6. Results

The activities pursued within the mentioned project have been divided into four time steps:
a. Elaboration of the prescriptive data of the IS in the age group of 0 - 14 years (year 2015)
b. Training / information events on paediatricians and families on the correct use of ISs
c. Elaboration of the prescriptive data of the ISs in the age group of 0 - 14 years (year 2017)
d. Comparison of the prescriptive data of IS in the age group of 0 - 14 years, in the years 2015 and 2017 (after the training phase).

a.Elaboration and processing of prescription data of Inhaled Steroids (IS) in the age group of 0 - 14 years (year 2015)

In the first phase of the project we collected and processed the prescribing data of Inhaled Steroids (IS) used in paediatrics in the age group of 0-14 years for the year 2015 (before 2017, year of the study), in order to have a clear picture of the prescribing activity of Family Paediatricians involved in the project.
We analyzed the IS prescribing data for **13,530 children** aged between 0-14 followed by 17 family paediatricians of whom, 11 of the Molise Region and 6 of the Umbria Region, as shown in **Table n.1.**

Table n.1

Region	Family Pediatricians	Children (0-14 yrs)
Molise	**11**	**7.786**
Umbria	**6**	**5.744**
TOTAL	**17**	**13.530**

The data was obtained from the FARMASTAT database and from the Pharmacovigilance Centre of the Umbria Region and were found to be homogeneous and superimposable to those of the databases (INFANTIA and JUNIOR BIT) of Family Paediatricians.
In particular, we have taken into consideration the following prescription and consumption indicators for the evaluation of outcomes: number of prescriptions, number of pieces, pharmaceutical expenditure and prescriptions of individual active ingredients. We also highlighted the number of patients in the individual PdFs in order to be able to calculate prevalence of use of IS in children aged from 0 to 14 as indicators of appropriateness.
In addition, for each paediatrician involved in the study, we analyzed the number of patients aged between 0-14 treated with IS in order to calculate the data of prevalence of use.
As it is well known, the indicators of prescription appropriateness in specialist medicine are expressed in terms of prevalence of use (P = n ° subjects / population * 100). Considering that the number of patients aged between 0-14 for 17 paediatricians for 2015 was **13,530** and that the number of children from 0-14 years who received at least one IS prescription during the year under examination were 2802, it designates that the prevalence of use (P = 13530/2802 * 100) of the ISs prescribed in the age group 0-14 years from the 17 Paediatricians of the family in 2015 was **20.71%** (Fig. n. 1).
We calculated the prevalence of appropriate prescriptions and the prevalence of inappropriate prescriptions: from the 2802 patients who received at least one IS prescription, we analyzed the number of patients with the prescriptions made according to the Guidelines and the number of patients with inappropriate prescriptions. We obtained the following data (Fig. n. 2):
1) From the 2802 patients who received at least one prescription, the number of patients with the prescriptions according to the Guidelines were **767** with a prevalence of **5.67%**
2) From the 2082 patients who received at least one prescription, the number of patients with inappropriate prescriptions was found to be 2035 with a prevalence of **15.04%**
Therefore, the prevalence data of the appropriate prescriptions is 5.66%, while that of the inappropriate prescriptions is 15.04%.
We analyzed the percentage of appropriate and inappropriate prescriptions, we found that out of 2802 patients who received at least one prescription, **72.63% (2035**) was the percentage of inappropriate prescriptions while only **27.37% (767**) turned out to be the percentage of appropriate prescriptions (Fig.n. 2).
We considered the total number of prescriptions, the total number of pieces prescribed, the total number of prescriptions according to the Reference Guidelines and the total number of inappropriate prescriptions to

calculate the percentages of appropriateness and prescriptive inaccuracy of the ISs in the year 2015 implemented by Family Paediatricians in children aged between 0 to 14.
The results obtained are shown in **Table n. 4** and have shown that the total number of prescriptions of IS carried out by 17 family paediatricians for children aged 0 to 14 years is 4175 corresponding to a number of **4338** quantities prescribed.

Table n. 4: Prescription indicators – year 2015

Total prescriptions	**4175**
Guideline prescriptions	**1308**
Inappropriate prescriptions	**2867**
Total pieces	**4338**
% of prescription inappropriateness	**68.67%**
% of prescription appropriateness	**31.33%**

The total number of prescriptions according to the Reference Guidelines is 1308; therefore the number of inappropriate IS prescriptions is 2867 with a percentage of **68.67%.** This data indicates that the total percentage of appropriate prescriptions in children from 0 to 14 years is only 1308 or **31.33%** .
Accomplishing a more detailed analysis of the percentages of appropriateness and inappropriateness of non-prescriptive accuracy of the ISs in the various age groups, it is documented that (Fig. n. 3):
1) in the age group from **0 to 4 years** there were 2181 total prescriptions with 1532 inappropriate prescriptions with a percentage of inappropriateness equal to 70.24% ;
2) in the **5 to 10 year** age group there were 1600 total prescriptions with 1061 inappropriate prescriptions with a 66.31% percentage of inappropriateness;
3) in the **11-14 age group** there were 394 total prescriptions with 275 inappropriate prescriptions with a 69% percentage rate of inappropriateness ;
Subsequently (Fig. n. 4) we calculated the consumption data, quantifiable in a total of € **57.926,87** for the prescription of IS, in the age group of 0-14 years, during the year 2015 in the two Regions. Valuing the expense for drugs administered inappropriately the indication equal to € 38.992.40, while the expenditure for drugs administered appropriately concluded to be € 18.934,41. Therefore the percentage of inappropriate spending was equal to 67.31%.
Finally, we analyzed the percentages of prescribed inappropriateness of the individual **active principles** of the IS and it was revealed that; **(Table n. 5**):
1) **Beclomethasone Dipropionate** was used in **2429** prescriptions with a percentage of use equal to **58.18%.** The number of inappropriate prescriptions was **1736** with a percentage of inappropriateness equal to **71.47%** (Fig. n. 5),
2) **Budesonide** was used in **1267** prescriptions with a **30.35%** utilization rate. The number of inappropriate prescriptions was 872 with a 68.82% percentage of inappropriateness, (Fig. n. 6)
3) **Fluticasone Propionate** was used in **335** prescriptions with a percentage of use equal to **8.02%.** The number of inappropriate prescriptions was 155, with a prescription rate of 53.73% (Fig. n. 7),
4) **Flunisolide** was used in **132** prescriptions with a percentage of use equal to **3.16%.** The number of inappropriate prescriptions was 93, with a 70.45% percentage of inappropriateness (Fig. n. 8),
5) **Other active principles** were used in **12** prescriptions with a percentage of use equal to **0.28%.** The number of inappropriate prescriptions was 11 with a 91.67% percentage of inappropriateness.

Table n. 5: **Percentage of prescriptive inappropriateness of active principles** ***- year 2015***

Active principles	Total prscriptions	Utilization rate	Inappropriate prescriptions	% of inappropriateness
Beclomethasone	**2429**	**58.18%**	**1736**	**71.47%**
Budesonide	**1267**	**30.35%**	**872**	**68.82%**
Fluticasone	**335**	**8.02%**	**155**	**53.73%**
Flunisolide	**132**	**3.17%**	**93**	**70.45%**
Others	**12**	**0.28%**	**11**	**91.67%**

b. Training / Information events for paediatricians and families on the correct use of ISs.

The processing of IS prescribing data in the pediatric age, in the age group of 0 - 14 years, indicated a resilient criticality of the prescriptive activity in the Molise and Umbria Regions in the year 2015 examined, with a prevalent use of 20.71% and with a 68.68% inappropriateness rate for this class of drugs.
Therefore, in the light of the above mentioned results, it was regarded necessary to commence an information campaign on the appropriate use of this class of drugs, both through the organization of training / informative events, and through the dissemination of national and international guidelines, on the correct use of IS in therapy.
As acknowledged, in fact, an inappropriate use of IS represents a potential risk not only for individual health, with an increase in the risk of adverse reactions, but also because it conducts to an increase in costs for the National Health Service.
We then proceeded to highlight facts related to the prescriptive inappropriateness by divulging the main aspects of national and international guidelines to family pediatricians through an Investigator's Meeting and more briefing meetings.
It is also emphasized that it has periodically sent communications to Family Pediatricians of the Molise Region and the Umbria Region regarding the project and has intervened in conferences and training events to consider the attention to the purpose of the study with particular reference to the correct use of IS in the age group from 0 to 14 years.
Lastly, the information / training work carried out by Family Paediatricians is eminent in relation to their patients, in order to raise awareness in the correct use of pharmaceuticals in paediatrics especially regarding ISs in the most vulnerable age group, avoiding do-it-yourself and self-prescriptions from the families themselves, that expose children to risks of adverse events. At the end of this current research, other training events are planned for the year 2018.

c. Elaboration and processing of prescription data of Inhaled Steroids (IS) in the age group of 0 - 14 years (year 2017)

In the third phase of the project we collected and processed the prescribing data of Inhaled Steroids (IS) used in paediatrics in the age group of 0-14 years for the year 2017 in order to have a clear picture of the prescribing activity of Family Paediatricians involved in the project after the information/training phase.
We analyzed the IS prescribing data for **13.948** children aged between 0-14 followed by 17 Family Paediatricians of whom, 11 of the Molise Region and 6 of the Umbria Region, as shown in **Table n. 6.**

Table n.6.

Region	Family Pediatricians	Children(0-14 yrs)
Molise	**11**	**8.210**
Umbria	**6**	**5.738**
TOTAL	**17**	**13.948**

Also these data was obtained from the FARMASTAT database and from the Pharmacovigilance Centre of the Umbria Region and were found to be homogeneous and superimposable to those of the databases (INFANTIA and JUNIOR BIT) of Family Paediatricians.
In particular, as of the year 2015, we have taken into consideration the following prescription and consumption indicators for the evaluation of outcomes: number of prescriptions, number of pieces, pharmaceutical expenditure and prescriptions of individual active ingredients. We also highlighted the number of patients in the individual PdFs in order to be able to calculate prevalence of use of IS in children aged from 0 to 14 as indicators of appropriateness.
In addition, for each paediatrician involved in the study, we analyzed the number of patients aged between 0-14 treated with IS in order to calculate the data of prevalence of use (P = n ° subjects / population * 100). Considering that the number of patients aged between 0-14 for 17 paediatricians for 2015 was **13.984** and that the number of children from 0-14 years who received at least one IS prescription during the year under examination were **2113,** it designates that the prevalence of use (P = 13984/2113 * 100) of the ISs prescribed in the age group 0-14 years from the 17 Paediatricians of the family in 2017 was **15.15%** (Fig. n. 9).
We calculated the prevalence of appropriate prescriptions and the prevalence of inappropriate prescriptions: from the 2802 patients who received at least one IS prescription, we analyzed the number of patients with the prescriptions made according to the Guidelines and the number of patients with inappropriate prescriptions. We obtained the following data (Fig. n. 10):

1) From the **2113** patients who received at least one prescription, the number of patients with the prescriptions according to the Guidelines were **887** with a prevalence of **6.36%;**
2) From the **2113** patients who received at least one prescription, the number of patients with inappropriate prescriptions was found to be **1126** with a prevalence of **8.79%.**
Therefore, the prevalence data of the appropriate prescriptions is **6.36%,** while that of the inappropriate prescriptions is **8.79%.**
We analyzed the percentage of appropriate and inappropriate prescriptions, we found that out of 2802 patients who received at least one prescription, **72.63% (2035**) was the percentage of inappropriate prescriptions while only **27.37% (767**) turned out to be the percentage of appropriate prescriptions (Fig. n. 10).
Then we analyzed the percentage of appropriate and inappropriate prescriptions. We have shown that out of 2113 patients who had received at least one prescription, 41.98% (887) was the percentage of inappropriate prescriptions, while only 58.02% (1126) was the precent of appropriate prescriptions.
After we considered the total number of prescriptions, the total number of pieces prescribed, the total number of prescriptions according to the Reference Guidelines and the total number of inappropriate prescriptions to calculate the percentages of appropriateness and prescriptive inaccuracy of the ISs in the year 2017 implemented by Family Paediatricians in children aged between 0 to 14.
The results obtained are shown in **Table n. 9** and have shown that the total number of prescriptions of IS carried out by 17 Family Paediatricians for children aged 0 to 14 years is **3055** corresponding to a number of **3148** quantities prescribed.

Table n. 9: Prescription indicators – year 2017

Total prescriptions	**3055**
Guideline prescriptions	**1183**
Inappropriate prescriptions	**1181**
Total pieces	**3148**
% of prescription inappropriateness	**38.66%**
% of prescription appropriateness	**61.34%**

The total number of prescriptions according to the Reference Guidelines was 1873; therefore the number of inappropriate IS prescriptions is 1181 with a percentage of **38.66%.** This data indicates that the total percentage of appropriate prescriptions in children from 0 to 14 years was only 1873 or **61.34%** .
Accomplishing a more detailed analysis of the percentages of appropriateness and inappropriateness of non-prescriptive accuracy of the ISs in the various age groups, it is documented that (Fig. n. 11):
1) in the age group from **0 to 4 years** there were **2148** total prescriptions with **606** inappropriate prescriptions with a percentage of inappropriateness equal to **39.30 %** ;
2) in the **5 to 10 year** age group there were **1768** total prescriptions with **468** inappropriate prescriptions with a **35.94%** percentage of inappropriateness ;
3) in the **11-14 age group** there were 420 total prescriptions with 109 inappropriate prescriptions with a **35.05%** percentage rate of inappropriateness;
Subsequently (Fig. n. 12) we calculated the consumption data, quantifiable in a total of € **42.281,50** for the prescription of IS, in the age group of 0-14 years, during the year 2017 in the two Regions. Valuing the expense for drugs administered inappropriately the indication equal to € **15.912,47,** while the expenditure for drugs administered appropriately concluded to be **€ 26.369,03**. Therefore the percentage of inappropriate spending was equal to **37.63%**.
Finally, we analyzed the percentages of prescribed inappropriateness of the individual **active principles** of the IS and it was revealed that; **(Table n. 10**):
1) **Beclomethasone Dipropionate** was used in **1925** prescriptions with a percentage of use equal to **63.01%.** The number of inappropriate prescriptions was **737** with a percentage of inappropriateness equal to **38.29%** (Fig. n. 13),
2**) Budesonide** was used in **730** prescriptions with a **23.90%** utilization rate. The number of inappropriate prescriptions was **316** with a **43.29%** percentage of inappropriateness, (Fig. n. 14)
3) **Fluticasone Propionate** was used in **263** prescriptions with a percentage of use equal to **8.61%.** The number of inappropriate prescriptions was **50**, with a prescription rate of **19.01%** (Fig. n. 15),
4) **Flunisolide** was used in **137** prescriptions with a percentage of use equal to **4.48%.** The number of inappropriate prescriptions was **78**, with a **56.93%** percentage of inappropriateness (Fig. n. 16),
5) No Other active principles have been used.

Table n. 10: **Percentage of prescriptive inappropriateness of active principles** – ***year 2017***

Active principle	Total prescriptions	Utilization rate	Inappropriate prescriptions	% of inappropriateness
Beclomethasone	**1925**	**63.01%**	**737**	**38.29%**
Budesonide	**730**	**23.90%**	**316**	**43.29%**
Fluticasone	**263**	**8.61%**	**50**	**19.01%**
Flunisolide	**137**	**4.48%**	**78**	**56.93%**
Others	**0**	**0.0%**	**0**	**0.0%**

d. Comparison of the prescriptive data of Inhaled Steroids (IS) in the age group of 0 - 14 years, in the years 2015 and 2017 (after the training phase) in the two Regions

In the last phase of the study, we compared prevalence use data, data of prescriptive appropriateness in various age groups, consumption data and data related to the individual active ingredients used, after the training phase carried out both on the Family Pediatricians and on the families themselves.

1) Comparison of prevalence of use.
2) Comparison between the prevalence of appropriate prescriptions and the prevalence of inappropriate prescriptions.
3) Comparison between the percentage of appropriate and inappropriate prescriptions.
4) Comparison between the percentages of appropriateness and inappropriateness prescription of the ISs in the various age groups.
5) Comparison of consumption data (Pharmaceutical expenditure from appropriate and inappropriate prescriptions).
6) Comparison of the percentages of prescribing inappropriateness of the single active principles of the IS.

We obtained the following results:

1) **Comparison of prevalence of use.**

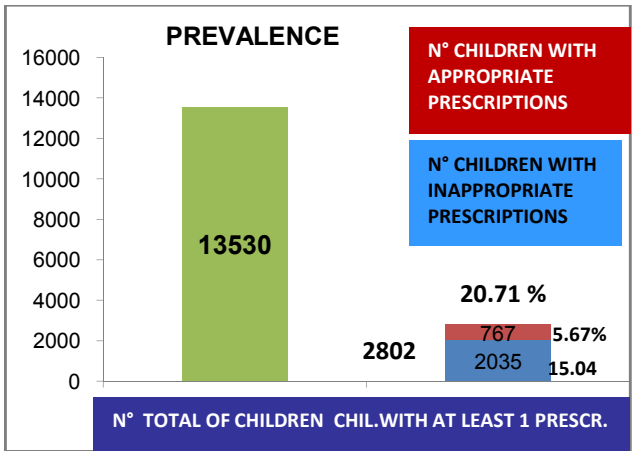

Fig.n.1 Prevalence 2015

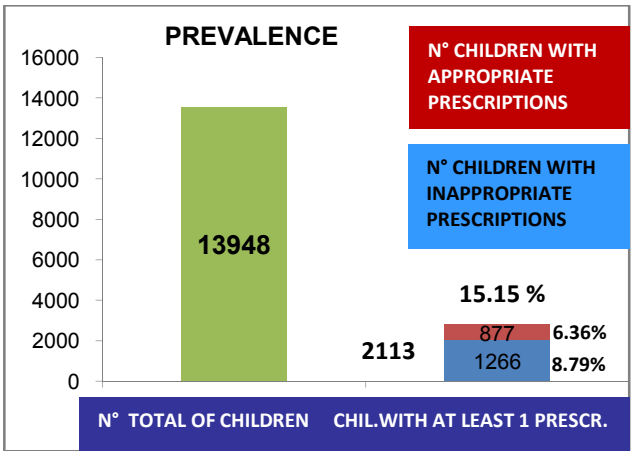

Fig. n. 9 Prevalence 2017

As is well known, the value of prescription appropriateness in specialized medicine are expressed in terms of prevalence of use (P = n ° subjects / population * 100). Considering that, in 2015, the number of patients aged between 0-14 for 17 paediatricians were 13,530 and that the number of children from 0-14 years who received at least one IS prescription during that year were 2802, it consequently indicates that the prevalence of use (P = 13530/2802 * 100) of the ISs prescribed in the age group 0-14 years from the 17 Family Pediatricians in 2015 was 20.71%.

Considering that, in 2017, the number of patients aged 0-14, for 17 pediatricians were 13.948 and that 2113 of these patients were prescribed at least one IS prescription during the year, it implies that the prevalence of use (P = 13530/2802 * 100) of the ISs prescribed for 0-14 years by the 17 family pediatricians in the year 2017 was 15.15%.
In 2015, the prevalence figure for the appropriate prescriptions is 5.47%, while that for inappropriate prescriptions is 15.04%, while in 2017 the prevalence date for the appropriate prescriptions is 6.36%, while that for inappropriate prescriptions is be 8.79% (Fig .n. 1 Fig. n. 9).

2) Comparison between the percentage of appropriate prescriptions and the percentage of inappropriate prescriptions on the prevalence of prescriptions.

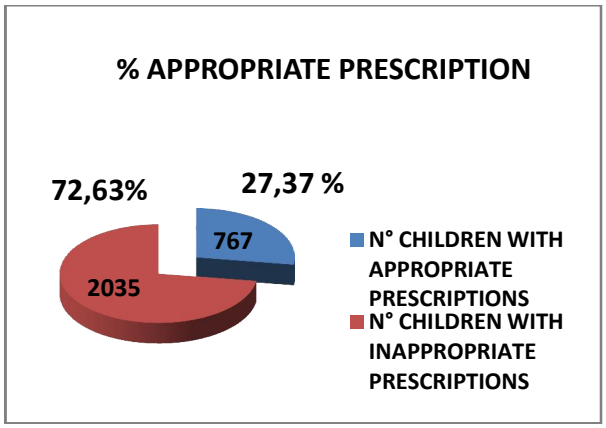

Fig. n. 2 % Appropriate prescriptions 2015

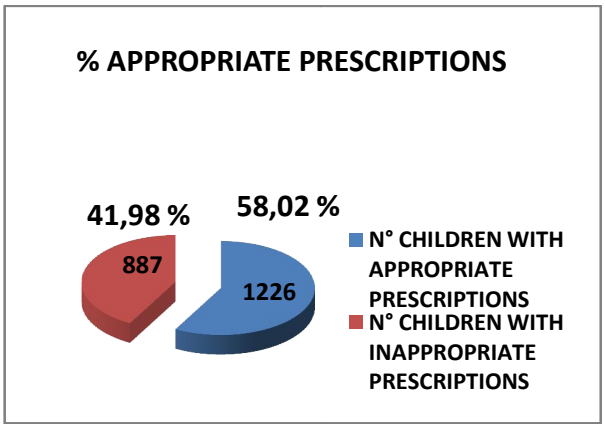

Fig. n. 10 % Appropriate prescriptions 2017

In 2015, the percentage of patients with inappropriate prescriptions were 72.63% (2035) while only 27.37% (767) transpired to be the percentage of the patients with appropriate prescription, whereas in 2017 41.98% (887) was the percentage of patients with inappropriate prescriptions, whilst 58.02% (1226) emerged with befitting prescriptions (Fig. n. 2- Fig. n. 10).

3) Comparison between the percentages of appropriate and inappropriate prescriptions on the total number of prescriptions.

In 2015 the total number of prescriptions was 4175 with a number of inappropriate IS prescriptions equal to 2867 (a percentage of 68.67%) while the total percentage of appropriate prescriptions for children in the age group of 0 to 14 (according to the Reference Guidelines) resulted in being only 1308 equal to 31.33%.
In 2017 the total number of prescriptions were 3055, improper IS prescriptions were equal to 1181 (a percentage of 38.66%) while the total percentage of appropriate prescriptions in children aged 0 to 14 (according to the Reference Guidelines) was 1874 equal to 61.34%.

4) Comparison between the percentages of suitable and unsuitable prescribing of ISs in various age groups.

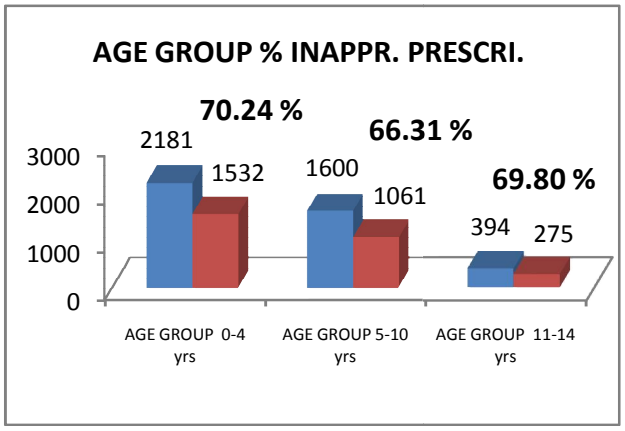

Fig. n. 3 Age group inappropriate prescriptions 2015

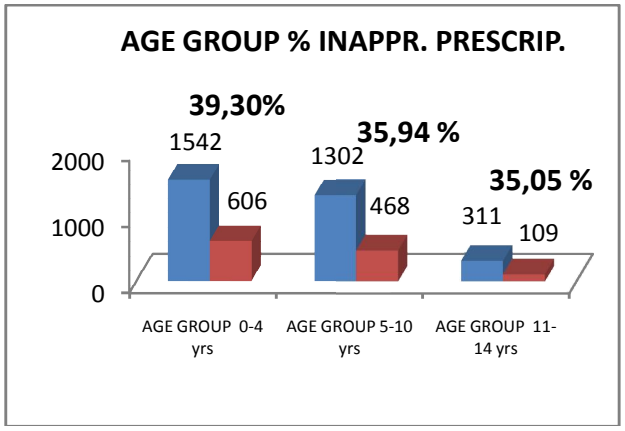

Fig. n. 11 Age group inappropriate prescriptions 2017

As accentuated, in 2015, in the age group from 0 to 4, there was a percentage of 70.24% of inappropriate prescription; in the age group from 5 to 10 the percentage was equal to 66.31% and in the 11 to 14 age group a percentage of 69.80%,

In 2017, prescriptive inappropriateness, in the age group from 0 to 4 was 39.30%, in the age group from 5 to 10, 35.94% and from 11 to 14 years the percentage was 35.04% (Fig n.3 Fig. n. 11).

e) Comparability of consumption data (Pharmaceutical expenditure from appropriate and inappropriate prescriptions.)

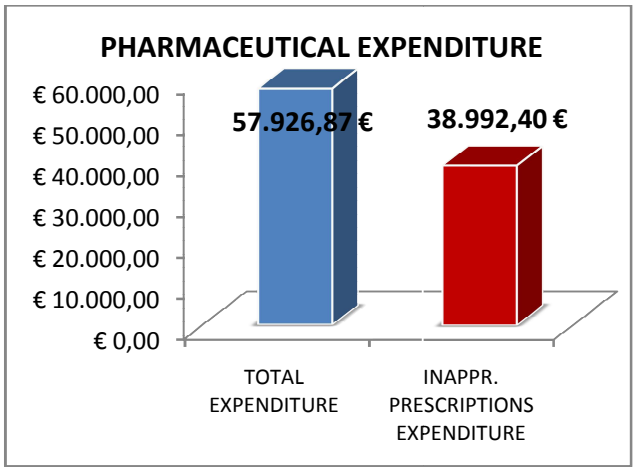

Fig. n. 4 Expenditure 2015

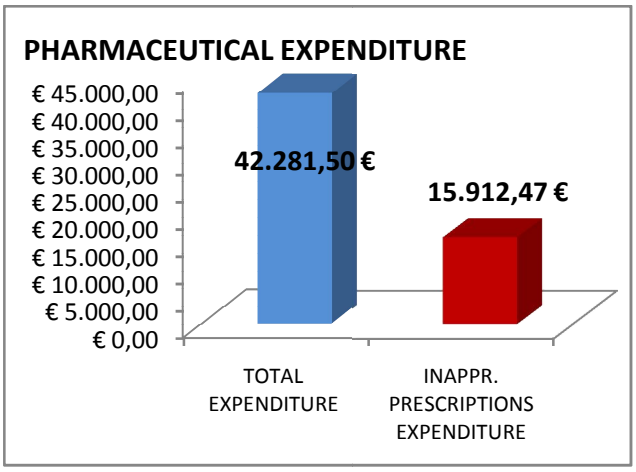

Fig n. 12 Expenditure 2017

The total expenditure, for the year 2015, for IS prescriptions was quantifiable to a total of € 57,926.87, in the age group of 0-14 years. Assessing the expenditure for drugs administered inappropriately it was shown that it was equal to € 38.992.40, while the expenditure for drugs administered appropriately emerged as € 18.934,47. Therefore the percentage of inappropriate spending was equal to 67.31%.

In 2017, the total expenditure calculated for IS prescriptions, in the age group of 0-14 had a total of €42,281.50, considering that the expense for drugs administered inappropriately was shown to be equal to € 15.912,47 while the expenditure for drugs administered appropriately was € 26.369,03 Therefore the percentage of inappropriate spending was equal at 37.63% (Fig. n. 4- Fig. n. 12).

f) Comparison of the percentages of prescribing inappropriateness of the single active principles of the ISs.

In 2015, it was noted that, for Beclometasone Dipropionate there was a percentage of 71.47% of prescriptive inappropriateness; for Budesonide a percentage of 68.82%; for Fluticasone Propionate a percentage of 53.84%; for Flunisolide a 70.45% percentage of inappropriateness, for other active substances a percentage of inappropriateness equal to 91.67% (Fig. n. 5-8 - Fig. n. 13-16).

In 2017, it was recorded that, for Beclometasone Dipropionate there was a percentage of 38.29% of prescriptive inaccuracy; for Budesonide a percentage of 43.29%; for Fluticasone Propionate a percentage of 19.01%; for Flunisolide a percentage of inappropriateness of 56.93%, for other active substances a percentage of inappropriateness of 0% (Fig. n. 2- Fig. n. 10).

.

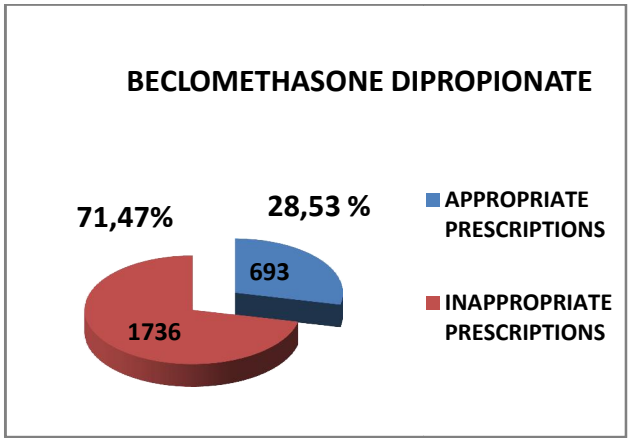

Fig .n. 5 Beclomethasone prescriptions 2015

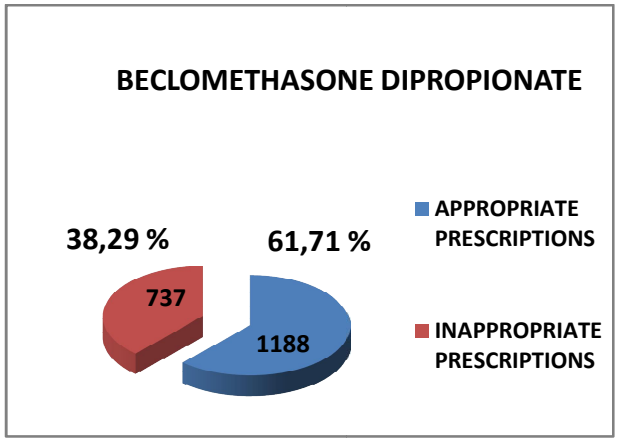

Fig .n. 13 Beclomethasone prescriptions 2017

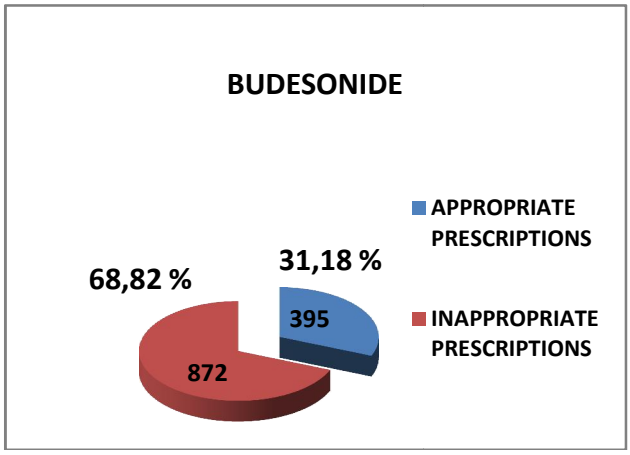

Fig .n. 6 Budesonide prescriptions 2015

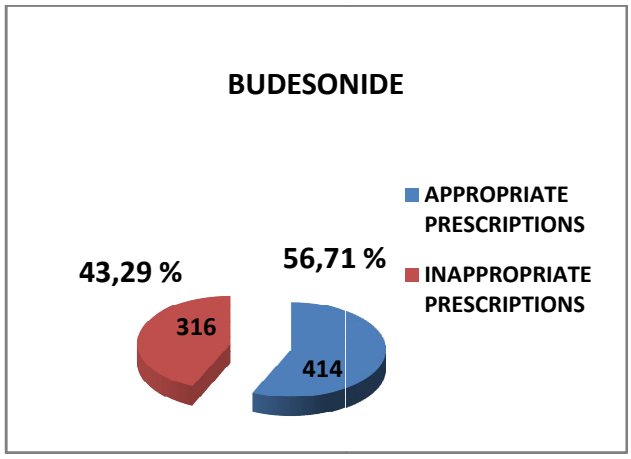

Fig .n. 14 Budesonide prescriptions 2017

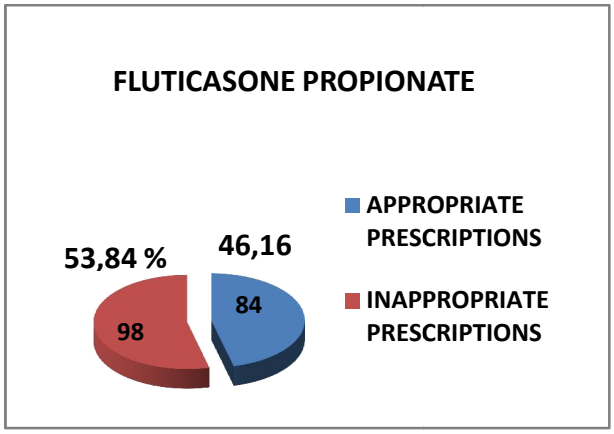

Fig .n. 7 Fluticasone prescriptions 2015

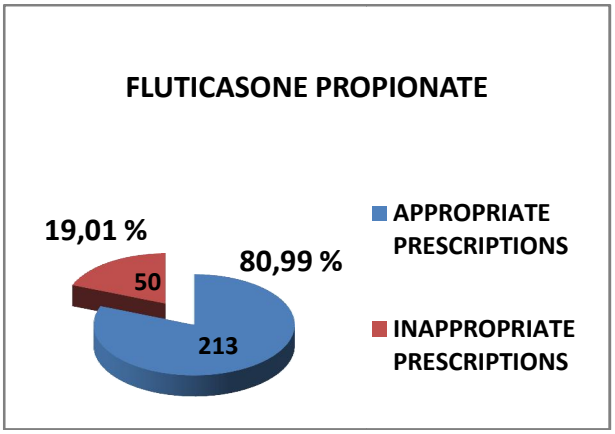

Fig .n. 15 Fluticasone prescriptions 2017

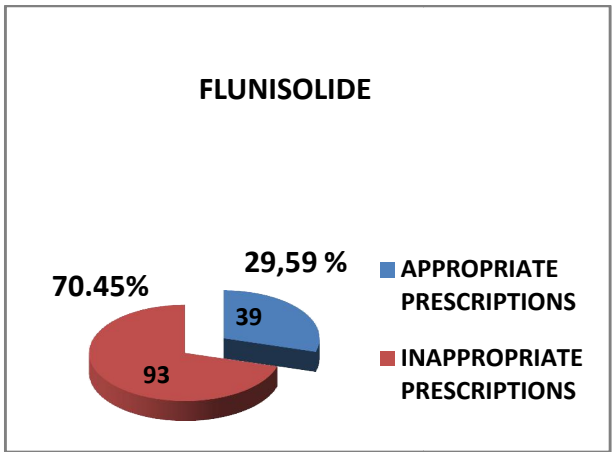

Fig .n. 8 Flunisolide prescriptions 2015

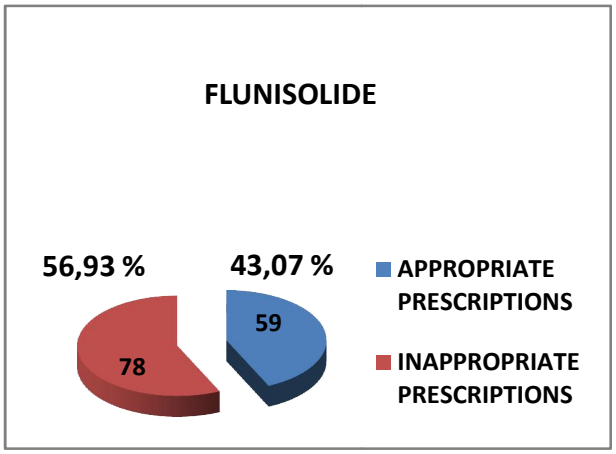

Fig .n. 16 Flunisolide prescriptions 2017

g) Comparison of the total number of pieces prescribed.

In 2015 the total number of pieces prescribed was 4328, while in 2017 the total was 3148. There is a reduction in the total number of pieces prescribed (from 4328 to 3148)

From the comparison of the prescription data of 2015 and that of 2017, after formative training for Family Pediatricians and the correct information given to the family on the rational use of inhaled Corticosteroids, an improvement is highlighted:

- of the prevalence of children with at least one prescription by 15.56% (from 20.71% to 15.15%)
- of the prevalence of children with inappropriate prescriptions by 6.25% (from 15.04% to 8.79%)
- of the percentage of children (with at least one prescription) with appropriate prescriptions by 30.65% (from 27.37% to 58.02%)
-of the percentage of children (with at least one prescription) with inappropriate prescriptions by 30.65% (from 72.63% to 41.98%)
-of the percentage of the appropriate prescriptions by 30.01% (from 31.33% to 61.34%) of the total prescriptions
-of the percentage of inappropriate prescriptions by 30.01% (from 68.67% to 38.66%) of the total prescriptions
- the percentage of inappropriate prescriptions in diverse age groups, namely:
    - in the age group from 0 to 4 years, by 30.94% (from 70.24% to 39.30%);
    - in the 5 to 10 year age group, 30.37% (from 66.31% to 35.94%);
    - in the 11 to 14 year age group, 34.76% (from 69.80% to 35.04%).

- total expenditure of € 15,645.36 (from € 57.926.87 to € 42.281.50)
    - expenditure for improperly administered medicines of € 23.079.93 (from € 38.992.40 to € 15.912.47):
    - inappropriate spending 29.68% (from 67.31% to 37.63%).
- the percentage of inappropriate prescriptions for the individual active ingredients, namely:
    - for Beclometasone dipropionate, 33.18% (from 71.47% to 38.29%);
    - 25.53% for Budesonide (from 69.82% to 43.29%);
    - for Fluticasone propionate, 34.83% (from 53.84% to 19.01%).
    - for Flunisolide, 13.52% (from 70.45% to 56.93%).
- also the total number of prescribed articles were reduced by 1190 pieces (from 4338 to 3148)

7. Discussion

The REDS Study has been the first multi regional Pharmacovigilance project presented by the Molise Region in the pediatric field (AIFA PV Call -2010-211) focused on children population.
Specifically the study was a phase IV research project, coordinated by a FP-MCRN (Family Pediatrician-Medicines for Children Research Network), which on the one hand provided training and information regarding the proper use of IS in children and possible iatrogenic diseases caused by their misuse, on the other hand setting up a territorial active survey on prescriptive appropriateness and safety of these medications in children aimed at the risk-benefit balance on usage.
The project's aim is to improve prescriptive awareness, giving an accurate diagnosis and attaining a reduction in pharmaceutical expenditures related to IS use from 0-14 years.
The study wanted firstly to overcome the limits of OsMed data, which they see as an inability to trace the diagnosis that underlies the prescription, on a proper assessment of the requirements in the age group that ranges from 0 to 14 years.
Considering the National Guidelines and International ones (GINA, NICE etc.) on the correct use of IS in children, the possibility of recruiting close to 100% of patients, examinations at their clinics (self-help), collaboration with families and proper compliance with the protocol, the study conducted by the FP-MCRN has allowed the conclusion to achieve an overall improvement of prescriptive appropriateness, to have a clear picture of the epidemiological situation, to obtain effective control of the benefits, a reduction and a proper evaluation of those that are the possible ADRs related to therapy.
More specifically, therefore, the project is proposed as objectives the improvement of diagnostic and prescriptive appropriateness, reducing unnecessary hospitalization in pediatrics and achieving reduction in pharmaceutical expenditure relating to the use of IS in the range of ages 0-14 years.
In this epidemiological / observational (case-control) and active surveillance project, the prescribing data for children (0 - 14 yrs) were collected and processed by Family Pediatricians (FPs). The activities have been divided into four time steps**:** 1) Elaboration of the prescriptive data (year 2015 -retrospective); 2) Training / information events on FPs and families on the correct use of IS (year 2016); 3) Elaboration of the prescriptive data (of the same FPs) (year 2017-prospective) and 4) comparison with those of 2015.
The processing of prescription data of IS in children, particularly in the age group 0-14 years has shown a strong prescriptive critical activity in the two region in the esamine years (2015 and 2017).
Therefore, in light of the results before mentioned, there was a clear necessity to undertake an information campaign on the appropriate use of this class of medication, either through the organization of training/information events, and through the dissemination of national and international guidelines on the correct IS use in therapy.
As it is known, in fact, an inappropriate use of IS is a potential risk not only for individual health, with an increase in exposure to the risk of adverse reactions, but also for public health and the problem of costs to the National Health Service.
Among the main unjustified use of IS, highlighted is the fact of the high use of this class of medication for the treatment of colds, coughs and sore throats especially in the 0 to 14 years age group, and therefore IS are not effective for treating them.
The high prescription of IS in the pediatric population for childhood respiratory diseases such as strep throat, acute cough, cold and bronchiolitis mainly caused by viruses is a recognized indicator of inappropriate prescribing. It then proceeded to give relief to these aspects of inappropriateness prescriptive disseminating the main aspects of national and international guidelines for paediatricians. In particular, it was forwarded, as shown in the international guidelines (GINA,NICE ,etc), in the case of a child with a sore throat, though there are other sign of infection concomitant respiratory tract (nasal discharge, cough) and do not require therapy with IS.
The training event has paid particular attention to the importance of promoting research and pharmacological trial culture, by building an even higher skill aimed especially at protecting the most vulnerable as the pediatric population, and its attention to the culture of iatrogenic disease for a careful analysis of the risk/benefit ratio of

medication for use in children. Also pediatrician's colleagues were stimulated to major reporting of adverse reactions in children.
The aims of the project were illustrated and announced, first the data of the pediatric IS prescriptions, promoting awareness on appropriateness of prescription through the communication of the above mentioned national and international guidelines.
Finally it highlights the information/training work done by Family Pediatricians with the families of their patients to stress the concept of the proper use of medicines in children, and in particular of IS in the most vulnerable age group, avoiding the "do it yourself " by families , that expose children to the risk of adverse symptoms.
We have tried to reduce the selection bias through the insertion of a homogeneous population of children who are in need of IS according to the International Guidelines (0- 14 years). Children participating in the research are under the Family Pediatrician's care. In fact, the Italian FP take care of about 900 children from 0 up to 14 years of age. For this reason the case studies are absolutely homogeneous and the risk of drop out is really very low (<5%).
The information biases have been overcome through the collection of data takendirectly from the FP database; the databases were always verifiable. This research has been verified by the Steering Committee (SC).
Therefore there was a careful analysis by the SC of the data to be included in thedatabase according to the quality standards and without transcription biases. In addition a further quality control has been guaranteed mainly by a statistically correct interpretation. The confounding factors as age, sex, socio-economic and educational level were not relevant to this epidemiological investigation.
The final phase of the project involved the development and comparison of prescriptive data of IS used in the age group 0-14 years, in the year 2015 and 2017, in order to evaluate a possible improvement in prescribing, following training/information events.
All in all to evaluate the improvement of prescriptive appropriateness in the next year to the training/information events, by monitoring the prescription of medication as object data in the year 2017.
The data were taken from FARMASTAT and pediatric database and in particular the following has been taken into consideration, prescription and consumption indicators for the evaluation of the results: the number of prescriptions, number of items and pharmaceutical expenditure. The number of patients assessed in order to be able to calculate the prevalence of use of IS in children 0-14 years as a prescriptive appropriateness indicator.
By comparing prescription data of 2015 and 2017 after the formation of Family Pediatricians and the information to families on the proper use of IS and of any adverse events related to their misuse, the first thing that emerges is the prevalence decreased from 20.71% to 15.15% ; the percentage of the appropriate prescriptions increased from 27.37% to 58.02% ; the percentage of the inappropriate prescriptions decreased from 72.63% to 41.98%; the prevalence of inappropriate prescriptions in the 0-4 yrs decreased from 70.24% to 39.30%; in the 5-10 yrs from 66.31% to 35.94%;and in the 11-14 yrs from 69.80% to 35.04%; the percentage of inappropriate expenditure decreased from 67.31% to 37.63%;. the percentages of inappropriate prescriptions decreased for Beclomethasone from 71.47% to 38.29%; for Budesonide from 69.82% to 43.29%; for Fluticasone from 53.84% to 19.01%; and for Flunisolide from 70.45% to 56.93%.; the total number of pieces prescribed decreased from 4338 to 3148.
Last but not least emphasizing the uniqueness of this multicenter research in which issues are dealt with regarding prescriptive appropriateness, training for Family Pediatricians, information for families, importance of assessments and reporting of ADRs linked to the medication in question which are the main foundations of a correct formula of active pharmacovigilance in pediatrics.
Assessing any adverse events that occurred in the two reference years in children aged 0 to 14 years after medication treatment with CSI, have not revealed any adverse events.

8. Conclusion

We have highlighted that only through training course for pediatricians and correct information to families can we have a significant improvement in the correct use of Inhaled Steroids.
For this reason we need an effort regarding the training on these drugs both by pediatricians and above all by parents who frequently administer medicines to children for infections of the respiratory tract, without consulting their pediatricians.
It was very important to urge pediatricians to pay more attention to the proper use of IS, especially for certain diseases that do not require it, such as a cold, cough, sore throats and bronchiolitis.