group

Diagnostic group ^a	Number of cases	Cases with unnecessary injection prescribed	%	Number of cases	Cases with unnecessary injection prescribed	% ^b
Baseline				Follow-up		
Back/body/limb pain/ache	42	17	41%	19	2	[11%]
Diarrhea or dehydration (uncomplicated)	2	0	[0%]	3	2	[67%]
Dizziness or weakness	4	2	[50%]	2	1	[50%]

¹⁶ 95% confidence interval (32.9%, 35.1%)

¹⁷ 95% confidence interval (28.5%, 31.5%)

Headache or migraine	14	5	[36%]	6	0	[0%]
Respiratory infections	5	0	[0%]	21	3	14%
Skin lesions	0	0	NA	4	2	[50%]
Skin rash ^c	10	1	[10%]	6	2	[33%]
Signs and symptoms of illness undefined	4	0	[0%]	21	2	10%
TOTAL	81	25	31%	74	13	

^a Table displays only those diagnostic groups found to have more than 1 unnecessary injection at either Baseline or Follow-up.

^b Percentages in brackets are based on a sample of fewer than 20 cases.

^c Recorded as 'Skin disease, scabies, dermatitis' at baseline

8. FOLLOW-UP STUDY LIMITATIONS

As stated above, the results of the PRR study need to be interpreted with caution. In addition to the small sample size of diagnostic groups, other limitations of the study must be considered. First, there is the overlap of GSIP interventions with the follow-up period of data collection. Some interventions were implemented prior to or very early in the follow-up study period; other interventions were implemented further into the study period, limiting the number of months for which the full effect of interventions can be observed. In an attempt to control for this limitation we can look at the prevalence of injections in the first three months of the study period compared to the last three months by which time all interventions had been completed. This comparison reveals lower injection prevalence in the months after completion of all interventions – from 25% in August, September and October to 17% in November, December and January.

Perhaps the most significant limitation of the study is the lack of control over the quality of data contained in the patient records, a limitation that frequently accompanies the use of a secondary data source. Both the baseline and follow-up phases of the PRR sampled cases with incomplete information – missing diagnosis, missing treatment, or non-specific diagnosis such as 'signs and symptoms of illness undefined'. Though there were fewer 'unknown' cases at follow-up, there were still 21 cases sampled that had no diagnoses or symptoms recorded for the date of service, though medication was prescribed to the patient at that time. These cases were retained for analysis based on the assumption that the treatment pattern qualified for examination even in the absence of diagnostic notes. Similarly, there were 14 cases that had no medication prescribed, but these cases were retained because no prescription was considered to show a deliberate behavior of the prescriber and therefore relevant to this analysis. Additionally, some recorded diagnoses presented sparse detail by which to judge the rational use of injections, including 'Trauma' cases (intentional or non-intentional), 'accident or injury'. According to clinical guidelines from Uganda, severe cases may require injections, but from the hospital records in Guyana, this distinction was difficult to make.

In the same vein as missing and non-specific diagnoses, some entries left unanswered questions, such as ‘common cold’ combined with ‘fever’. If this combination indicated a patient with pneumonia, it was not recorded as such in the hospital records. More specific details were available for some cases from the patient records; these are stored in the follow-up study database for reference as needed.

Finally, the unavailability of pharmaceutical and supply stock records for the follow-up period preclude any analysis of the impact of stock-outs on prescriber formulation choice

9. DISCUSSION

The overall use of injectable prescriptions declined post-intervention suggesting that exposure to rational drug use interventions has resulted in behavior change at West Demerara Hospital. Unnecessary injections, in particular, have declined, which are precisely the injections targeted by interventions because they can easily be treated with an equally effective oral prescription. For example, B vitamin can be prescribed as an injection but is easily substituted with tablets. At baseline, four B vitamin injections (B-complex and B-12) were observed while the follow-up sample received only non-injectable prescriptions for all forms of vitamin B (B-1, B-6 and B-complex). In addition, after MOH/GSIP interventions, interview responses suggest that prescribers had a heightened awareness of the shortages of non-injectable alternatives that may have impacted their ability to prescribe non-injectable medications to patients.

Though the analysis presented here shows a statistically significant decline in patient cases receiving injections, prevalence of injectable prescriptions and prevalence of unnecessary injections, the observed decline should be interpreted with caution. The diagnoses observed in the two study periods differed, which could have affected the categorization of necessary versus unnecessary injections at the analysis stage. Among the conditions found only at follow-up were laceration, bursitis, allergy, cyst, lumbago, numbness, and skin rash. This study’s classification of injections as necessary or unnecessary may also have been impacted by the quality of patient records. Both the baseline and follow-up data contained unspecific diagnoses such as ‘general syndrome’ and ‘signs and symptoms of illness undefined’. Without any further indication in the patient record, these injections were classified as unnecessary. It may be the case that poor record keeping or insufficient time with the patient led to omissions in the patient record while the condition of the patient at the time of treatment did in fact warrant an injection. This would artificially inflate the number of ‘unnecessary’ injections observed.

On the other hand, the PRR has employed conservative criteria for categorizing each observed injection as necessary or unnecessary, precisely because of the degree of uncertainty present in the data. Each injection was classified based on normal treatment practices for that case’s diagnostic group. Determination of the necessity of injections often depends on specific factors of the case, such as severity of the condition, which were not available in the patient records. To accommodate this uncertainty, injection treatment for these diagnostic groups was classified as necessary. Had we been able to

collect more detailed information on the patient's condition at time of treatment, we might instead have been able to classify each injection based on the specific details of the case rather than on broad treatment practices by diagnostic group.

Examining unnecessary injections by diagnostic groupings eliminates some of the problems encountered when considering the entire sample as discussed above. What emerges from this analysis, however, is a contradictory picture. Some diagnostic groups saw substantial decline, most notably 'body/back/limb pain/ache', while others, like respiratory infection, increased. The increase in injections used to treat respiratory infections is particularly puzzling given that this was one of the conditions specifically targeted in the formulary job aid. The small number of cases in each diagnostic group prevents drawing firm conclusions as to the impact of interventions.

The analysis and comparison of baseline and follow-up data point to areas that may require additional examination and attention. First is the use of stat injectable doses administered at the hospital and followed up with the same medication in oral formulation. This treatment approach was observed frequently at both baseline and follow-up. GSIP medical staff indicated that this is a common treatment approach for chronic pain, infections, vomiting and asthma. Oral treatment for these conditions could perhaps be enhanced through promoting better patient management of chronic pain and asthma and immediate use of oral medications for infections whenever possible.

Another consideration is the prescription of insulin injections at the outpatient department. GSIP medical staff indicated that insulin doses administered to OPD clients are generally stat doses for patients in crisis, which may be followed up at the clinic with additional insulin treatment as necessary. On the other hand, the Insulin Home Use Assessment conducted by GSIP in 2007 revealed that diabetic patients at West Demerara Hospital may visit the outpatient department for their regular insulin prescription if they missed their appointment at the diabetes clinic. The patient records do not indicate whether the OPD insulin prescriptions were for crisis patients or regular prescriptions. Metformin tablets may also be used to control type II diabetes; this oral medication was available throughout the study period. The high prevalence of insulin injections administered at the outpatient department (4 out of 28 diabetes cases, or 14% at baseline, and 5 out of 27, or 19%, at follow-up), though not considered unnecessary injections in the strict sense, may point toward the need for greater outreach to promote non-insulin approaches to managing type II diabetes.

Based on the results presented, we can cautiously conclude that there has been some post-intervention behavior change. At the same time, with the post-intervention prevalence of unnecessary injections at 30% there is room for continued improvement. Furthermore, the long-term impact of GSIP interventions is uncertain in the face of rapid staff turnover in Guyana's public health sector.¹⁸ Maintaining the gains achieved by GSIP interventions

¹⁸ At WDH, GSIP trained 2 pharmacists and 3 pharmacy assistants. Since that time one pharmacist has resigned, one assistant has been transferred to another department within the hospital, and a second assistant emigrated. No data is available on the number of providers who have left either the region or country but senior officers at WDH continue to speak about the shortage of staff.

and making further improvements cannot be taken for granted. Future efforts can build on activities already implemented through continued rational drug use training, expanded formulary job aid, medication counseling and development and implementation of national standard treatment guidelines that promote the use of oral formulations as first line of treatment where they are equally effective as injectable formulations.

10. RECOMMENDATIONS

The findings from the study indicate that the emphasis placed on the following interventions had a positive effect on the results:

- Training prescribers on the risk and practice of rational injection use increases understanding and cogent prescription decisions. The Ministry should consider working with the medical schools to include this training in their curricula and with the medical associations to ensure annual or bi-annual updates on standard treatment guidelines.
- Finalizing the standard treatment guidelines, ensuring they include, where appropriate, non-injectables as the first line of treatment and instituting a process for monitoring rational drug use at outpatient departments would favorably impact the process.
- The training on and the formulary job aid tool was considered helpful by the prescribers in identifying the conditions and treatment which have equally efficacious oral treatments. The Ministry of Health could consider expanding the contents of the tool to include additional conditions and broadening its distribution
- The study and training discussions identified conditions for which appropriate oral treatments were either not on the essential drug list or out of stock. The impending national standard treatment guidelines should be used to develop a coherent list of non-injectables and, especially for hospitals, daily updates on available essential medications should be disseminated to prescribers
- Training of pharmacist and pharmacy assistants in prescription adherence counseling was valuable in providing guidance to patients about the key details on dosage instructions and recognizing and handling potential side effects. The Ministry should consider incorporating the training into pharmacy and pharmacy assistant programs, training pharmacists on supervision practices, reviewing patient flow to reduce waiting time and increase quality of care and scaling up the dissemination of the pharmacist assistant job aid.

APPENDIX 1: Prescriber interview questionnaire

Date _____ Name of Health Facility _____

1. In your opinion, when treating a patient with a simple case of fever, is medicine taken by mouth MORE effective, JUST AS effective, or LESS effective than medicine taken by injection?
 1. Oral MORE Effective
 2. JUST AS Effective
 3. Oral LESS Effective
 4. Don't know
 5. Other (specify) _____

Instructions: One response only.

2. When you prescribe treatment for your patients, do you tell them anything related to medicine taken by mouth and/or injections? If yes, what information do you give about the medication prescribed?
 - A. Oral medication is just as good
 - B. Injections act faster than oral medications
 - C. How to follow-up – next steps
 - D. Side effects
 - E. How to treat side effects
 - F. What to do if have adverse reaction
 - G. Other, specify _____
 - H. None

*Instructions: If the prescriber responds "no", mark option H "none." Multiple responses are possible. Mark all that are mentioned spontaneously by the respondent. **Do not read.***

3. Out of every 10 outpatients you see, for about how many (on average) do you prescribe any medication?

_____ *Instructions: Record the number mentioned. It must be between 0 and 10. Use the number cited here to ask the next question.*

4. Of those _____ how many get a prescription that includes at least one injection?

5. How do you decide whether a patient should get an injection or a prescription for an oral medicine)?

Instructions: Record the response in the prescriber's own words.

6. For which, if any, specific conditions, do you believe injectable medicine is most necessary?

7. What factors, if any, encourage doctors or other health workers to prescribe treatments that include injections rather than oral medicine? (*Probe: what else?*)

- A. Shortage of oral medicine
- B. Patients want injections
- C. No guidelines
- D. No time/too many patients
- E. Patient will not complete (adhere to) treatment regimen of orals
- F. Injections bring more income
- G. Other, specify _____
- H. Nothing/Don't know

*Instructions: Multiple responses are possible. Mark all that are mentioned spontaneously by the respondent. **Do not read.***

8. What suggestions do you have for making it easier to prescribe medication in oral form instead of injectable form?

- A. Better supplies of oral medicine
- B. Patients who accept your decision for type of prescription
- C. More training/supervision
- D. More time to counsel
- E. Patients who complete (adhere to) treatment regimen
- F. Fewer needles/syringes/injectable medications
- G. Reminders/job aids/guidelines
- H. Other, specify _____
- I. Nothing/Don't know

*Instructions: Multiple responses are possible. Mark all that are mentioned spontaneously by the respondent. **Do not read.***

9. Out of every 10 patients to whom you do NOT prescribe an injection, about how many of them then request an injection? _____
10. How likely would you be to give the client an injection, if they asked for it, when you originally were going to prescribe another formulation?
1. Very likely
 2. Somewhat likely
 3. Somewhat unlikely
 4. Very unlikely

Instructions: One response only.

11. Imagine that I am a patient with a fever. You prescribed an oral to me but I asked for an injection. What would you say or do in response?
- _____
- _____

12. From what sources did you receive information about injections or the benefits of oral medicine in the last 6 months?
- A. Training workshop
 - B. Supervisor
 - C. Colleagues
 - D. Poster
 - E. Brochure
 - F. Pocket Guide
 - G. Newsletter
 - H. Video
 - I. Calendar
 - J. Journals/publications
 - K. Professional Association (specify) _____
 - L. Other (specify) _____
 - M. None

*Instructions: Multiple answers are possible. Mark all that are mentioned spontaneously by the respondent. **Do not read.** Probe asking "Anything else?"*

13. When did you start working at this facility?

Month: _____ Year : _____
99 Do not remember

Instructions: If the person does not remember the exact date, ask him/her to estimate.

Is this date before the beginning of interventions _____

1. *Yes*
2. *No*

14. When did you last receive training about prescribing different medicines to treat your patients (including deciding between injections and other routes of administration)?

1. Less than 3 months
2. 3- 6 months
3. > 6 and <12 months
4. Between 1 and 2 years
5. More than 2 years
6. Never
7. Don't know/don't remember

Instructions: Read the options aloud and mark the one that most closely fits the respondent's experience.

15. Do you find materials like this poster useful? (*SHOW IMAGES OF PRESCRIBER-RELATED MATERIALS OR THE ACTUAL MATERIALS*)

1. *Yes*
2. *No*

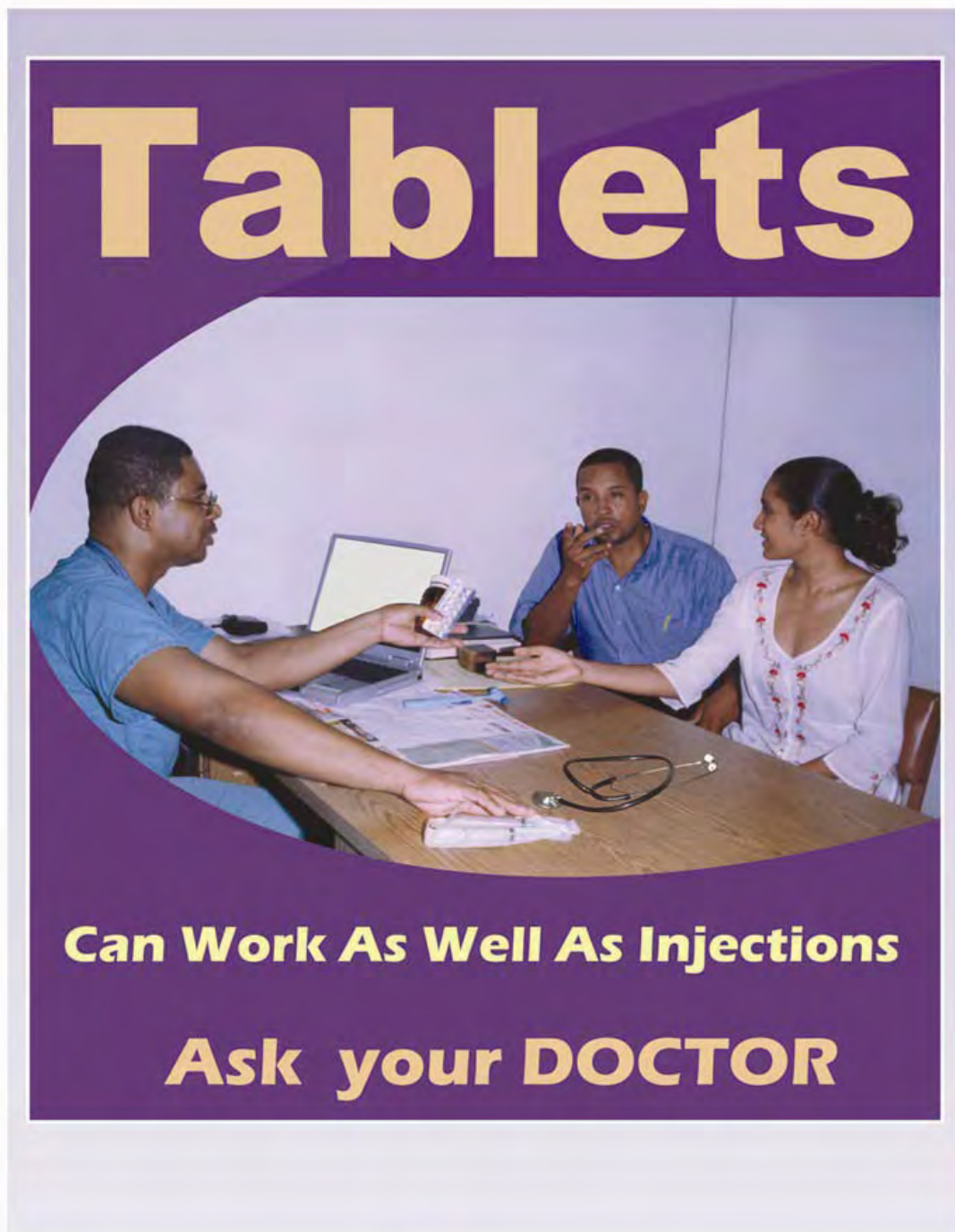
16. Which materials like this do you find useful for you and/or your patients?

- A. Poster
- B. Brochure
- C. Pocket Guide
- D. Newsletter
- E. Video
- F. Calendar
- G. None

*Instructions: Multiple answers are possible. Mark all that are mentioned spontaneously by the respondent. **Do not read.** Probe asking "Anything else?"*

Thank you for your time. Your input has been valuable.

APPENDIX 2: Tablets poster



APPENDIX 3: Frequency of diagnoses at follow-up for West Demerara Hospital

Facility:	Diagnosis:	# of Cases ever
West Demerara	Fever	29
	Diabetes Mellitus	27
	Hypertension	27
	Respiratory Infection	25
	Vomiting	16
	Diarrhoea-Not bloody	11
	Body/back/limb pain/ache	9
	Asthma	9
	Headache	8
	Urinary Tract infection	8
	Cough	7
	Heart Disease	7
	Skin rash	6
	Abscess	6
	Influenza	6
	Skin lesion	6
	Cold (common)	5
	Arthritis	4
	Otitis	4
	Dermatitis	4
	Chest Pain	3
	Abdominal Pain	3
	Amenorrhoea	3
	Arthrosis	3
	Vaginal Infection	3
	Dizziness	3
	Heart failure	2
	Muscle contraction	2
	Hip pain	2
	Hemorrhoids	2

West Demerara

Forearm trauma	2
Hand trauma	2
Knee trauma	2
Kidney colic	2
Weakness	2
Epilepsy	2
Spine pain	2
Chest trauma	2
Shortness of breath	2
Shoulder pain	2
Parkinson's disease	2
Belly pain	1
Gastritis	1
General Syndrome	1
Bee sting	1
Foot trauma	1
Ankle trauma	1
Face trauma	1
Anemia	1
Allergy (reaction)	1
Allergies	1
High cholesterol	1
Acute syndrome	1
Acute bursitis	1
Auricular fibrillation	1
Burns	1
Insomnia	1
Colic	1
Conjunctivitis	1
Chest injury	1
Cyst on the back	1
Cellulitis of the mouth	1
Finger infection	1
Diabetic foot	1

West Demerara

Ciatalgia	1
Breast Lump	1
Dysfunctional Uterine Bleeding	1
Bilateral pedal odema	1
Erectile dysfunction	1
Face injury	1
Face paralysis	1
Bilateral axilla mass	1
Bursitis	1
Sinusitis	1
Numbness of the head	1
Osteochondritis	1
Osteochondritis	1
Osteochondrosis	1
Pain in abdomen	1
Pain in chest	1
Pelvic pain	1
Poison ingestion	1
Prostate cancer	1
PV Bleeding	1
Rash between legs	1
Injury to leg (small)	1
Severe lower abdominal pain	1
Neck pain	1
Stiff ankle	1
Stomach burns	1
Stomach pain	1
Trauma to abdomen	1
Trauma to left ankle	1
Trauma to right hand	1
Ulcer in the leg	1
Ulcer to foot	1
Uterus fibroid	1
Vaginal bleeding	1

West Demerara

Vaginal laceration	1
Visual disorder	1
Septic arthritis	1
Left elbow injury or pain	1
Infected nail bed	1
Injury to abdomen	1
Injury to arm	1
Injury to elbow	1
Injury to foot (infected)	1
Injury to mouth	1
Kidney Stone	1
Laceration	1
Laceration to hand	1
Laceration to hand and finger	1
Laceration to head	1
Laceration to left hand	1
Numbness in hand	1
Laceration to the mouth	1
Numbness	1
Left side pain	1
Leg pain	1
Lipemia	1
Lumbargo	1
Lump to right foot	1
Lymphangitis	1
Malaria (vivax)	1
Menstrual Disorder	1
Menstrual pain	1
Mouth infection	1
Neck injury	1
Incomplete abortion	1
Laceration to the foot	1
Sum of diagnoses for this facility:	361

APPENDIX 4: Follow-Up Report: Injectable medications prescribed as derived from database outputs

West Demerara Hospital

Grouping variable		# of total cases	Total # of cases prescribed at least one injectable medication	Proportion prescribed one or more injectable medications
Gender				
	Male	134	30	22%
	Female	166	33	20%
Age Groups				
	<=5	36	10	28%
	6-15	32	10	31%
	16-25	38	3	8%
	26-35	38	11	29%
	36-45	48	12	25%
	46-55	46	9	20%
	56-65	38	4	11%
	>65	24	4	17%
Provider Type				
	Doctor	300	63	21%
	MEDEX	0	0	
TOTALS:		300	63	21%

APPENDIX 5: Conditions categorized by whether they ever require medication in an injectable form

Abdominal pain	Maybe
Allergy (reaction)	
Anxiety	
Burn	
Bursitis	
Cyst	
Diarrhoea Disease (acute)	
Dysmenorrhea	
Facial paralysis	
Fever	
Hemorrhoids	
Laceration	
Malaria	
Oedema	
Prostate cancer	
Abscess	No
Abortion (threatened)	
Amenorrhea	
Anemia	
Arthralgia	
Arthritis	
Body/back/limb pain/ache	
Breast Lump	
Candida	
Candidiasis Vagina	
Cellulitis	
Cerebrovascular Disease	
Cholecystitis	
Cold or cough-no pneumonia, bronchitis	
Constipation	
Cramps	
Cystitis	
Cyst (non-threatening)	
Diarrhoea or dehydration, uncomplicated	
Dizziness or weakness	
Dysfunctional Uterine Bleeding	
Dyspepsy	
Ear Infection	
Erectile dysfunction	
Eye conditions	
Fatigue	
Fibroid	
Filaria	
Fungal Infection	
Gastritis (simple or acute) or gastroenteritis	

General Syndrome	
Headache or migraine	
Hematoma	
High cholesterol	
Hypertension	
Hyperthyroid	
Impetigo	
Influenza	
Insomnia	
Intestinal Colic	
Intestinal worms	
Irregular menstruation	
Lipemia	
Lumbago	
Mouth sores	
Mycosis	
Nose Bleed	
Numbness	
Osteochondritis or Osteochondrosis	
Otitis	
Parkinson's disease	
Pelvic Inflammatory Disease	
Peptic Ulcer Disease	
Rash	
Respiratory Infection	
Sacrolumbago	
Seasonal allergies	
Sinusitis	
Skin diseases, scabies, dermatitis	
Skin lesion	
Spasm	
Tendinitis	
Tuberculosis	
Ulcer	
Urinary Tract infection	
Vaginal discharge or infection	
Worms or parasitic infection, intestinal worms	
Acute syndrome	
Symptoms or signs of illness undefined	Unknown
Animal bites	
Arthrosis	
Asthma	
Bone Fracture	
Chest Pain	
Congestive heart failure	
Diabetes Mellitus	Yes
Epilepsy	
Family Planning	

Gallbladder
Gastro-intestinal diseases
Heart disease
Lymphangitis
Menstrual Disorder
Poison ingestion
Pregnancy
PV Bleeding
Renal calculi or kidney stones
Shortness of breath
Tachycardia
Tonsillitis
Trauma - accidents injuries
Typhoid
Vomiting

APPENDIX 6: Final diagnostic labels applied to cases with single and multiple diagnoses

Diagnostic Label	Frequency	Valid Percent
Abdominal Pain	4	1.3
Abscess	6	2.0
Acute syndrome	1	.3
Allergy(reaction)	2	.7
Amenorrhea	2	.7
Anemia	1	.3
Arthritis	4	1.3
Arthrosis	2	.7
Asthma	9	3.0
Body/back/limb pain/ache	19	6.3
Breast Lump	1	.3
Burns	1	.3
Bursitis	2	.7
Cellulitis	1	.3
Chest Pain	3	1.0
Ciatalgia	1	.3
Cold or cough-no pneumonia, bronchitis	1	.3
Congestive Heart Failure	1	.3
Cyst-inj needed	1	.3
Cyst-no inj	2	.7
Dermatitis	3	1.0
Diabetes Mellitus	27	9.0
Diabetic foot	1	.3
Diarrhoea-Not bloody	1	.3
Diarrhoea or dehydration, uncomplicated	3	1.0
Dizziness or weakness	2	.7
Dysfunctional Uterine Bleeding	1	.3
Dysmenorrhea	1	.3
Epilepsy	2	.7
Erectile dysfunction	1	.3
Eye conditions	1	.3
Face paralysis	1	.3
Fever	17	5.7
Fibroid	1	.3
Gastritis	1	.3
General Syndrome	1	.3
Headache	6	2.0
Heart Disease	6	2.0
Hemorrhoids	2	.7

Diagnostic Label	Frequency	Valid Percent
Hypertension	7	2.3
Influenza	4	1.3
Laceration	8	2.7
Lipemia	1	.3
Lumbargo	1	.3
Lymphangitis	1	.3
Malaria	1	.3
Menstrual Disorder	1	.3
Mouth sores	1	.3
Numbness	3	1.0
Oedema	1	.3
Osteochondritis or Osteochondrosis	2	.7
Osteochondrosis	1	.3
Otitis	4	1.3
Parkinson's disease	2	.7
Poison ingestion	1	.3
Prostate cancer	1	.3
PV Bleeding	2	.7
Rash	6	2.0
Renal calculi or kidney stones	3	1.0
Respiratory Infection	21	7.0
Seasonal allergies	1	.3
Shortness of breath	2	.7
Sinusitis	1	.3
Skin infection	2	.7
Skin lesion	4	1.3
Spasm	2	.7
Symptoms or signs of illness undefined	21	7.0
Tachicardia	1	.3
Trauma - accidents injuries	23	7.7
Ulcer	1	.3
Urinary Tract infection	8	2.7
Vaginal Infection	3	1.0
Vomiting	16	5.3
Total	300	100.0

APPENDIX 7: Follow-Up Prescribed medications at West Demerara Hospital OPD
August 2007 – January 2008 and stock status for corresponding months

Acronym Key

CAP = Capsule	LOTION = Lotion
CREAM = Topical cream	OINT = Ointment
DROPS = Drops	SUSP = Oral suspension
INF = Infusion	SYR = Syrup
INJ = Injectable	TAB = Tablet

FACILITY	MONTH	STOCKOUT
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West Demerara:

Acetylsalicylic acid (Aspirin) TAB	August 2007	No
	September 2007	No
Formulation: NonInjectable	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No

Amiloripine TAB	August 2007	No
	September 2007	No
Formulation: NonInjectable	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No

AMINOPHYLINE INJ	August 2007	No
	September 2007	No
Formulation: Injectable	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No

	Month	Stockout
AMITRYPTILINE TAB Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
AMOXICILLIN CAP Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Amoxil SYR Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Amoxil TAB Formulation: NonInjectable	August 2007	Record Missing
	September 2007	Record Missing
	October 2007	Record Missing
	November 2007	Record Missing
	December 2007	Record Missing
	January 2008	Record Missing
	<hr/>	
AMPICILLIN CAP Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	

	Month	Stockout
Antacid TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Anti-biotic cream Formulation: Non Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Anti-haemorrhoidal CREAM Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	Yes
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Anti-haemorrhoidal SUPP Formulation: Non Injectable	August 2007	No
	September 2007	No
	October 2007	Yes
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
ATENOLOL TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
BENZATHINE PENICILLIN INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
BENZYL BENZOATE LOTION Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
BETAMETHASONE CREAM Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
BISACODYL TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Buscopan INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
Buscopan TAB Formulation: NonInjectable	August 2007	No
	September 2007	Yes
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CALAMINE LOTION Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Captopril TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CARBAMAZEPINE TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	Yes
	January 2008	Yes
	<hr/>	
CHLORAMPHENICAL SYRUP Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
CHLORAMPHENICOL CAP Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CHLORAMPHENICOL EAR DROPS Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CHLORAMPHENICOL INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CHLOROQUINE SYR Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
CHLOROQUINE TAB Formulation: NonInjectable	August 2007	Record Missing
	September 2007	Record Missing
	October 2007	Record Missing
	November 2007	Record Missing
	December 2007	Record Missing
	January 2008	Record Missing
	<hr/>	

	Month	Stockout
CIMETIDINE INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CIMETIDINE TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CIPROFLAXIN TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CLOTRIMAZOLE OINTMENT Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
CLOTRIMAZOLE PESSRIES Formulation: NonInjectable	August 2007	Yes
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No

	Month	Stockout
Control TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
COTRIMOXAZOLE TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Cough SYR Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Daflon TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
Daonil TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
Deprovera INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
DEXTROSE INF Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
DICLOFENAC INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
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DICLOFENAC TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
DIGOXIN INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
DIGOXIN TAB Formulation: NonInjectable	August 2007	Record Missing
	September 2007	Record Missing
	October 2007	Record Missing
	November 2007	Record Missing
	December 2007	Record Missing
	January 2008	Record Missing
	<hr/>	
Dilantin TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Ergometrine INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
ERGOMETRINE TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
ERYTHROMYCIN SUSP Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	Yes
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
ERYTHROMYCIN TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Essidrex TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Ferrober TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
FERROUS SULPHATE TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Flagyl TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
FOLIC ACID TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
FRUSEMIDE INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
FRUSEMIDE TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Gelusil TAB Formulation: NonInjectable	August 2007	Record Missing
	September 2007	Record Missing
	October 2007	Record Missing
	November 2007	Record Missing
	December 2007	Record Missing
	January 2008	Record Missing
	<hr/>	
GENTAMYCIN EYE/EAR DROPS Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	

	Month	Stockout
Glyceryl Trinitrate GTN (sublingual) Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Gravol INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Gravol TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
GRISEOFULVIN TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
HYDROCORTISONE EYE OINT Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	

	Month	Stockout
Hydrocortisone INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
HYDROCORTISONE SKIN OINT Formulation: NonInjectable	August 2007	Record Missing
	September 2007	Record Missing
	October 2007	Record Missing
	November 2007	Record Missing
	December 2007	Record Missing
	January 2008	Record Missing
	<hr/>	
HYDROCORTISONE SUCCINATE INJ Formulation: Injectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
IBUPROFEN TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Insulin lente INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
INSULIN SOLUBLE INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Isordil TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Lasix TAB Formulation: NonInjectable	August 2007	Record Missing
	September 2007	Record Missing
	October 2007	Record Missing
	November 2007	Record Missing
	December 2007	Record Missing
	January 2008	Record Missing
	<hr/>	
Levodopa TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	Yes
	<hr/>	
Lipitor TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	

	Month	Stockout
Maxalon TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
MEBENDAZOLE TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
METFORMIN TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
METOCLOPRAMIDE TAB Formulation: NonInjectable	August 2007	Record Missing
	September 2007	Record Missing
	October 2007	Record Missing
	November 2007	Record Missing
	December 2007	Record Missing
	January 2008	Record Missing
	<hr/>	
Miconazole CREAM Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
MULTIVITAMIN TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
NEOMYCIN CREAM Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
NIFEPIDINE TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Normal Saline IV Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
NYSTATIN CREAM Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
NYSTATIN SYR Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
NYSTATIN TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Omaprazole TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
ORS (taken by mouth) Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
PARACETAMOL SUSP Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
PARACETAMOL SYR Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Pariton INJ Formulation: Injectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
Pariton SUSP Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
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Pariton TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
PCT-PARACETAMOL TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
Piriton INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Prednisolone TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Primalot TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	No
	December 2007	No
	January 2008	No
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Primaquine TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
Ranitidine TAB Formulation: NonInjectable	August 2007	No
	September 2007	Yes
	October 2007	Yes
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout	
SALBUTAMOL (Ventolin) INH Formulation: NonInjectable	August 2007	No	
	September 2007	No	
	October 2007	No	
	November 2007	No	
	December 2007	No	
	January 2008	No	
	<hr/>		
SALBUTAMOL TAB Formulation: NonInjectable	August 2007	No	
	September 2007	No	
	October 2007	No	
	November 2007	No	
	December 2007	No	
	January 2008	No	
	<hr/>		
Seclophen INJ August 2007 No Formulation: Injectable	September 2007	No	
	October 2007	No	
	November 2007	No	
	December 2007	No	
	January 2008	No	
	<hr/>		
	Seprin SUSP Formulation: NonInjectable	August 2007	No
September 2007		No	
October 2007		No	
November 2007		No	
December 2007		No	
January 2008		No	
<hr/>			
Seprin TAB Formulation: NonInjectable	August 2007	No	
	September 2007	No	
	October 2007	No	
	November 2007	No	
	December 2007	No	
	January 2008	No	
	<hr/>		

	Month	Stockout
SILVERSULPHADIAZINE CREAM Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Stemitil TAB Formulation: NonInjectable	August 2007	Yes
	September 2007	Yes
	October 2007	Yes
	November 2007	Yes
	December 2007	Yes
	January 2008	Yes
	<hr/>	
TETENUS TOXOID INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Valium INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Valium TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

	Month	Stockout
VITAMIN B COMPLEX INJ Formulation: Injectable	August 2007	Yes
	September 2007	Yes
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
VITAMIN B COMPLEX TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Vitamin B1 TAB Formulation: NonInjectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Vitamin B6 TAB Formulation: NonInjectable	August 2007	No
	September 2007	Yes
	October 2007	Yes
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	
Volterin INJ Formulation: Injectable	August 2007	No
	September 2007	No
	October 2007	No
	November 2007	No
	December 2007	No
	January 2008	No
	<hr/>	

Volterin TAB

Formulation: NonInjectable

Month	Stockout
August 2007	Yes
September 2007	Yes
October 2007	No
November 2007	No
December 2007	No
January 2008	No