

Gluten-free meals in public catering

L. Bioletti¹, B.M. Ferrero², P. Magistroni³, M.J. Teriaca⁴, S. Ropolo⁵,
L. Emma⁶, K. Leggio⁷, L. Fransos⁸, A. Marzullo¹, C. Strumia⁹, F. Vietti¹,
G. Paltrinieri¹

Key words: *Coeliac disease, public catering, surveillance, check list, gluten-free meal*

Parole chiave: *Celiachia, ristorazione pubblica, sorveglianza, lista di controllo, pasto senza glutine*

Abstract

Background. The Piedmont Region, the Food Hygiene and Nutrition Services of the Local Healthcare Authorities of the Piedmont Region (coordinated by ASL TO 3), and the Italian Coeliac Association Piedmont Onlus, have created a theoretical-practical training pathway for Food Business Operators to ensure a safe gluten-free meal.

Study design. The aim of the study is to perform a retrospective analysis of the data collected in order to assess whether the Food Business Operators will be able to manage in the short, medium and long term audits (3-month audits, 6-month audits and 1-year audits) all the production stages of a gluten-free meal (storage, production,

Methods. We have analysed the check-list used for assessing the gluten free meal, recorded from 2010 to 2016 by the staff of the Food Hygiene and Nutrition Services. They were filled out during three educational audits and they refer to 81 facilities.

Results. Two-hundred and forty-three audits were conducted (3 per facility). During all stages of production of gluten-free meals (short, medium and long term), non-compliant aspects had decreased (not statistically significant). The data analysis showed a slight increase in non-compliant aspects after a 1-year storage, the trend of non-compliant aspects slightly decreased during the three production stages, the service stage registered a slight upward trend, and finally, during the basic requirements stage and control plan stage, non-compliant aspects were in sharp decline (statistically significant).

Conclusions. The decrease of non-compliance guarantees safety and protection of the celiac subject, even if storage and services must be monitored more carefully in the medium term.

¹ Area Health Authority 3 of Turin, Italy - Prevention District - Service of food safety standards and human nutrition, hereinafter quoted as "SIAN of ASL TO 3"

² University of Turin - Bachelor's degree in Nutrition & Dietetics, Turin, Italy

³ University Hospital "City of Health and Science" of Turin - Immunogenetics and transplant biology unit, Turin, Italy

⁴ University of Turin, Turin, Italy

⁵ Area Health Authority of Turin, Integrated Prevention District - SIAN of the City of Turin, Italy

⁶ University Hospital "City of Health and Science" of Turin - Orthopaedic trauma unit, Turin, Italy

⁷ Chemical Laboratory of Turin Chamber of Commerce and Industry, Turin, Italy

⁸ Non-profit Italian Association of Coeliac disease, Piedmont and Aosta Valley division- hereinafter referred as "AIC"

⁹ Health Directorate coordinating Prevention and Veterinary Districts of Piedmont Region, Italy

Introduction

A Gluten Free Diet (GFD) very often poses serious consequences on the social life of individuals with coeliac disease, thus making dining out really complicated, owing to the difficulty in finding gluten-free meals as well as the fear of gluten cross contamination (1). As a result, a great number of individuals with coeliac disease avoid dining out and travelling (2).

Following a GFD is often associated with a decrease in the participation in leisure activities and with the increasing attention paid to food as well as to its preparation (3, 4). The difficulty of dining out is also due to the frustration and the embarrassment which an individual with coeliac disease feels when he finds himself discussing the gluten-free options available in the menu of the restaurant with the staff (5).

The promotion of GFD education in public catering is deemed fundamental by several authors (6). That is because on-job training and refresher courses for Food Business Operators (FBOs) are two of the most important means to ensure an improvement in the safety standards and the quality of services provided to gluten-free meals in public catering (7). In Italy, the importance of this statement was acknowledged thanks to the Legislative Decree No. 123 dated 4.07.2005 "*Standards for the protection of individuals with coeliac disease*", which provides direct interventions aiming to facilitate the societal inclusion of patients with coeliac disease. More specifically, art. 5 "*Right to information*" includes the insertion of special informative product sheets for training activities and refresher courses designed for restaurant and hotel managers (8). Since 2009, the Piedmont Region, the Food Hygiene and Nutrition Branch of the Service of food safety standards and human nutrition (FHNS-SIAN) of the Piedmont Healthcare Authorities (regionally coordinated by ASL TO 3), and the Italian

Coeliac Association (ICA) have interacted synergistically in order to guarantee the safe access to public catering. This was made possible by the setting-up of a training courses meant for FBOs, which included lectures and educational audits held in the facilities (e.g. restaurants, pizza restaurants, cafés, etc.) (9). Therefore, the aim of the study is to conduct a retrospective analysis in order to assess whether FBOs, after following the training course, are able to safely provide a gluten-free meal/menu and whether they can maintain this standard and long-term skill in order to protect individuals with coeliac disease. The training course was designed by the FHNS-SIANs of Piedmont Region for FBOs and deals with coeliac disease. It includes short, medium and long term audits - 3-month audits, 6-month audits and 1-year audits - throughout all the production stages of a gluten-free meal, meaning storage, production, service, basic requirements and control plan.

Material and Methods

The training course, designed by the Piedmont Region, FHNS-SIANs and ICA, is divided into three phases:

1st phase: 4-hour lectures aimed to illustrate coeliac disease from MD's, dietitian's and occupational health and safety officer's (TPALL) standpoints;

2nd phase: A 4-hour practical session in the kitchen with a chef specialised in gluten-free flours and products.

3rd phase: a 6-hour on-site training in the facilities aimed to test managerial methods designed to avoid gluten cross-contamination throughout all the production stages of gluten-free meals. The results obtained during the two previous phases are then put into practice in 3 audits of 2 hours each, according to the work organisation of each facility. During the third audit, which was organised three months after the second phase, course

participants were asked to fill in an evaluation form assessing the management of gluten-free meals in public catering (hereinafter referred to as check-list).

At the end of the three phases, participants are given a certificate of attendance which proves their “*qualification to produce and administer gluten-free meals*”.

Subsequently, two verification auditing processes - a 6-month audit and 1-year audit – will be conducted in order to assess whether facilities still maintain their skills as regards managing a gluten-free meal/menu over time. During the verification process, the same check-list designed for the 3-month audit is filled in, so at the end of the training course the Local Healthcare Service (ASL) will be able to collect data and observe outcomes on a short, medium and long term basis. Thus, check-lists referring to the management of gluten-free meals were analysed by inspectors of the food safety standards and human nutrition departments of 12 Piedmontese ASLs during the 3-month audits, 6-month audits and 1-year audits, from 2010 to 2016.

The check list which refers to the management of gluten-free meals in public catering consists of 36 items divided into four main areas:

- 7 entries for storage
- 18 entries for production
- 7 entries for service
- 4 entries for basic requirements and control plan.

All through the audits, each macro area was evaluated and attributed a score of unsatisfactory, satisfactory or *good*. Later, all these data were uploaded to the information portal of the Piedmont Region: <sianpiemonte.net> (Reteunitaria).

Check-list outcomes, which were extrapolated from the information portal, were arranged in a spreadsheet. Subsequently, the statistical data were transformed into three benchmarks according to the replies received:

Table 1 – 3-month audit, 6-month audit and 1-year audit, compliance, non-compliance and empty sections

	3-month audits			6-month audits			1-year audits					
	Compliance	Non-compliance	Empty	Total	Compliance	Non-compliance	Empty	Total	Compliance	Non-compliance	Empty	Total
Storage	563	3	1	567	565	1	1	567	564	3	0	567
Production	1,158	10	47	1,215	1,181	9	25	1,215	1,198	3	14	1,215
Service	485	0	1	486	483	1	2	486	480	1	5	486
Basic requirements and control plan	320	4	0	324	323	0	1	324	324	0	0	324
Total	2,526	17	49	2,592	2,552	11	29	2,592	2,566	7	19	2,592

compliant, when the score obtained fulfilled the requirements

non-compliant, when the score obtained did not fulfil the requirements

empty, when the section was not filled out.

The check-list used during the three audits was designed to assess 36 parameters, 6 of which were in a multiple-choice format. Therefore, these last entries were collected as a single parameter for a total of 32 parameters. Hence the data obtained refer to 96 assessment criteria for each single facility for a total of 7,776 assessment criteria. During data processing, empty sections were left out (49 sections for short, 29 for medium and 19 for long-term audits) as outlined in Table 1 (3-month audits, 6-month audits and 1-year audits, compliance, non-compliance and empty sections). Therefore, a statistical analysis was carried out on 7,679 assessment criteria.

Data processing was evaluated using the *Pearson's chi-squared statistical test* and statistical significance was defined as $\alpha=0.05$. The test returns the total number of values, the Chi-squared value, the degrees of freedom (Df), and the p-value.

Results

From 2010 to 2016, 243 audits were conducted in 81 facilities throughout the Piedmont Region. (Table 2).

The assessment of the 32 parameters, carried out during each audit, had the purpose of defining compliance as regards management of gluten-free meals in the short, medium and long-term period, and it maintained a positive trend (although not statistically significant). During all the production stages of gluten-free meals, compliant aspects (namely storage, production, service, basic requirements and control plan) constantly rose, while non-compliant aspects slightly decreased. (Table 3).

Besides the general trend, compliant and non-compliant aspects of each area of GFM production were also analysed (namely *storage, production, service, basic requirements and control plan*). This procedure was designed to study possible critical aspects in GFD and in some production stages. The data analysis showed a slight increase in non-compliant aspects after a 1-year *storage*, compared to the

Table 2 - Total number of facilities involved and audits carried out from 2010 and 2016 classified according to the corresponding local health services (ASL)

ASL	2010-2016 facilities Number	Total audit Number
AL Alessandria ASL	9	27
AT Asti ASL	11	33
BI Biella ASL	6	18
CN1 Cuneo ASL	4	12
CN2 Alba and Bra ASL	13	39
NO Novara ASL	6	18
TO1 Turin ASL	7	21
TO3 Collegno and Pinerolo ASL	4	12
TO4 Ciriè, Chivasso and Ivrea ASL	2	30
TO5 Chieri, Carmagnola, Moncalieri and Nichelino ASL	10	30
VCO Verbano-Cusio-Ossola ASL	5	15
VC Vercelli ASL	4	12
Total	81	243

Table 3 - Total amount of compliant and non-compliant aspects of all gluten-free meals production stages - namely storage, production, service, basic requirements and control plan - assessed in the short, medium and long-term audits

	3-months audit		6-months audit		1-year audit		Total	
	Number	%	Number	%	Number	%	Number	%
Compliance	2,526	99.33	2,552	99.57	2,566	99.73	7,644	99.5
Non-compliance	17	0.67	11	0.43	7	0.27	35	0.5
Total	2,543	100	2,563	100	2,573	100	7,679	100

$p_x^2=0.106$

same figure in the 6-month period (although not statistically significant). The trend of non-compliant aspects slightly decreased during the three *production* stages (although not statistically significant). *Service* stage registered a slight upward trend (still not statistically significant), and finally, during the *basic requirements* stage and *control plan* stage, non-compliant aspects were in sharp decline and this last figure was statistically significant with $p_x^2 = 0.018$ (Table 4).

Limitations

Limitations of the study included lack of data interpretation. In fact, the entire amount

of data collected was impossible to assess because of the uneven pattern of the three audits. However, missing data were minimal in comparison with the total amount of data collected: 97 empty entries out of 7,776 entries collected during the three audits (1.25%).

Discussion and conclusions

Data analysis starts with the assessment carried out during the 3-month audits, when the training course is completed and facilities are considered able to safely offer gluten-free meals.

Table 4 - Compliance and non-compliance divided into the 4 main areas of GFM production: storage, production, service, basic requirements and control plan

		3-month audits		6-month audits		1-year audits		p_x^2
		Number	%	Number	%	Number	%	
Storage	Compliance	563	99.47	565	99.82	564	99.65	0.564
	Non-compliance	3	0.53	1	0.18	3	0.35	
	Total	566	100	566	100	567	100	
Production	Compliance	1,158	99.14	1,181	99.24	1,198	99.75	0.129
	Non-compliance	10	0.86	9	0.76	3	0.25	
	Total	1,168	100	1,190	100	1,201	100	
Service	Compliance	485	100.00	483	99.79	480	99.79	0.604
	Non-compliance	0	0.00	1	0.21	1	0.21	
	Total	485	100	484	100	481	100	
Basic requirements and control plan	Compliance	320	99.77	323	100	324	100	0.018
	Non-compliance	4	1.23	0	0.00	0	0	
	Total	324	100	323	100	324	100	

FBOs are capable of selecting and preparing appropriate foods avoiding the risk of gluten cross-contamination. Data collected at the beginning of our study confirm this hypothesis, as, in the short-term, compliance with the proper management of a gluten free meal was roughly 100%, while non-compliance was less than 1%. Even though $p_x^2=0.106$ is not statistically significant (cp. Table 1), the general health improvement in patients with coeliac disease is still remarkable. In the short and long term training, the decrease of non-compliant aspects and the consequent increase of those compliant are considered a positive index of safety and protection for people who suffer from a permanent intolerance to gluten.

On the one hand, these data confirm the accuracy of the working methods implemented by SIANs, AIC and the Piedmont Region in order to ensure the safety of gluten-free meals. On the other hand, it shows how a restaurant manager who chooses to prepare dishes suitable for patients with coeliac disease, is someone who can count on excellent groundwork, which is essential in order to receive the qualification to produce and administer gluten-free meals in public catering.

Literature data confirm that a change of habits is being maintained in the short and medium term, while highlighting that slipping back into old habits is still possible in the long term. Therefore, the analysis of 6-month and 1-year audits is useful for verifying the extent of this possible regression and identifying which area is more sensitive to this phenomenon. The aim is to promote activities which attempt to address the critical issues encountered in the field.

Storage and service stages registered a slight drop in the trend of non-compliant aspects in the 6-month audits. Although this figure was not statistically significant (cp. Table 4) SIAN officers were driven to plan

targeted interventions in these stages in the medium-term.

The trend of *production* stage reflects general data (Table 4) and demonstrates the attention paid by FBOs to this stage of the gluten-free meal production process;

During *basic requirements* stage and *control plan* stage, a statistically significant improvement in non-compliant aspects was shown with $p_x=0.018$. Therefore, the corrective action carried out at the end of the 3-month audit proved to be an effective preventive action, because non-compliant aspects were virtually null in the last audits (Table 4).

At the end of 2016, the 4-hour lecture phase of the training course was turned into a distance learning course. The course consisted of 10 training modules and was addressed to managers of restaurants, cafés and pizza restaurants who were able to connect to their network with any computer or smart phone. Once the modules were completed, managers had to sit an exam in presence of their District Health Authority Representatives and, if they passed it, they could enter the on-site training phase.

In conclusion, coeliac disease remains a serious chronic disease, and those affected are most likely prone to complications, but a correct diagnosis and healthy eating habits can lead to the complete resolution of the symptoms. However, unlike the past, it is still perceived as a social disease which, beyond the epidemiological dimension of the problem, has a major impact on families, schools, health facilities, working habits and leisure time activities (9). However, the results of the study suggest that – when the Health Authorities succeed in organising something similar to what has been organized by the Region Piedmont – patients with coeliac disease can obtain to eat in qualified restaurants, without the fear of accidentally ingest gluten as a result of an unsuitable management.

Riassunto

Il pasto senza glutine nella pubblica ristorazione

Premessa. La Regione Piemonte, i Servizi di Igiene degli Alimenti e della Nutrizione delle Aziende Sanitarie Locali Piemontesi (di cui l'ASL TO3 è coordinatore) e l'Associazione Italiana Celiachia Piemonte Onlus, dal 2009, lavorano in sinergia per garantire in ristorazione pubblica un pasto senza glutine sicuro, grazie all'istituzione di un percorso di formazione rivolto agli Operatori del Settore Alimentare organizzato in lezioni teoriche e audit formativi pratici presso le strutture stesse.

Disegno dello studio. L'obiettivo dello studio è quello di effettuare un'analisi retrospettiva al fine di valutare se a breve, medio e lungo termine (audit a 3 mesi, 6 mesi e ad 1 anno) in tutte le fasi di produzione del pasto (stoccaggio, produzione, servizio, requisiti fondamentali e piano di autocontrollo) gli Operatori del Settore Alimentare siano in grado di gestire il senza glutine in sicurezza e mantenere tale capacità nel tempo.

Metodi. Sono state analizzate le schede di valutazione della gestione del pasto senza glutine della ristorazione pubblica raccolte dal 2010 al 2016, dagli operatori dei 12 Servizi di Igiene degli Alimenti e della Nutrizione piemontesi, compilate durante i tre audit formativi e relative a 81 strutture.

Risultati. Gli audit totali effettuati sono stati 243 (3 per ogni struttura). Le non conformità complessive hanno registrato una riduzione durante le verifiche a breve, medio e lungo termine (non statisticamente significativa). Lo stoccaggio a 1 anno registra un lieve aumento delle non conformità, la produzione ha un andamento delle non conformità in diminuzione nei tre momenti, il servizio registra un trend lievemente in aumento, requisiti fondamentali e piano di autocontrollo hanno un andamento delle non conformità in netta diminuzione (statisticamente significativo).

Conclusioni. La diminuzione delle non conformità garantisce sicurezza e tutela del soggetto celiaco, anche se occorre monitorare con maggiore attenzione a medio termine stoccaggio e servizio.

References

1. See JA, Kaukinen K, Makharia GK, Gibson PR, Murray JA. Practical insights into gluten-free diets. *Nat Rev Gastroenterol Hepatol* 2015; **12**(10): 580-91. doi: 10.1038/nrgastro.2015.156. Epub 2015 Sep 22.
2. Case S. The gluten-free diet: how to provide effective education and resources. *Gastroenterology* 2005; **128**(4 Suppl 1): S128-34. doi: 10.1053/j.gastro.2005.02.020.
3. Burden S, Langley-Evans S, Pounder R, Talley N. Editorial: coeliac disease - pathogenesis, prognosis and management. *Aliment Pharmacol Ther* 2014; **39**(6): 555-6. doi: 10.1111/apt.12679.
4. Silvester JA, Weiten D, Graff LA, Walker JR, Duerksen DR. Living gluten-free: adherence, knowledge, lifestyle adaptations and feelings towards a gluten-free diet. *J Hum Nutr Diet* 2016; **29**(3): 374-82. doi: 10.1111/jhn.12316. Epub 2015 Apr 20.
5. Taylor E, Dickson-Swift V, Anderson K. Coeliac disease: the path to diagnosis and the reality of living with the disease. *J Hum Nutr Diet* 2013; **26**(4): 340-8. doi: 10.1111/jhn.12009. Epub 2012 Nov 29.
6. Ludvigsson JF, Bai JC, Biagi F et al; BSG Coeliac Disease Guidelines Development Group; British Society of Gastroenterology. Diagnosis and management of adult coeliac disease: guidelines from the British Society of Gastroenterology. *Gut* 2014; **63**(8): 1210-28. doi: 10.1136/gutjnl-2013-306578. Epub 2014 Jun 10.
7. De Stefano S, Silano M. Relazione annuale al Parlamento sulla celiachia. 2016. Available on: http://www.salute.gov.it/imgs/C_17_pubblicazioni_2689_allegato.pdf [Last accessed: 2020, Dec 3].
8. Law 04.07.2005, No 123. Standards for the protection of individuals with coeliac disease". Official Gazette of the Italian Republic No 156, 07.07.2005.
9. Robinson BL, Davis SC, Vess J, Lebel J. Primary care management of celiac disease. *Nurse Pract* 2015; **40**(2): 28-34. doi: 10.1097/01.NPR.0000460828.86940.1.