Esc Anna Nery 2022;26:e20210015



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# Multiprofessional flowchart for care of acute intoxications by agrotoxic in primary health care

## *Fluxograma multiprofissional para atendimento de intoxicações agudas por agrotóxicos na atenção primária à saúde*

## *Diagrama de flujo multiprofesional para la atención del envenenamiento agudo por agrotoxicos en la atención primaria de salud*

Adriane Karal[1]
Dara Montag Portaluppi[2]
Denise Antunes de Azambuja Zocche[1,3]
Leila Zanatta[1,3]

1. Universidade do Estado de Santa Catarina, Programa de Pós-Graduação Stricto Sensu em Enfermagem. Chapecó, SC, Brasil.

2. Universidade do Estado de Santa Catarina, Curso de Graduação em Enfermagem. Chapecó, SC, Brasil.

3. Universidade do Estado de Santa Catarina, Departamento de Enfermagem. Chapecó, SC, Brasil.

**Corresponding author:**
Adriane Karal.
E-mail: adri.karal@hotmail.com

Submitted on 02/17/2021.
Accepted on 09/26/2021.

DOI:https://doi.org/10.1590/2177-9465-EAN-2021-0015

## Abstract

**Objective:** To construct and validate a multiprofessional care flowchart for acute pesticide intoxication cases in Primary Health Care. **Method:** This is a methodological study, carried out in two stages: production-construction and content validation. The flowchart construction was carried out based on scientific literature, addressing the topic of pesticides, and a press conference involving 19 Primary Health Care professionals in a municipality in Santa Catarina, in December 2018. The validation process was carried out through a Google Forms questionnaire, by seven judges. The Percentage of Agreement and the Content Validity Index were used. **Results:** The flowchart had a global content validity of 0.97, with the first eight items having a maximum value and approval by the Municipal Health Council. **Conclusion:** The flowchart started to be used as a technological tool that guides and qualifies the care of acute pesticide intoxications cases. **Implications for practice:** The flowchart use in care for patients suspected or intoxicated by pesticides is a care management tool, allowing the health team to act harmoniously, in addition to assistance actions systematized and, consequently, obtain the quality of the service provided.

**Keywords:** Nursing; Agrochemicals; Primary Health Care; Workflow; Patient Care Team.

## Resumo

**Objetivo:** construir e validar um fluxograma de atendimento multiprofissional para casos de intoxicações agudas por agrotóxicos na Atenção Primária à Saúde. **Método:** estudo metodológico, realizado em duas etapas: produção-construção e validação do conteúdo. A construção do fluxograma foi realizada com base na literatura, abordando a temática agrotóxicos, e entrevista coletiva envolvendo 19 profissionais da Atenção Primária à Saúde de um município catarinense, em dezembro de 2018. O processo de validação foi realizado por meio de questionário do *Google Forms,* por sete juízes. Utilizou-se o Percentual de Concordância e o Índice de Validade de Conteúdo. **Resultados:** o fluxograma apresentou validade de conteúdo global igual a 0,97, tendo os oito primeiros itens apresentado valor máximo e aprovação pelo Conselho Municipal de Saúde. **Conclusão:** o fluxograma passou a ser utilizado como instrumento tecnológico que orienta e qualifica os atendimentos dos casos de intoxicações agudas por agrotóxicos. **Implicações para a prática:** a utilização do fluxograma na assistência ao paciente, suspeito ou intoxicado por agrotóxico, constitui-se como ferramenta de gestão do cuidado, permitindo que a equipe de saúde atue de forma harmônica, além de que as ações da assistência sejam sistematizadas e, consequentemente, se obtenha qualidade do serviço prestado.

**Palavras-chave:** Enfermagem; Agroquímicos; Atenção Primária à Saúde; Fluxo de Trabalho; Equipe de Assistência ao Paciente.

## Resumen

**Objetivo:** construir y validar un diagrama de flujo de atención multiprofesional para casos de intoxicación aguda por plaguicidas en Atención Primaria de Salud. **Método:** estudio metodológico, realizado en dos etapas: producción-construcción y validación de contenido. La construcción del diagrama de flujo se llevó a cabo a partir de la literatura que aborda el tema plaguicidas, y una entrevista colectiva a 19 profesionales de Atención Primaria de Salud de un municipio de Santa Catarina, en diciembre de 2018. El proceso de validación se realizó a través de un cuestionario de Google Forms, por siete jueces. Se utilizaron el porcentaje de acuerdo y el índice de validez de contenido. **Resultados:** El diagrama de flujo tuvo una validez de contenido global de 0.97, mostrando los primeros ocho ítems el valor máximo y la aprobación del Consejo Municipal de Salud. **Conclusión:** El diagrama de flujo pasó a ser utilizado como un instrumento tecnológico que orienta y califica la atención en casos de intoxicación aguda por plaguicidas. **Implicaciones para la practica:** El uso del diagrama de flujo en el cuidado de pacientes sospechosos o intoxicados por pesticidas es una herramienta de gestión de la atención, permitir que el equipo de salud actúe en armonía, que se sistematicen las acciones asistenciales y consecuentemente se obtiene calidad de servicio.

**Palabras claves:** Enfermería; Agroquímicos; Atención Primaria de Salud; Flujo de Trabajo; Grupo de Atención al Paciente.

## INTRODUCTION

The Ottawa charter for health promotion, produced in 1986, recognizes several determinants of the health-disease process and emphasizes health promotion as a process that allows individuals to carry out actions that promote the improvement of quality of life and health. The letter defines health in a broad view, which is now understood as a resource for life, involving physical, mental and social well-being[1]. It also reinforces the importance of creating healthy environments, protecting the environment and conserving resources as well as reorienting health services.

Although the global context has changed since the first conference for health promotion, these aspects were inserted in the others and, more recently, in the defense of health, in all policies, as an integral part of other sectors that can have effects on health and the environment[2]. It is also highlighted the recognition of health and well-being as the essence for achieving the agreed goals in the 2030 Agenda, identifying the potential to promote health in relation to sustainable development and to involve society in the health development process to guarantee a healthy life[3].

Thus, the perception of health involves political, economic, cultural, social factors and, not least, environmental conditions[1]. In Brazil, individuals are often exposed to chemical substances, such as pesticides, also called agrochemicals, present in different environments, such as homes, workplaces, schools and the community in general, generating air, water and soil contamination[4]. This implies the existence of risks of damage to health, due to the harmful effects of pesticides[5], mainly for farmers who rarely use Personal Protective Equipment (PPE)[6]. In 1989, Law 7,802, known as the Pesticides Act, was launched, which regulates aspects of production, marketing, registration of pesticides, among others. Within healthy public policies, it is clear that, in the current context, this Law was an achievement acquired for the conservation of natural resources and the protection of the environment, consequently, of human health[7].

Brazil is among the countries that most use pesticides and to cultivate large areas and export raw materials, the hegemonic model of agricultural production in Brazil is based on the monoculture of genetically modified species, supported by the use of large quantities of these products[7]. Accordingly, in 2010, the national market accounted for 19% of the global pesticide market, approximately US$7.3 billion, considered the largest pesticide market in the world[8].

In this context, and taking into account the current scenario in Brazil, there is also the challenge of achieving the goals of the agenda, foreseen for 2020, with regard to the environmentally sound management of pesticides and their residues, in addition to reducing their release into the environment to minimize negative impacts[9]. Considering that agricultural commodities are one of the main pillars of the Brazilian economy, the benefits of using pesticides must be balanced with the potential risks. However, the health effects, mainly in the long term, resulting from occupational exposure to pesticides, in Brazil, are still incipient, requiring further studies to fill this gap[6].

According to data from the Notifiable Diseases Information System (Sinan - *Sistema de Informações de Agravos de Notificação*), nthe period from 2007 to 2015, Brazil had an increase in the number of notifications of pesticide poisoning, with an increase of 139% and a cumulative total of 84,206 cases notified. This increase in the number of cases is probably a result of the increased commercialization of pesticides, their intrinsic toxicity, and the improvement of surveillance and health care in identifying, diagnosing and notifying cases[10].

In this context, in the context of health services, Primary Health Care (PHC) in Brazil, called Primary Care (PC), is presented as the preferred entry point. It is also a component of the Health Care Network (RAS - *Rede de Atenção à Saúde*), essential in providing fundamental care with actions of promotion, prevention, treatment, health surveillance[11], involving situations related to exposure as well as pesticide poisoning.

From the point of view of comprehensiveness, PHC seeks to meet the needs of individuals, families and communities in its coverage area, and considers the determinants, risks and damages to health in the work processes of the multidisciplinary team that constitutes it. Moreover, it acts coordinating care at this level of care and directs the provision of services in other points of the network[11].

Nurses, inserted in PHC multidisciplinary teams, produce several health actions through technical and scientific knowledge. As part of its activities, it develops nursing care for the promotion and prevention of situations such as poisoning, by providing guidance, health education activities regarding health risks and the dangers of exposure, as well as in cases of poisoning, acting, directly, in data collection, recognition of signs and symptoms, diagnosis and treatment guidance, in order to reduce the risks of morbidity and mortality[12].

Acute pesticide poisoning results from a single exposure or from successive exposures in a short period, which can cause immediate effects, identified from dizziness, nausea, vomiting, headache, cough, fever and chills, bitter taste in the mouth, epigastric pain, abdominal cramps, diarrhea and itching throughout the body[13]. Diagnosis, based on these symptoms, is not always easy, given their unspecificity; therefore, knowing the context in which the health service user is essential.

A recent study points out a significant increase in the demand for care in pesticide poisoning cases for nursing and the need to reorganize the service and professional qualification[14]. Therefore, the use of technologies in nurses' work process is intended to facilitate their actions as a member and active in the team, making them more resolute[15].

Whether they are material or not, technologies have the potential to intervene in certain situations. One example is flowcharts as a technological tool, which optimize care and allow visualizing workflow and moments of care production[16]. It is noticed that the construction and validation of instruments have been increasingly present in research, as many nursing professionals recognize the need to use these instruments in daily practice[17].

In this context, there is the following guiding study question: can a health technology, built together with the multidisciplinary team, help PHC professionals to qualify the care of users with acute pesticide poisoning? Based on this concern, this study aimed to construct and validate a flowchart of multidisciplinary care for acute pesticide poisoning cases in PHC.

## METHOD

This is a methodological study, developed in two stages: multidisciplinary care flowchart production-construction for acute pesticide poisoning cases in PHC and validation of this material by professionals working in PHC from a municipality in the Far West of the state of Santa Catarina. Methodological research focuses on the development, assessment and improvement of methodological tools and strategies[18].

In the flowchart production-construction process (stage 1), we sought to carry out a situational diagnosis, identifying the health practices developed in PHC, against individuals intoxicated by pesticides and the weaknesses of this service. This information was pointed out by the professionals participating in the research, through a collective interview, in which a script with six semi-structured questions was used. The press conferences were audio recorded and transcribed in Microsoft Word for further analysis. The data obtained during the research were archived by the researcher and will be kept for a period of five years and then discarded.

Data collection, through collective interviews, was carried out with each of the five municipality Family Health teams (FHt) and with a Primary Care team (PHt) from the Basic Health Unit (BHU). To participate in the research, professionals were considered nurses, doctors and nursing technicians, who had been working for at least one year in the municipality's PHC and who were present at the time of the previously scheduled press conference. The graduates who agreed to participate in the study signed the Informed Consent Form. Data collection was carried out during December 2018 and 19 out of a total of 26 professionals participated.

The identification of each participant during the research was preserved, being carried out with initials N (Nurse), NT (Nursing Technician) and D (Doctor), accompanied by numbering: N(1), N(2), NT(1), NT(2), D(1), D(2), respectively.

For the flowchart production-construction, an integrative literature review was also carried out, in which the main publications on pesticide poisoning in PHC were analyzed, obtained from the databases of Coordination for the Improvement of Higher Education Personnel (Capes - *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*) and the Virtual Health Library (VHL). The theoretical framework for constructing a flowchart proposed by Silva and Silvino[19]was used. The flowchart structure follows a set of symbols that represent the process stages, the people, the sequence of actions and the circulation of data and documents, showing the origin, process and destination of information. The horizontal flowchart, presented in this study, is a graphic instrument that emphasizes the people involved in a certain routine, with the objective of describing the events in detail[19].

For the elaboration of this flowchart, four symbols were considered: oval; rectangle; diamond; and a thin, continuous arrow. The oval symbol has the meaning terminal or terminator and represents start, stop or end of the process; the rectangle has the meaning of operation/process and represents action; the diamond, meaning decision point, choice of alternatives; and the thin, continuous arrow, used to indicate the direction of the flow of documents and processes[19].

The professionals involved in the study received the first version of the multidisciplinary care flowchart for acute pesticide poisoning cases during training on pesticides, which was carried out by the researcher and aimed at PHC professionals. The professionals were instructed to carry out flowchart analysis and propose suggestions for its adjustments and subsequent validation.

For the flowchart validation (stage 2), the concept of content validity was used, with a questionnaire-type instrument, based on a judgment of adequacy of a set of items in relation to content. The collected data were analyzed using Content Validity Index (CVI), considering values above 0.78 and equal to or greater than 80% in the Percentage of Agreement[20].

A judgment questionnaire[21] was used, adapted to assess the flowchart content, with ten items (Table 1). All professional nurses, doctors and nursing technicians who participated in the collective interview (stage 1) were invited to participate in the validation stage; however, only seven professionals participated in this process stage.

The judges, then identified as PHC professionals from the respective municipality, performed the service flowchart's judgment via Google Forms. The analysis was carried out using a Likert-type scale with two response intervals, suitable or not. Furthermore, the instrument had a space for comments and suggestions. At the end of assessment, judges' recommendations were accepted and incorporated into the flowchart.

The research complies with Resolution 466/12 of the Brazilian National Health Council (*Conselho Nacional de Saúde*) for research carried out on human beings and was approved by the Institutional Review Board, under Opinion 96023718300000118.

## RESULTS

The results of this study are presented in two stages: flowchart production-construction and validation.

### Flowchart production-construction

In the first stage, which was flowchart construction, data was collected about the health practices developed in PHC, against the individual intoxicated by pesticides, and the weaknesses of this service were pointed out by the professionals participating in the research, through a collective interview. This situational diagnosis allowed the flowchart to harmonize with the reality and praxis of the patient care team.

**Table 1.** Flowchart content concordance assessment. Chapecó-SC, Brazil, 2019.

| Assessed Items | CVI |
|---|---|
| 1. Usefulness/relevance: the question is relevant and serves the purpose of the proposed procedure. | 1.0 |
| 2. Consistance: the content is deep enough to understand the issue. | 1.0 |
| 3. Clarity: explained clearly, simply and unequivocally. | 1.0 |
| 4. Objectivity: allows punctual response. | 1.0 |
| 5. Simplicitness: the question expresses a single idea. | 1.0 |
| 6. Feasible: the question is applicable. | 1.0 |
| 7. Update: the stages in the roadmap follow the most current evidence-based practices. | 1.0 |
| 8. Vocabulary: words chosen properly and unambiguous. | 1.0 |
| 9. Precision: each assessment item is distinct from the others, they are not confused. | 0.86 |
| 10. Instructional sequence of topics: the sequence of the question is shown in a coherent way and in order of correct executions. | 0.86 |

**Source:** Research data, 2019.

During the press conference, the 19 participating professionals, six nurses, five doctors and eight nursing technicians, all clinical, demonstrated a positive assessment of the existence of a flowchart, as they reported the absence of this type of technology to assist individuals intoxicated by pesticides, assisted in the municipality PHC.

For the flowchart theoretical knowledge construction, content from the Ministry of Health, Federal Nursing Council resolutions, ordinances, study notebooks and scientific articles were used. Then, the symbols, content and actions to be performed by professionals/teams were arranged. The first version of the flowchart was presented to PHC professionals during training carried out by the researcher on multidisciplinary care for acute pesticide poisoning cases in PHC, with the aim of collecting suggestions to improve the flowchart. However, professionals made a positive assessment, not suggesting changes. The flowchart (Figure 1) was then sent to judges for content validation.

A label panel was also developed (Chart 1), based on an analysis of inventory control of companies with authorized sales in the municipality, provided by the Integrated Agricultural Development Company of Santa Catarina (Cidasc - *Companhia Integrada de Desenvolvimento Agrícola de Santa Catarina*), referring to the most commercialized pesticides in the second half of 2017 and the first half of 2018. The panel contains classification of pesticides according to mode of action, active ingredient, trade name, toxicological class and acute clinical manifestations resulting from exposure to them. On the panel, the colors represent the degree of toxicity of each product, with the red band being extremely toxic, the yellow band, highly toxic, the blue band, moderately toxic and the green band, not very toxic. The label panel was built to guide professionals as to the type of pesticide that users may have had contact with and facilitate the conduct, being an instrument attached to the flowchart.

### Flowchart validation

At this stage, the flowchart was assessed by seven judges, namely: three female nurses; a male doctor; a female doctor; and two female nursing technicians, working in PHC of the respective municipality, this number being considered representative for content validation[17]. Judges' age ranged from 29 to 55 years (mean 38 years and Standard Deviation (SD) of 8.2). Of the seven judges, four (57.1%) had a title of specialist in family health and one of a master's degree in this area.

In the flowchart validation process, considering each item separately, the agreement among the judges regarding the usefulness, consistency, clarity, objectivity, simplicity, feasibility, updating and vocabulary was 100%, receiving maximum value CVI (CVI 1.0). On the other hand, in the items precision and instructional sequence of topics, different indexes were obtained (0.86 in each item), which did not compromise the results, as the value is above the desired limit (Table 1). The global CVI was equal to 0.97, thus it was not necessary to submit the instrument to a new assessment.

The judges positively assessed the items related to the flowchart content; however, they made suggestions to improve it. The suggested changes were analyzed by the researcher, based on relevant literature, and accepted as shown in Chart 2 below.

Thus, after validation and implementation of suggested changes, the final version of the flowchart was obtained (Figure 1), which was later approved by the Municipal Health Council of the municipality in question, recorded in the minutes. The instrument presented had a positive assessment, as a technology to improve care for individuals intoxicated by pesticides, as well as the flowchart relevance to improve notifications of pesticide poisoning in the municipality.

## DISCUSSIONS

The development of the proposed flowchart arose amid the need to improve the identification of pesticide poisoning cases in PHC of a municipality in the Far West of Santa Catarina, since estimates by the World Health Organization (WHO) indicate that, for each reported poisoning event, there are 50 unreported[8]. In this

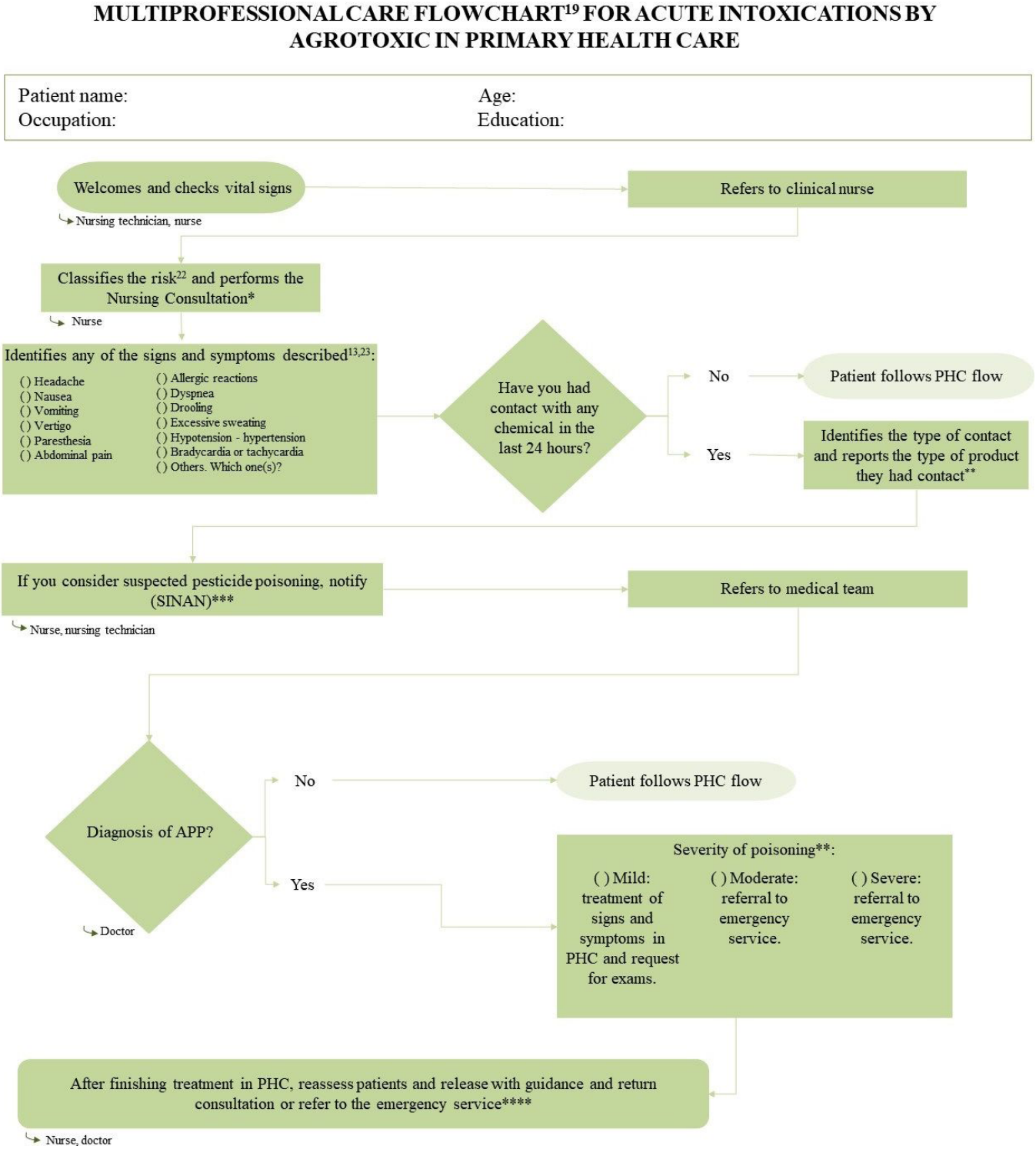


**Figure 1.** Multiprofessional care flowchart[19] for acute intoxications by agrotoxic in Primary Health Care[22,23]. Legend: *Nursing consultation/assessment performed by nurses, with the information registered via the IPM health system. ** Label Panel developed by the author, referring to the most commercialized pesticides in Itapiranga-SC in the second semester/2017 and first semester/2018. ***In case of doubt, professionals can contact the Information and Toxicological Assistance Center of Santa Catarina CIATox through the number 0800 643 5252. ****Community Health Workers (CHWs) help identify areas of use of chemical products. Emergency services: Sociedade Hospitalar Itapiranga Ltda nº: 4936770141; SAMU nº: 192, Fire Department nº: 193. Transport service of the Municipal Health Department of Itapiranga-SC nº: 49367877743.
Source: Prepared by the authors, 2019.

**Chart 1.** Label panel* of the most commercialized pesticides in the semesters 02/2017 and 01/2018 in the research municipality[24-27]. Legend: *Integrated Agricultural Development Company of Santa Catarina CIDASC – Regional Department of São Miguel do Oeste provided a pesticide stock control table for companies with authorized sales in the municipality of Itapiranga.

## Label Panel*

| Classification/ Action | Active substance | Trade name | Toxicological class | Acute Clinical Manifestations |
|---|---|---|---|---|
| Most commercialized pesticides in Itapiranga-SC in the first half/2018 | | | | |
| Herbicides[24-27] | Glyphosate + Isopropylamine Salt | Original Roundup | III | Nausea, vomiting, epigastric pain, bleeding from the gastrointestinal tract, shock, respiratory failure, non-cardiogenic pulmonary edema, periorbital edema, edema and paresthesias at dermal contact sites. |
| | Glyphosate + Ammonium Salt | Roundup WG | III | |
| | Glyphosate + Potassium Salt | Zapp QI 620 | III | |
| | 2,4-D Dimethylamine | U 46 D Fluid | I | Epigastric pain, vomiting, diarrhea, myalgia, muscle spasms, metabolic acidosis, liver and kidney damage, seizures and rhabdomyolysis. |
| | Fluroxypyr methyl + Picloram Triisopropanolamine | Plenum | I | Nausea, its dust can be irritating to the eyes, skin, nose, throat and respiratory tract. |
| Pesticide[24-27] | Imidacloprid + Beta-cyfluthrin | Connect | II | Miosis, tearing, bronchorrhea, sweating, sialorrhea, vomiting, diarrhea, abdominal cramps, bradycardia, cough, cramps, hypertension, mental confusion, headache, tremors, respiratory depression. |
| | Thiodicarb | Larvin 800 WG | I | Miosis, tearing, bronchorrhea, sweating, sialorrhea, vomiting, diarrhea, abdominal cramps, bradycardia, cough, cramps, hypertension, mental confusion, headache, tremors, respiratory depression. |
| | Deltamethrin | Decis 25 EC | I | Dermatitis, rhinitis, asthma, headache, nausea, vomiting, diarrhea, epigastric pain, paresthesias, seizures, coma. |
| Fungicide[24-27] | Prothioconazole + Trifloxystrobin | Fox | I | Mild piloerection, uncoordinated walking, drooling, respiratory depression. |
| | Mancozebe | Unizeb Gold | I | Dermatitis, pharyngitis, bronchitis, conjunctivitis, respiratory failure. |
| | Trifloxystrobin + Tebuconazole | Nativo SC 300 | III | Disorders in behavior, uncoordinated movements, respiratory depression. |
| Most commercialized pesticides in Itapiranga-SC in the second half/2017 | | | | |
| Herbicides[24-27] | Glyphosate | Original Roundup | III | Nausea, vomiting, epigastric pain, bleeding from the gastrointestinal tract, shock, respiratory failure, non-cardiogenic pulmonary edema, respiratory failure, periorbital edema, edema and paresthesias in dermal contact sites. |
| | Glyphosate | Zapp QI | III | |
| | Glyphosate + Isopropylamine Salt | Athanor | III | |
| | Diuron + Paraquat Dichloride | Gramocil | I | Abdominal pain, edema, digestive ulcerations, nausea, vomiting, diarrhea, respiratory failure. |
| | 2,4-D Amine | 2,4-D Amina 840 SL | I | Epigastric pain, vomiting, diarrhea, myalgia, muscle spasms, metabolic acidosis, liver and kidney damage, seizures, rhabdomyolysis. |
| Pesticide[24-27] | Thiodicarb | Larvin 800 WG | I | Miosis, tearing, bronchorrhea, sweating, sialorrhea, vomiting, diarrhea, abdominal cramps, bradycardia, cough, cramps, hypertension, mental confusion, headache, tremors, respiratory depression. |
| | Imidacloprid + Thiodicarb | Cropstar | II | Vomiting, diarrhea, abdominal cramps, bronchospasm, miosis, bradycardia, drooling, tearing, bronchorrhea, headache, urinary incontinence. Severe diaphoresis can cause dehydration and shock. |
| | Thiamethoxan + Lambda-cyhalothrin | Engeo Pleno | III | Dermatitis, rhinitis, headache, nausea, vomiting, diarrhea, epigastric pain, paresthesia, seizures, coma. |
| Fungicides and Acaricides[24-27] | Mancozeb | Dithane | I | Dermatitis, pharyngitis, bronchitis, conjunctivitis, respiratory failure. |
| | Trifloxystrobin + Tebuconazole | Nativo SC 300 | III | Disorders in behavior, uncoordinated movements, respiratory depression. |
| | Prothioconazole + Trifloxystrobin | Fox | I | Mild piloerection, uncoordinated gait, drooling, decreased respiratory movements. |

**Source:** Prepared by the authors, 2019.

**Chart 2.** Modifications made to the flowchart according to judges' suggestions.

| Judges' suggestions | Modifications made |
|---|---|
| Insert vital signs check (N1) | Inserted header with: patient name, age, education and occupation.<br>Modified terminal from "Patient with signs and symptoms of acute pesticide poisoning (APP) received in Primary Health Care (PHC)" to "Welcomes and checks SSVV". |
| Insert patient assessment by nurse and nursing technician (N2) | Process "Reception and nursing and medical consultation" was substituted for "Refers to clinical nurse" and for "Classifies the risk and performs EC".<br>Inserted process "Identifies some of the signs and symptoms described".<br>Inserted decision point: "Have you had contact with any chemical in the last 24 hours[2]?" with alternatives "No" and terminal "Patient follows PHC flow", or "Yes" and process "Identifies the type of contact and reports the type of product that had contact".<br>Replace process "If you suspect APP: 1st Notify. *C 2nd Stratify risk" to "If you consider suspected pesticide poisoning, notify (Sinan)". |
| Insert need for referral for medical care (N1) | "Refer to medical team" process inserted. |
| Redesign flowchart to streamline and optimize (D1) | Replaced sentence in decision point from "Is it a diagnosis of APP?" to "APP diagnosis?".<br>Replaced terminal "A" for "Patient follows PHC flow".<br>Modified phrase from "Risk stratification" to "Severity of poisoning".<br>Taken out text box with professionals involved and arranged within the symbols. |

**Source:** Research data, 2019.

research, acute pesticide poisoning cases were addressed, because the symptoms usually present nonspecific characteristics, which leads to difficulties in establishing a diagnosis and, therefore, contributes to underreporting of cases[28].

The flowchart elaboration fulfills the need to qualify the care provided to individuals intoxicated by pesticides, through a technology that facilitates and guides assistance. Still, the elaboration of this flowchart can be considered an advance for assistance of pesticide poisoning cases in the city and region, whose economy revolves around agribusiness, in addition to being of low cost.

The search for available literature, combined with knowledge of health practices and the weaknesses identified in the care of individuals intoxicated by pesticides, reported by PHC professionals, was essential for the flowchart to be constructed, taking into account the real context of the teams and that could be harmonized with professional praxis. Thinking about the applicability of the constructed technology, a label panel was created, aiming to help professionals identifying the type of pesticide that caused poisoning, thus streamlining and guaranteeing resoluteness in the conduct. This panel incorporates the flowchart.

In this context, since health professionals need to be able to identify, diagnose and treat cases with an emphasis on promotion, health education and damage prevention [8,29], the constructed technology emerges as a facilitator of this process. And not only, but as an ally to the various actions that promote quality of life and health for individuals, and that consider the various determinants of the health-disease process of paramount importance for the creation of healthy environments and for the protection of the environment, as well as the reorientation of health services that are consistent with the ideas and evidence raised at the conferences for health promotion.

The perception of risks and actions for prevention, promotion and health education are essential and inherent attributes of PHC services[11]. Spreading knowledge on the subject is essential for raising awareness about the proper use of protective equipment, whether individual or collective, as well as for the recognition and association of signs and symptoms with the use of pesticides,

favoring the identification and proper conduct towards identified cases.

The flowchart can support new possibilities, actions to change behavior, in order to add health promotion and disease prevention[30]. Signals for the elaboration of actions against exposure and use of protective measures, in order to minimize the risks of exposure to pesticides. Therefore, health workers need to carry out epidemiological surveillance activities and implement health care strategies for individuals, whether training health teams or groups in the community and, in particular, rural workers[31].

However, studies show that individuals being aware of the risks due to pesticide use is not enough to cause changes in behavior, requiring other mechanisms to comply with safety standards and control policies[31], which can be articulated with the different spheres of government and sectors, with the intention of bringing the subject of health to all public policies.

The choice of professionals working in the PHC of the respective municipality, to compose the judges, was made in view of professionals' ability to identify work flow, and the perception that the multidisciplinary team's active participation is essential for the instrument is used and strengthens quality of care[32].

In the content analysis process, judges' contributions were included, as relevant information about flow and actions emerged, not previously presented. The judges judged the flowchart suitable for applicability in professional clinical practice (CVI 1.0). From this perspective, the flowchart elaboration represents a technology that directs workers and contributes to care[16].

Regarding the types of instruments used to assess the flowchart, test scores allow the researcher to analyze the accuracy of a given inference, which permeates the entire process of construction, application, correction and results, with the intention of verifying whether the proposed content responds to all aspects of the object[17]. The use of an electronic judgment questionnaire, through Google Forms, proved to be easy to apply, facilitating the collection of data for validation, as well as the visualization of individualized results or not.

In this research, the flowchart for validation was presented only once, because in quantitative analysis the ten indices were considered satisfactory, CVI ≥ 0.86 and global 0.97. Therefore, the multidisciplinary care flowchart for acute pesticide poisoning cases in PHC is considered validated. Validation studies of care-educational and care technologies usually use CVI to validate the content of the developed technological product as well as making adjustments to the final validated version[32-33].

The study has not been validated for appearance. It may have limitations, as it was performed for the professional practice of PHC in a certain region and its applicability in other regions of the state or country may require adaptations. Moreover, it is a technology aimed at diagnosing acute pesticide poisoning cases, not being applied to chronic cases. Therefore, further studies that address the characteristics of chronic poisonings are suggested.

## FINAL CONSIDERATIONS AND IMPLICATIONS FOR PRACTICE

In this work, the process of production-construction and validation of a multidisciplinary flowchart for handling acute pesticide poisoning in PHC was presented. The development of this technology, in addition to being based on scientific knowledge, also took into account the needs identified by the PHC professionals themselves so that the production-construction of a work tool applicable to reality was possible.

It is understood that, as it constitutes an instrument of practice guidance, the multidisciplinary flowchart for acute pesticide poisoning care contributes to professional qualification, equipping PHC professionals for this service and qualifying the assistance provided to service users. Furthermore, it shows itself as a transforming technology in the work process to optimize, organize and qualify care, helping to investigate, identify and target suspected or confirmed acute pesticide poisoning cases in PHC. For nursing and health, in general, the technology presented here also reveals itself as a care management tool for individuals intoxicated by pesticides, allowing the systematization of care and, consequently, the quality of this care.

Furthermore, this technology presents itself as an innovative research and teaching instrument, which can be used in teaching assistance to acute pesticide poisoning. Furthermore, the results of this study provide knowledge about health practices and needs in the face of acute pesticide poisoning, which enables training in health, dissemination of the researched topic, in addition to opening doors for further research in this area.

Regarding the study limitations, it is important considering the small number of current studies that address this issue, specifically, which present instruments for PHC professionals to use in the care of individuals intoxicated by pesticides. Also, because of the limited number of judges who participated in the study and because they are professionals only from the PHC of the municipality where the research was carried out, therefore, the results cannot be extended to other geographic regions and other levels of health care.

In order to improve this technology, validation by experts in the field of clinical toxicology is recommended. It is also considered the need for continuous updating, in addition to assessing its applicability in the scenario presented as well as at other levels of health care.

## FINANCIAL SUPPORT

Fapesc TO 2021TR808.

## AUTHOR'S CONTRIBUTIONS

Study design. Adriane Karal. Leila Zanatta. Denise Antunes de Azambuja Zocche.

Data collection or production. Adriane Karal. Leila Zanatta. Denise Antunes de Azambuja Zocche.

Data analysis. Adriane Karal. Dara Montag Portaluppi. Leila Zanatta. Denise Antunes de Azambuja Zocche

Interpretation of results. Adriane Karal. Dara Montag Portaluppi. Leila Zanatta. Denise Antunes de Azambuja Zocche

Article writing and critical review. Adriane Karal. Dara Montag Portaluppi. Leila Zanatta. Denise Antunes de Azambuja Zocche

Approval of the final version of the article. Adriane Karal. Dara Montag Portaluppi. Leila Zanatta. Denise Antunes de Azambuja Zocche

Responsibility for all aspects of article content and integrity. Adriane Karal. Dara Montag Portaluppi. Leila Zanatta. Denise Antunes de Azambuja Zocche

## ASSOCIATED EDITOR

Candida Primo Caniçali

## SCIENTIFIC EDITOR

Ivone Evangelista Cabral

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